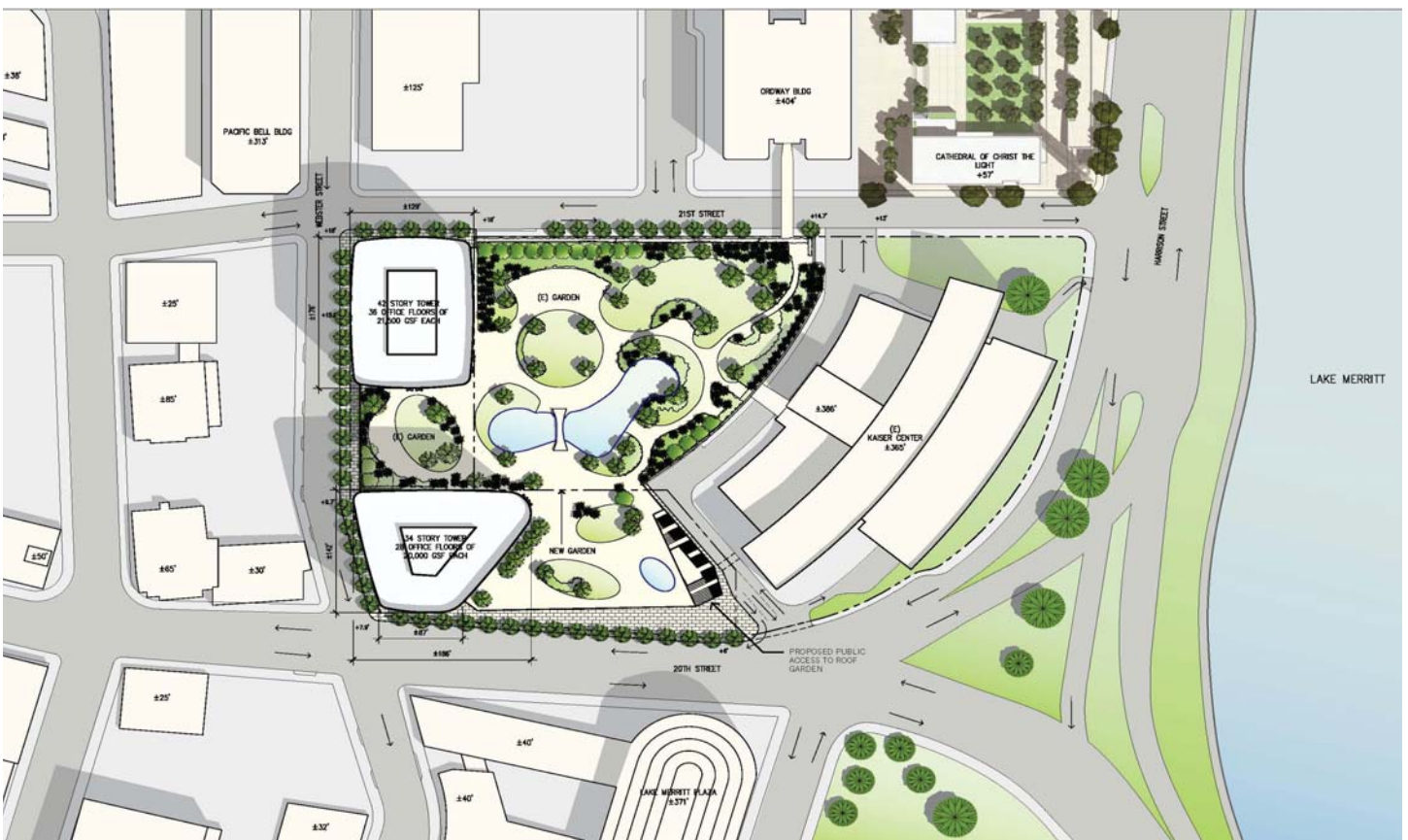


KAISER CENTER OFFICE PROJECT

Draft Environmental Impact Report
SCH No. 2008052103

Prepared for
The City of Oakland

August 2010



KAISER CENTER OFFICE PROJECT

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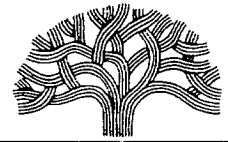
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**COMBINED NOTICE OF AVAILABILITY AND RELEASE OF A
DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR) AND NOTICE OF PUBLIC HEARINGS ON
THE DEIR FOR THE KAISER CENTER OFFICE PROJECT**

TO: All Interested Parties

PROJECT NAME: Kaiser Center Office Project

PROJECT LOCATION: 300 Lakeside Drive, Oakland, CA 94612

PROJECT SPONSOR: The Swig Company as "Project Applicant" on behalf of its affiliate, SIC-Lakeside Drive. LLC, the Property Owner

CASE FILE NO: ER 08-003, PUD 08-103, TPM 9848; CEQA State Clearinghouse No. 2008052103

REVIEW PERIOD: August 23, 2010 through October 7, 2010

PROJECT LOCATION: The Proposed Project would redevelop approximately 2.2 acres at the westernmost portion of the 7.2-acre Kaiser Center property ("Project Site"). The Proposed Project is located at the northeast corner of Webster and 21st Streets and the southeast corner of Webster and 20th Streets in the vicinity of downtown Oakland. The Project Site is bounded by Webster Street to the west, 20th Street to the south, Harrison Street to the east, and 21st Street to the north. The site is a portion of a larger parcel identified as Assessor Parcel Number 008-0652-001-05 and includes the 5-story Kaiser Center Parking Garage, roof garden, the Webster Street Mall, and the 29th Street Mall. The existing 29-story Kaiser Center office tower at the eastern side of the Project Site is not a part of the Proposed Project and would not be altered or affected by the Proposed Project. The Project Site is not on the Cortese List.

PROJECT DESCRIPTION: The Proposed Project includes without limitation a Vesting Tentative Parcel Map, Planned Unit Development Permit, and a Preliminary Development Plan to add two new office towers to a portion of the existing 7.2 acre Kaiser Center site. The Project would add approximately 1,474,992 square feet of net new development in two development phases. Phase I would demolish the existing 20th Street Mall (approximately 58,190 square feet) and construct a 34-story (469 feet tall) office tower (approximately 641,972 square feet) at the corner of 20th/Webster Streets. The existing 122,606 square foot roof garden will be partially demolished (removing approximately 18,369 square feet) and replaced/reconfigured with 22,933 square feet along 20th Street, resulting in an additional 4,564 square feet of roof garden space. Phase II includes the demolition of the Webster Street Mall (approximately 38,190 square feet) and construction of a 42-story (573 feet tall) office tower (approximately 833,020 square feet) at the corner of Webster/21st Street. This project also includes the addition of 697 parking spaces in a subterranean and above ground parking garage.

The Project Site is within the Central Business District land use designation identified in the Oakland General Plan. The zoning on the Project Site at the time the Project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone,

and the S-4 Design Review Combining Zone¹. The Project Site is also located within the Lake Merritt Historic District.

ENVIRONMENTAL REVIEW: The City issued a Notice of Preparation (NOP) of a DEIR on May 22, 2008. A DEIR now has been prepared for the Project, under the requirements of the California Environmental Quality Act (CEQA), pursuant to Public Resources Code Section 21000 et seq.

The DEIR analyzes potentially significant environmental impacts in the following categories: Aesthetics, Shadow and Wind; Air Quality and Greenhouse Gases; Biological Resources; Cultural Resources; Geology, Soils, and Seismicity; Hazardous Materials; Hydrology and Water Quality; Land Uses, Plans, and Policies; Noise and Vibration; Population, Employment, and Housing; Public Services and Recreation; Transportation and Circulation; and Utilities and Services Systems.

The DEIR identifies significant and unavoidable impacts related to Wind Hazards, Air Quality (PM10 emissions), Historic Resources; Noise (related to Traffic), and Transportation (intersection/roadway) impacts.

Copies of the DEIR are available for review or distribution to interested parties at no charge at the Community and Economic Development Agency, Planning Division, 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, CA 94612, Monday through Friday, 8:30 a.m. to 5:00 p.m. The DEIR may also be reviewed at the following website: <http://www2.oaklandnet.com/Government/o/CEDA/o/PlanningZoning/s/Application/DOWD009157>. This project is document number 10.

PUBLIC HEARINGS ON DEIR:

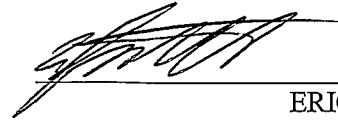
1. The Oakland City Planning Commission will conduct a public hearing on the DEIR on **October 6, 2010**, at **6:00 p.m.** in Hearing Room 1, City Hall, 1 Frank H. Ogawa Plaza; and
2. The Oakland Landmarks Preservation Advisory Board will conduct a public hearing on the historic resource aspect of the DEIR on **October 4, 2010**, at **6:00 p.m.** in Hearing Room 1, City Hall, 1 Frank H. Ogawa Plaza.

The City of Oakland is hereby releasing this DEIR, finding it to be accurate and complete and ready for public review. Members of the public are invited to comment on the DEIR. There is no fee for commenting, and all comments received will be considered by the City prior to finalizing the EIR and making a decision on the Project. In light of the EIR's purpose to provide useful and accurate information about such factors, comments on the DEIR should focus on the sufficiency of the DEIR in discussing possible impacts on the physical environment, ways in which potential adverse effects might be minimized, and alternatives to the Project. Comments may be made at the public hearing described above or in writing. Please address all written comments to: Heather Klein and Darin Ranelletti, City of Oakland, Community and Economic Development Agency, Major Projects, Planning Division, 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, CA 94612; (510) 238-3658 (fax); or emailed to hklein@oaklandnet.com and dranelletti@oaklandnet.com. Comments should be received no later than **4:00 p.m. on October 7, 2010**. Please reference case number **ER 08-003** in all correspondence.

If you challenge the EIR or Project in court, you may be limited to raising only those issues raised at the Planning Commission public hearing described above, or in written correspondence received by the Community and Economic Development Agency on or prior to 4:00 p.m. on **October 7, 2010**.

¹ Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial. However, pursuant to Section 6 of the rezoning ordinance, the Proposed Project is "grandfathered" under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such.

After all comments are received, a Response to Comments/Final EIR will be prepared and the Planning Commission will consider certification of the Final EIR and render a decision on the Project at a meeting date to be scheduled. For further information, please contact Heather Klein at (510) 238-3659 or at hklein@oaklandnet.com or Darin Ranelletti at (510)238-3663 or at dranelletti@oaklandnet.com.



ERIC ANGSTADT

Deputy Director, Community and Economic Development Agency

Date of Notice: **August 19, 2010**
File Number ER 08-003

TABLE OF CONTENTS

Kaiser Center Office Project Draft Environmental Impact Report

	<u>Page</u>
Notice of Availability and Release	
List of Acronyms and Abbreviations	ix
I. Introduction	I-1
A. Project Overview	I-1
B. Environmental Review	I-2
C. Project Review and Approval	I-3
D. Organization of the Draft EIR	I-4
II. Summary	II-1
A. Project Overview	II-1
B. Environmental Impacts, Standard Conditions of Approval and Mitigation Measures	II-3
C. Alternatives	II-4
D. Areas of Controversy	II-5
III. Project Description	III-1
A. Project Location and Site Characteristics	III-1
B. Previous Approvals and Site Alterations	III-7
C. Objectives of the Proposed Project	III-8
D. Project Components	III-9
E. Required Public Agency Approvals and Utility Providers	III-25
IV. Environmental Setting, Impacts, Standard Conditions of Approval and Mitigation Measures	IV-1
A. Aesthetics, Shadow and Wind	IV.A-1
B. Air Quality and Greenhouse Gases	IV.B-1
C. Biological Resources	IV.C-1
D. Cultural Resources	IV.D-1
E. Geology, Soils and Geohazards	IV.E-1
F. Hazardous Materials	IV.F-1
G. Hydrology and Water Quality	IV.G-1
H. Land Use, Plans and Policies	IV.H-1
I. Noise	IV.I-1
J. Population, Employment and Housing	IV.J-1
K. Public Services and Recreation Facilities	IV.K-1
L. Transportation and Circulation	IV.L-1
M. Utilities and Service Systems	IV.M-1

	<u>Page</u>
V. Alternatives	V-1
A. Criteria for Selecting Alternatives	V-1
B. Summary of Alternatives	V-5
C. Alternatives Analysis	V-6
D. Environmentally Superior Alternative	V-28
VI. Impact Overview and Growth Inducement	VI-1
A. Significant Unavoidable and Cumulative Environmental Impacts	VI-1
B. Growth-Inducing Impacts	VI-4
C. Significant Irreversible Environmental Effects	VI-6
D. Effects Found Not to be Significant	VI-7
VII. Report Preparers	VII-1
 Appendices (Provided on Compact Disc in back cover of this document)	
A. Notice of Preparation (NOP) and Responsive Comments	A-1
A.1 NOP and Attachments	
A.2 NOP Mailing List: Agencies and Organizations	
A.3 NOP Mailing List; 300' Radius	
A.4 NOP Mailing List: Neighborhood Groups/Census Tract	
A.5 NOP Posting Locations	
A.6 Summary of Scoping Meeting and Responsive Comments	
A.7 Comment Letters in Response to NOP	
B. Wind Study Test Data	B-1
C. Air Quality and GHG Data	C-1
D. Biological Resources Data	D-1
D.1 Lists of Special Status Species within Study Area – CDFG	
D.2 Lists of Special Status Species within Study Area – USFWS	
D.3 Lists of Special Status Species within Study Area – CNPS	
D.4 Tree Removal Plan	
E. Cultural Resources Correspondence	E-1
E.1 Historic Resources Evaluation	
E.2 Native American Heritage Commission Communications	
E.3 Exterior Façade Feasibility Analysis	
F. Noise Data	F-1
G. Traffic Data	G-1
G.1 Intersection Turning Movement Counts	
G.2 Intersection LOS Calculation Worksheets	
G.3 Revision of Measure DD Configuration for Harrison Street / Lakeside Drive / 20th Street Triangle	
G.4 Pedestrian Facilities Survey	
G.5 Mode Split Findings	
G.6 Travel Demand Model Land Use Findings	
G.8 Queue Calculations	
G.9 Collision Summary Sheets	
G.10 Roadway LOS Calculation Worksheets	

Page**Appendices (continued)**

G.11 Supplemental Analysis and Discussion of Planned Transportation Improvements	
G.12 Alternative Freeway Access Route Analysis Memo	
G.13 Harrison Street-Oakland Avenue Study Comparison	
G.14 Proposed Westbound Signal Phase Sequence for Intersection #3 (Harrison Street / 27th Street / 24th Street)	
H. Phase 1 (South Tower Only) Transportation Analysis	H-1
I. Preliminary Greenhouse Gas Emissions Reduction Plan	I-1
J. Alternatives Data	J-1

List of Figures

III-1	Regional and Site Location Map	III-2
III-2	Project Site and Surrounding Land Uses	III-3
III-3	General Plan Land Use Designations and Zoning	III-4
III-4	Proposed Vesting Tentative Parcel Map	III-5
III-5	Proposed Project Site Plan	III-11
III-6	Conceptual Project Building Section Looking East	III-12
III-7	Conceptual Project Building Section Looking North	III-13
III-8	Conceptual Project – Basement Level Floor Plan	III-14
III-9	Conceptual Project – First Level Floor Plan	III-15
III-10	Conceptual Project – Second Level Floor Plan	III-16
III-11	Conceptual Project – Third Level Floor Plan	III-17
III-12	Conceptual Project – Fourth Level Floor Plan	III-18
III-13	Conceptual Project – Fifth Level Floor Plan	III-19
III-14	Conceptual Project – Sixth Level Floor Plan	III-20
IV.A.1	Simulation Photo Viewpoint Locations	IV.A-4
IV.A-2	Visual Simulation – View #1	IV.A-5
IV.A-3	Visual Simulation – View #2	IV.A-6
IV.A-4	Visual Simulation – View #3	IV.A-7
IV.A-5	Visual Simulation – View #4	IV.A-8
IV.A-6	Project and Cumulative Shadow, March 21, 9:00 am PDT	IV.A-10
IV.A-7	Project and Cumulative Shadow, March 21, 12:00 pm PDT	IV.A-11
IV.A-8	Project and Cumulative Shadow, March 21, 3:00 pm PDT	IV.A-12
IV.A-9	Project and Cumulative Shadow, June 21, 9:00 am PDT	IV.A-13
IV.A-10	Project and Cumulative Shadow, June 21, 12:00 pm PDT	IV.A-14
IV.A-11	Project and Cumulative Shadow, June 21, 3:00 pm PDT	IV.A-15
IV.A-12	Project and Cumulative Shadow, September 21, 9:00 am PDT	IV.A-16
IV.A-13	Project and Cumulative Shadow, September 21, 12:00 pm PDT	IV.A-17
IV.A-14	Project and Cumulative Shadow, September 21, 3:00 pm PDT	IV.A-18
IV.A-15	Project and Cumulative Shadow, December 21, 9:00 am PST	IV.A-19
IV.A-16	Project and Cumulative Shadow, December 21, 12:00 pm PST	IV.A-20
IV.A-17	Project and Cumulative Shadow, December 21, 3:00 pm PST	IV.A-21
IV.A-18	Wind Study Test Point Locations	IV.A-34
IV.A-19	Cumulative Visual Simulation – View #5	IV.A-42
IV.D-1	Project Shadow Patterns – Historic Resources	IV.D-28
IV.I-1	Roof Garden, Corner of Building at 21st and Webster Streets Thursday October 23, 2008	IV.I-6

Page**List of Figures (cont.)**

IV.I-2	Roof Garden, Corner of Building at 21st and Webster Streets Friday October 24, 2008	IV.I-6
IV.I-3	21st and Harrison Streets, 50 feet from Harrison, Thursday October 23, 2008	IV.I-7
IV.I-4	21st and Harrison Streets, 50 feet from Harrison, Friday October 24, 2008	IV.I-7
IV.I-5	Sensitive Noise Receptors in the Project Area	IV.I-8
IV.L-1	Project Study Area	IV.L-3
IV.L-2	Study Intersections and Roadway Segments	IV.L-6
IV.L-3a	Existing Intersection Geometry	IV.L-11
IV.L-3b	Existing Intersection Geometry	IV.L-12
IV.L-3c	Existing Intersection Geometry	IV.L-13
IV.L-3d	Existing Intersection Geometry	IV.L-14
IV.L-4a	Existing Traffic Volumes AM (PM) Peak Hour	IV.L-15
IV.L-4b	Existing Traffic Volumes AM (PM) Peak Hour	IV.L-16
IV.L-4c	Existing Traffic Volumes AM (PM) Peak Hour	IV.L-17
IV.L-4d	Existing Traffic Volumes AM (PM) Peak Hour	IV.L-18
IV.L-5	Existing Transit Network	IV.L-23
IV.L-6	Existing Pedestrian Network	IV.L-26
IV.L-7a	Existing Sidewalk and Crosswalk Conditions	IV.L-27
IV.L-7b	Existing Sidewalk and Crosswalk Conditions	IV.L-28
IV.L-8	Existing and Proposed Bikeway Network	IV.L-32
IV.L-9	Existing On-Street Parking Conditions	IV.L-33
IV.L-10	Existing Public Off-Street Parking Conditions	IV.L-34
IV.L-11a	Project Site Plan, First Level	IV.L-45
IV.L-11b	Project Site Plan, Second Level	IV.L-46
IV.L-12	Project Trip Distribution	IV.L-51
IV.L-13a	Existing Plus Project Traffic Volumes AM (PM) Peak Hour	IV.L-53
IV.L-13b	Existing Plus Project Traffic Volumes AM (PM) Peak Hour	IV.L-54
IV.L-13c	Existing Plus Project Traffic Volumes AM (PM) Peak Hour	IV.L-55
IV.L-13d	Existing Plus Project Traffic Volumes AM (PM) Peak Hour	IV.L-56
IV.L-14	Measure DD Implementation Project Geometry Changes	IV.L-72
IV.L-15a	Near Term (2015) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-74
IV.L-15b	Near Term (2015) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-75
IV.L-15c	Near Term (2015) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-76
IV.L-15d	Near Term (2015) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-77
IV.L-16a	Near Term (2015) Plus Project (Phase I) Traffic Volumes AM (PM) Peak Hour	IV.L-79
IV.L-16b	Near Term (2015) Plus Project (Phase I) Traffic Volumes AM (PM) Peak Hour	IV.L-80
IV.L-16c	Near Term (2015) Plus Project (Phase I) Traffic Volumes AM (PM) Peak Hour	IV.L-81
IV.L-16d	Near Term (2015) Plus Project (Phase I) Traffic Volumes AM (PM) Peak Hour	IV.L-82
IV.L-17a	Near Term (2015) Plus Project (Phase I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-93

Page**List of Figures (cont.)**

IV.L-17b Near Term (2015) Plus Project (Phase I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-94
IV.L-17c Near Term (2015) Plus Project (Phase I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-95
IV.L-17d Near Term (2015) Plus Project (Phase I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-96
IV.L-18a Cumulative (2030) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-110
IV.L-18b Cumulative (2030) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-111
IV.L-18c Cumulative (2030) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-112
IV.L-18d Cumulative (2030) Without Project Traffic Volumes AM (PM) Peak Hour	IV.L-113
IV.L-19a Cumulative (2030) Plus Project (Phases I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-115
IV.L-19b Cumulative (2030) Plus Project (Phases I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-116
IV.L-19c Cumulative (2030) Plus Project (Phases I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-117
IV.L-19d Cumulative (2030) Plus Project (Phases I & II) Traffic Volumes AM (PM) Peak Hour	IV.L-118
IV.L-20 Measure DD and Alternative Measure DD Configurations	IV.L-162
IV.L-21 Alternative Measure DD Traffic Volumes AM (PM) Peak Hour	IV.L-165
V-1 Proposed Offsite Location, Alternative 3 Offsite Maximum Reduced Impact Alternative	V-22
V-2 Conceptual Site Plan, Alternative 3 Offsite Maximum Reduced Impact Alternative	V-23

List of Tables

II-1 Summary of Impacts, Standard Conditions of Approval, Mitigation Measures and Residual Impacts	II-7
III-1 Proposed Project Redevelopment Compared to Existing Conditions	III-10
III-2 Summary of Minor Project Changes Since the NOP	III-21
III-3 Preliminary Construction Activity Summary	III-24
IV-1 List of Relevant Cumulative Projects from the City's Major Projects List (Mar-April 2009)	IV-6
IV.A-1 General Wind Conditions Summary	IV.A-35
IV.A-2 Wind Hazard Summary	IV.A-36
IV.A-3 Properties Included in Cumulative Shadow Analysis Kaiser Center EIR	IV.A-43
IV.A-3 Properties Included in Cumulative Shadow Analysis, Kaiser Center EIR	IV.A-44
IV.B-1 State and National Criteria Air Pollutant Standards, Effects, and Sources	IV.B-2
IV.B-2 Bay Area Attainment Status	IV.B-3
IV.B-3 Air Quality Data Summary (2005-2009) for the Project Area	IV.B-11
IV.B-4 Average Daily Construction-Related Pollutant Emissions (Pounds per Day)	IV.B-19
IV.B-5 Estimated Daily Emissions for the Proposed Project (Pounds per Day)	IV.B-21
IV.B-6 Projected Carbon Monoxide Concentrations	IV.B-23
IV.B-7 Oakland Community-Wide GHG Emissions Summary – 2005 (Tons/Year)	IV.B-29
IV.B-8 List of Recommended Actions by Sector	IV.B-36

	<u>Page</u>
List of Tables (cont.)	
IV.B-9 Construction-Generated GHG Emissions of the Proposed Project	IV.B-52
IV.B-10 Unadjusted Operational GHG Emissions Inventory from the Proposed Project	IV.B-53
IV.B-11 Baseline Operational GHG Emissions Inventory from the Proposed Project	IV.B-54
IV.B-12 Additional GHG Reduction Measures Identified for Potential Implementation by the Proposed Project	IV.B-60
IV.C-1 Special-Status Species Considered	7
IV.E-1 Modified Mercalli Intensity Scale	IV.E-3
IV.E-2 Active Faults in the Project Site Vicinity	IV.E-4
IV.F-1 Federal Laws and Regulations Related to Hazardous Materials Management	IV.F-3
IV.H-1 Project Consistency with Basic Zoning Regulations Regarding Use and Building Development	IV.H-13
IV.I-1 Typical Noise Levels	IV.I-2
IV.I-2 Existing Noise Environments at Project Location	IV.I-5
IV.I-3 Noise Land Use Compatibility Matrix	IV.I-10
IV.I-4 City of Oakland Operational Noise Standards at Receiving Property Line, DbA (from Stationary Sources)	IV.I-12
IV.I-5 City of Oakland Construction Noise Standards at Receiving Property Line, DbA	IV.I-13
IV.I-6 Typical Noise Levels from Construction Equipment	IV.I-18
IV.I-7 Preliminary Construction Activity Summary	IV.I-19
IV.I-8 Peak-Hour Traffic Noise Levels in the Project Vicinity Existing (2007) Versus Near Term Plus Project (2015)	IV.I-24
IV.I-9 Peak-Hour Traffic Noise Levels in the Project Vicinity Existing (2007) Versus Cumulative Plus Project (2030)	IV.I-26
IV.J-1 Existing Employment on the Kaiser Center Project Site, 2008	IV.J-2
IV.J-2 Employment, Households, and Population for Oakland, the East Bay, and Bay Area Region: 1990, 2000, 2005 and 2030	IV.J-4
IV.J-3 Changes in Housing Stock in Oakland, 1990-2000	IV.J-5
IV.J-4 Housing Growth in Oakland	IV.J-6
IV.J-5 Trends in Jobs and Employed Residents: 1990-2030	IV.J-8
IV.J-6 Future Employment on the Proposed Project Site, 2008	IV.J-13
IV.J-7 Proposed Project Employment Compared to Existing and Projected Future Employment in Oakland	IV.J-16
IV.J-8 Increase in Proposed Project Employment Compared to Projected Growth of Employed Residents, by Place of Residence	IV.J-18
IV.K-1 Reported Crimes in the City of Oakland 2008	IV.K-2
IV.L-1 Definitions for Intersection Level of Service	IV.L-8
IV.L-2 Criteria for Roadway Level of Service	IV.L-9
IV.L-3 Existing Intersection Levels of Service (LOS)	IV.L-19
IV.L-4 Existing Roadway Segment Level of Service (LOS)	IV.L-22
IV.L-5 Existing AC Transit Network	IV.L-24
IV.L-6 Existing Bart Service at 19th Street Station	IV.L-25
IV.L-7 Off-Street Parking Facilities	IV.L-35
IV.L-8 Project Weekday Person-Trip Generation	IV.L-50

Page**List of Tables (cont.)**

IV.L-9	Project Weekday Vehicle-Trip Generation	IV.L-50
IV.L-10	Existing Plus Project (Phase I and Phase II) Intersection Levels of Service (LOS)	IV.L-57
IV.L-11	Existing Plus Project (Phase I and Phase II) Roadway Segment Levels of Service	IV.L-69
IV.L-12	Near-Term (2015) Plus Project (Phase I) Intersection Levels of Service (LOS)	IV.L-83
IV.L-13	Near-Term (2015) Plus Project (Phase I) Roadway Segment Levels of Service	IV.L-91
IV.L-14	Near-Term (2015) Plus Project (Phase I and Phase II) Intersection Levels of Service	IV.L-97
IV.L-15	Near-Term (2015) Plus Project (Phase I and Phase II) Roadway Segment Levels of Service	IV.L-107
IV.L-16	Cumulative (2030) Plus Project (Phase I and Phase II) Intersection Levels of Service	IV.L-119
IV.L-17	Cumulative (2030) Plus Project (Phase I and Phase II) Roadway Segment Levels of Service	IV.L-132
IV.L-18	Bicycle Facility Requirements	IV.L-140
IV.L-19	Transit Corridor Travel Times – AM Peak Hour	IV.L-143
IV.L-20	Transit Corridor Travel Times – PM Peak Hour	IV.L-144
IV.L-21	Summary of Project Construction Traffic Activity	IV.L-146
IV.L-22	Project Weekday Peak-Hour Transit Trips	IV.L-148
IV.L-23	Existing Bart Train Capacity Utilization	IV.L-149
IV.L-24	Intersection Collision Summary	IV.L-156
IV.L-25	Intersection Collision Primary Causal Factors	IV.L-157
IV.L-26	Parking Code Requirements and Demand	IV.L-159
IV.L-27	Near-Term (2015) Intersection Levels of Service – Alternative Measure D	IV.L-166
IV.L-28	Cumulative (2030) Intersection Levels of Service – Alternative Measure D	IV.L-167
IV.L-29	Near-Term (2015) Plus Project (Phase I) Intersection Levels of Service – Alternative Measure D	IV.L-167
IV.L-30	Near-Term (2015) Plus Project (Phase I and Phase II) Intersection Levels of Service – Alternative Measure D	IV.L-169
IV.L-31	Cumulative (2030) Plus Project (Phase I and Phase II) Intersection Levels of Service – Alternative Measure D	IV.L-170
IV.L-32	Microsimulated Movement Delay – Alternative Measure D	IV.L-172
IV.L-33	Microsimulated 95th Percentile Queues – Original Measure D	IV.L-173
IV.L-34	Microsimulated 95th Percentile Queues – Alternative Measure D	IV.L-174
V-1	Comparison of Proposed Project and Alternatives Characteristics	V-6
V-2	Comparison of Proposed Project and Alternatives Impact	V-30

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LIST OF ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACCWP	Alameda Countywide Clean Water Program
ACDEH	Alameda County Department of Environmental Health
ACFD	Alameda County Fire Department
AC Transit	Alameda County Transit
ACM	asbestos-containing materials
ASCE	American Society of Civil Engineers
AST	aboveground storage tank
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BCDC	Bay Conservation and Development Commission
BMPs	Best Management Practices
C&D	construction and demolition
Cal EPA	California Environmental Protection Agency
CALGreen	A building code requirement pursuant to Title 24 of the CCR, proposed to take effect January 2011
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CAP	Clean Air Plan
CAPCOA	California Air Pollution Control Officers Association
CAR	Climate Action Reserve
CARB	California Air Resources Board
CBC	California Building Code
CBD	Central Business District
CCAA	California Clean Air Act
CCAR	California Climate Action Registry
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEC	California Energy Commission

CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CGS	California Geological Survey
CH ₄	methane
CHP	California Highway Patrol
CHP	combined heat and power
CIWMB	California Integrated Waste Management Board
CMA	Congestion Management Agency
C.M.S.	City Manager Series, City of Oakland Municipal Code reference
CNDDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalents
CPUC	California Public Utilities Commission
CRT	Climate Reserve Tons
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
Corps	U.S. Army Corps of Engineers
DA	Development Agreement
dB	decibels
dBA	decibels, A-weighted
DDT	dichloro-diphenyl-trichloroethane
DEIR	Draft Environmental Impact Report
DHS	Department of Health Services
DNL	Day/Night Average Sound Level
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
DSOD	California Division of Safety of Dams
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utilities District
EBRPD	East Bay Regional Parks District
EFH	Essential Fish Habitat

EIR	Environmental Impact Report
FAA	Federal Aviation Administration
FCAA	Federal Clean Air Act
FCWCD	(Alameda County) Flood Control and Water Conservation District
FDDC	Oakland Fire Department Dispatch Center
FDP	Final Development Plan
Fed/OSHA	Federal (U.S. Department of Labor) Occupational Safety and Health Administration
FEIR	Final Environmental Impact Report
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FIRM	Flood Insurance Rate Mapping
FMP	Federal Fisheries Management Plans
g	acceleration of gravity
GHG	greenhouse gas
gpd	gallons per day
gpm	gallons per minute
GWP	global warming potential
HABS	Historic American Buildings Survey
HALS	Historic American Landscape Survey
HAP	hazardous air pollutants
HFCs	hydrofluorocarbons
HMBP	Hazardous Materials Business Plan
HMMP	Hazardous Materials Management Plan
HPE	Historic Preservation Element
Hz	hertz
IBC	International Building Code
IEPR	Integrated Energy Policy Report
kW	kilowatt
lb	pound
LCFS	low carbon fuel standard
LEED	Leadership in Energy and Environmental Design
LEED AP	LEED Accredited Professional
LPAB	Landmarks Preservation Advisory Board
LUTE	Land Use and Transportation Element of the City of Oakland General Plan
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter

M	magnitude
mgd	million gallons per day
MM	Modified Mercalli intensity scale
MMRP	Mitigation Monitoring and Reporting Program
mph	miles per hour
MRP	Municipal Regional Permit
MSDS	Material Safety Data Sheet
msf	million square foot
MT	metric tons
MTC	Metropolitan Transportation Commission
Mw	moment magnitude
MW-hr	megawatt hour
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NO _x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPPA	California Native Plant Protection Act
O ₃	ozone
ODP	Operational Diversion Plan
OES	State Office of Emergency Services
OMC	Oakland Municipal Code
OPR	Governor's Office of Planning and Research
OSCAR	Open Space, Conservation, and Recreation Element of the Oakland General Plan
OUSD	Oakland Unified School District
Pb	lead
PCB	polychlorinated biphenyls
PDP	Preliminary Development Plan
pga	peak ground acceleration
PG&E	Pacific Gas and Electric
PM _{10, 2.5}	particulate matter less than 10 microns; less than 2.5 microns
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch

PUD	Planned Unit Development
RCRA	Resource Conservation and Recovery Act of 1976
RMP	Risk Management Plan
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
SAB	State Allocation Board
SB	Senate Bill
SCA, SCAs	Standard Condition of Approval, Standard Conditions of Approval
SDC	Seismic Design Category
SDWA	Safe Drinking Water Act
SIP	State Implementation Plan
SOV	single occupant vehicle
SPCCP	Spill Prevention, Control and Countermeasure Plan for ASTs
SQMP	Stormwater Quality Management Plan
SRI	solar reflection index
SRRE	Source Reduction and Recycling Element
SU	Significant Unavoidable Impact
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminants
TDM	Transportation Demand Management
TMDL	Total Maximum Daily Load
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGBC	United States Green Building Council
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compounds
VMT	vehicle miles travelled
VTM	vesting tentative map
WMAC	Waste Management of Alameda County
WRRP	Waste Reduction and Recycling Plan
WSA	Water Supply Assessment
WSMP	Water Supply Management Program
ZNE	zero net energy

CHAPTER I

Introduction

A. Project Overview

In March 2008, The Swig Company LLC (“Project Applicant”), on behalf of the property owner, SIC-Lakeside Drive, LLC, an affiliate of the Project Applicant, submitted a development application to the City of Oakland for the Kaiser Center Office Project (“Proposed Project” or “Project”) located near Lake Merritt in Oakland, Alameda County, California. (See **Figure III-1, Regional and Site Location Map**, in Chapter III, Project Description.) The Proposed Project would redevelop approximately 2.2 acres at the westernmost portion of the 7.2-acre Kaiser Center property (“Project Site”). Development of the Proposed Project would occur at the northeast corner of Webster and 20th Streets northeast of downtown Oakland.

The Project Site is currently occupied by the 29-story (365-foot tall) Kaiser Center office building at Harrison and Webster streets; the 20th Street Mall, a three-story retail/office building fronting 20th Street and Webster Street; the approximately three-story Webster Street Mall, which is currently occupied by 24 Hour Fitness Health Club and a portion of the parking garage; and a roof garden that is accessible to visitors to the Kaiser Center during business hours. The Proposed Project would affect only the 20th Street Mall, the Webster Street Mall and the roof garden – which occupy approximately 2.2 acres at the westernmost area of the Project Site. The existing Kaiser Center office building, which is located on the eastern side of the Project Site, would not be altered as part of the Proposed Project and will not be physically affected by the Proposed Project.

Overall, the Proposed Project would demolish approximately 280,002 square feet (sf) of office and commercial/retail uses and construct approximately 1.47 million square feet (msf) of office and commercial/retail uses in two new high-rise towers. The Proposed Project would demolish the existing 20th Street Mall and Webster Street Mall buildings, along with a portion of the roof garden, which would be replaced. The first tower to be constructed would be 34 stories in height and replace the existing 20th Street Mall. The second tower to be constructed would be 42 stories in height and replace the Webster Street Mall. Both towers would be primarily for office use and would also include street level retail spaces and other commercial uses (e.g. restaurants) on the 6th floor.

The Proposed Project would relocate approximately 18,369 square feet of the northwest portion of the existing 122,606 square foot (total) roof garden (which is existing private open space accessible by visitors to the Kaiser Center located at the same level as the proposed 6th floor level of the new high-rise towers) to the southern portion of the site, which would result in a net increase of the roof garden by approximately 4,500 square feet. The Proposed Project would also construct a new exterior “grand stairway” from 20th Street to the roof garden.

The Proposed Project would subdivide the entire Project Site from one existing legal parcel into four legal parcels although no physical changes are proposed to the eastern portion of the Project Site containing the existing office tower. (See Figure III-4, Proposed Vesting Tentative Parcel Map, in Chapter III, Project Description.)

The Project Site is within the Central Business District land use designation identified in the Oakland General Plan. The zoning on the Project Site at the time the project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone. Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial Zone. However, pursuant to Section 6 of the rezoning ordinance¹, the Proposed Project is “grandfathered” under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such. Notwithstanding the Project’s grandfathered status, the land uses proposed by the Project are consistent with the new CBD-C zoning, and based on conceptual Project plans, the Project is generally consistent with the new CBD-C development standards and regulations.

Additionally, the Project Site is located within the Lake Merritt Historic District.

B. Environmental Review

Initiating the Environmental Review Process

Subsequent to receiving and reviewing the Applicant’s development application, the City of Oakland Community and Economic Development Agency (CEDA), the Lead Agency for the Proposed Project (pursuant to State and local guidelines for implementing California Environmental Quality Act [CEQA]), determined that the Proposed Project was subject to CEQA (Public Resources Code Section 21000, et seq. and Section 15000, et seq.) and the State CEQA *Guidelines* (California Code of Regulations) promulgated thereunder (together “CEQA”). CEDA decided at the outset to prepare an Environmental Impact Report (EIR) for the Proposed Project.

CEDA has prepared this project-level EIR to analyze the potential environmental effects of the Project under CEQA. This EIR addresses all environmental topics identified in the City of Oakland’s CEQA Thresholds/Criteria of Significance document; the City elected not to prepare an Initial Study Checklist to reduce the scope of the EIR, as permitted by Section 15060(d) of the CEQA Guidelines.

¹ Section 6 of the Oakland Rezoning Ordinance states that the Ordinance shall be effective 30 days from the date of final passage by the City Council, but shall not apply to (a) building/construction related permits already issued and not yet expired; (b) to zoning applications approved by the City and not yet expired, or (c) to zoning applications deemed complete by the City as of the date of final passage. However, zoning applications deemed complete by the City prior to the date of final passage of this Ordinance may be processed under provisions of these Planning Code amendments if the applicant chooses to do so.

EIR Scoping

On May 22, 2008, CEDA issued a Notice of Preparation (NOP) for 30 calendar days to announce its intent to prepare and distribute an EIR for the Kaiser Center Project. The NOP was distributed to governmental agencies, organizations, and persons interested in the Proposed Project. CEDA sent the NOP to agencies with statutory responsibilities in connection with the Proposed Project and requested their input on the scope and content of the environmental information that should be addressed in the EIR. The City of Oakland Landmarks Preservation Advisory Board and the City Planning Commission held Scoping Meetings on June 9, 2008 and June 18, 2008, respectively, to accept comments regarding the scope of the EIR in response to the NOP. The NOP review period ended on June 21, 2008. The NOP and written and oral comments that CEDA received in response to the NOP are included as **Appendix A** to this Draft EIR. This Draft EIR addresses all comments received in response to the NOP that are relevant to environmental issues under CEQA.

Public Review

This Draft EIR is available for public review and comment for the period identified on the notice accompanying this document (45 calendar days). During the public review and comment period, written comments on the Draft EIR may be submitted to CEDA at the address indicated on the notice. Oral comments may be stated at the public hearing on the Draft EIR, which will be held as indicated on the above-referenced notice.

Following the public review and comment period for the Draft EIR, CEDA will prepare responses that address all substantive written and oral comments on the Draft EIR's environmental analyses and received within the specified review period. The responses and any other revisions to the Draft EIR will be prepared as a Responses to Comments document. The Draft EIR and its Appendices, together with the Response to Comments document will constitute a Final EIR (commonly referred to collectively as "EIR") for the Proposed Project.

Use of this EIR

Pursuant to CEQA, this EIR is a public information document prepared for use by governmental agencies and the public to identify and evaluate potential environmental consequences of the Proposed Project, to evaluate and recommend mitigation measures that would substantially lessen or eliminate significant environmental adverse impacts, and to examine a range of feasible alternatives to the Proposed Project. The information contained in this Draft EIR is subject to review and consideration by the City of Oakland (see *Project Review and Approval*, below) and any other responsible agency prior to the City's decision to approve, reject or modify the Proposed Project.

C. Project Review and Approval

The City of Oakland Planning Commission must ultimately certify that it has reviewed and considered the information in the EIR and that the EIR has been completed in conformity with the requirements

of CEQA. The Planning Commission must make this determination before any decision can be made regarding the Kaiser Center Project. This EIR identified significant effects that would result from the Proposed Project. Therefore, pursuant to CEQA *Guidelines* Section 15091, no public agency shall approve or carry out a project for which an EIR has been certified which identifies one of more significant effects of the project, unless the public agency makes one or more of the following findings:

1. Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.
2. Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such agency.
3. Specified economic, legal, social, technological, or other considerations, including provisions of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the Final EIR.

D. Organization of the Draft EIR

Following this Chapter I, *Introduction*, this Draft EIR is organized as follows:

Chapter II, *Summary*, contains a brief summary of the Proposed Project and allows the reader to easily reference the analysis presented in the Draft EIR. **Table II-1**, Summary of Impacts, Standard Conditions of Approval (SCA), Mitigation Measures, and Residual Impacts, is provided at the end of Chapter II as a reader-friendly reference to each of the environmental effects, proposed mitigation measures and residual environmental impacts after mitigation is implemented, presented by environmental topic. Chapter II also summarizes the analysis of alternatives to the Proposed Project, areas of controversy, and issues to be resolved.

Chapter III, *Project Description*, describes in detail the Project Site and surroundings, the background and regulatory context of the Proposed Project; Proposed Project characteristics (including anticipated development phasing and entitlements and approvals requested or required), and Project objectives. Chapter III also identifies other agencies that must consider or approve aspects of the Proposed Project.

Chapter IV, *Environmental Setting, Impacts, Standard Conditions of Approval, and Mitigation Measures*, discusses the environmental setting (existing physical conditions and regulatory framework), the environmental impacts of the Project and cumulative conditions that could result from the Proposed Project, and the SCA and mitigation measures that, after implementation, would reduce or eliminate significant impacts.

Chapter V, *Alternatives*, evaluates a reasonable range of alternatives to the Proposed Project and identifies an environmentally superior alternative.

Chapter VI, *Impact Overview and Growth-Inducing Impacts*, summarizes the potentially significant and unavoidable impacts and the cumulative impacts that could result with the Proposed Project,

as they are identified throughout Chapter IV. Chapter VI also describes the Proposed Project's potential for inducing growth.

Chapter VII, *Report Preparation*, identifies the authors of the EIR, including City staff and the EIR consultant team. The Project Sponsor and key consultants that provided technical resources for the EIR are also identified in this chapter.

Appendices to the Draft EIR are provided at the end of the document and include the NOP, Responses to the NOP, as well as certain supporting background documents and technical reports used for the impact analyses for specific topics. All reference documents and persons contacted to prepare the EIR analyses are listed at the end of each analysis section (e.g., M. Utilities) in Chapter IV, *Environmental Setting, Impacts, Standard Conditions of Approval and Mitigation Measures*. The appendices to the Draft EIR are available for review by the public at the City of Oakland CEDA, Planning Department-Major Projects, under reference Case Number ER 08-003, located at 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, California 94612.

CHAPTER II

Summary

A. Project Overview

The Swig Company LLC (“Project Applicant”), on behalf of the property owner, SIC-Lakeside Drive, LLC, an affiliate of the Project Applicant, proposes to develop the Kaiser Center Office Project (“Proposed Project” or “Project”) located near Lake Merritt in Oakland, Alameda County, California. In March 2008, the Project Applicant submitted a Basic Application for Development Review to the City of Oakland Community and Economic Development Agency (CEDA) describing the proposed actions. After reviewing the application, the City determined that a project-level Environmental Impact Report (EIR) would be the appropriate document to analyze the potential environmental effects of the Proposed Project under the California Environmental Quality Act (CEQA). This EIR addresses all environmental topics identified in the City of Oakland’s CEQA Thresholds/Criteria of Significance document.

Site Location

The Proposed Project is located at 300 Lakeside Drive, Oakland, California, on the west side of Lake Merritt, north of downtown Oakland. The Project Site is 7.2 acres bounded by Harrison Avenue on the east, 20th Street on the south, Webster Street on the west, and 21st Street on the north. The Assessor’s Parcel Number (APN) for the Project Site is 008-0652-001-05.

The Project Site consists of the 29-story Kaiser Center office tower on the east side of the site and associated 4-level parking garage on the north side and center of the site, the roof garden (on top of the parking garage) in the center of the site, and the 20th Street Mall and Webster Street Mall located on the west side of the site. The Proposed Project affects only the 20th Street Mall, the Webster Street Mall and a relatively minor portion of the roof garden – a total of approximately 2.2 acres at the westernmost area of the 7.2-acre Project Site.¹

The Project Site is within the Central Business District land use designation identified in the Oakland General Plan. The zoning on the Project Site at the time the project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17

¹ For clarity in this EIR, “Project Site” refers to the entire 7.2-acre site; the “Proposed Project” refers only to the two mall buildings and roof garden in the central and western portions of the site that will be physically affected by the Proposed Project.

Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone². The Project Site is also located within the Lake Merritt Historic District.

Land uses surrounding the Project Site include high-rise office/commercial buildings similar to that proposed by the Project and that exist on the eastern portion of the site that will not be altered, retail stores at street level, and high-density residential dwellings. Lake Merritt and Lake Merritt Park are located to the east of the Project Site.

Key Components of the Project and Phasing

The Proposed Project would demolish approximately 280,002 square feet (sf) of office and commercial/retail uses and construct approximately 1.47 million square feet (msf) of office and commercial/retail uses in two high-rise towers.

The Proposed Project would be constructed in two phases. The first phase would construct the 34-story South Tower (replacing the existing 20th Street Mall building) and additional roof garden space adjacent to the existing garden, and stairs accessible by visitors to the Kaiser Center to the expanded roof garden space from 20th Street. Demolition and construction activities for the first phase of the Proposed Project would occur for approximately three to four years following approval of the final development plan for the first phase. Occupancy of the South Tower is anticipated to occur approximately at the middle of the fifth year.

The second phase would construct the 42-story North Tower (replacing the existing Webster Street Mall building) and remove and replace a portion of the roof garden. Demolition and construction activities for the second phase of the Proposed Project are projected to begin a few months after completion of the South Tower, and would continue for approximately three to four years. Occupancy of the North Tower is anticipated to occur approximately at the end of the fourth year after the start of construction of the North Tower, or, in other words, approximately in the middle of the eighth year after demolition and construction begins on the South Tower.

Public Agency Approvals

This EIR is intended to be used to provide CEQA clearance for all required discretionary actions for the Proposed Project. The Planning Commission will make decisions on the required discretionary actions. At the time this EIR was prepared, the discretionary actions and other considerations and approvals anticipated to be required for the Proposed Project include those listed below, without limitation.

- **Preliminary Development Plan (PDP), Final Development Plans (FDPs) and Design Review for a Planned Unit Development (PUD)** (Oakland Planning Code Chapter 17.140)
- **Vesting Tentative Parcel Map (VTM)** (Oakland Municipal Code Title 16)

² Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial. However, pursuant to Section 6 of the rezoning ordinance, the Proposed Project is “grandfathered” under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such.

- **Tree Removal Permit** (Oakland Municipal Code Chapter 12.36)
- **Encroachment Permits** (Oakland Municipal Code Chapter 12.08)
- **Demolition Permits** (Oakland Municipal Code Chapter 15.36)
- **Excavation Permits** (Oakland Municipal Code Chapter 12.12)
- **Public Right-of-Way (P)-Job Permit** (Oakland Municipal Code Chapter 12.20)
- **Other Various Building Permits** (Oakland Municipal Code Title 15)
- **Development Agreement** (Oakland Municipal Code Chapter 17.138). At the time of publication of this Draft EIR, Applicant has not elected to seek approval of a development Agreement with the City, but Applicant reserves the right to do so.

B. Environmental Impacts, Standard Conditions of Approval and Mitigation Measures

Table II-1, Summary of Impacts, Standard Conditions of Approval, Mitigation Measures, and Residual Impacts, is included at the end of this chapter. Table II-1 includes all impact statements, SCAs, recommended mitigation measures, and the level of significance of the impact after SCAs and recommended mitigation measures are implemented. Table II-1 also identifies Recommended Conditions and Project-Specific Conditions of Approval (discussed below).

The Proposed Project will result in significant and unavoidable project-level impacts associated with wind hazards, air quality (PM-10 emissions), historic resources, traffic noise, and traffic. The Proposed Project combined with cumulative development will result in significant and unavoidable cumulative impacts associated with wind hazards, air quality (PM-10 emissions), greenhouse gas emissions, and traffic. Except for the historic resources and wind hazards impacts, each of these impacts is considered significant and unavoidable because the impacts cannot be reduced to less than significant levels even with SCAs and feasible mitigation measures applied. Cultural resources impacts have been conservatively deemed significant and unavoidable because the Proposed Project does not yet incorporate specific design detail to determine review and evaluation for adherence to established standards, such as the Secretary of Interior's Standards for Treatment of Historic Properties. Similarly, wind impacts are conservatively deemed significant and unavoidable because potentially mitigating design features have not been fully tested with the wind model to determine if those designs features would reduce the excessive wind speeds to below the threshold.

Recommended Conditions and Project-Specific Conditions of Approval

Although not required by CEQA, certain "Recommended Conditions" are included the *Transportation and Circulation* section of this EIR with respect to certain improvements that are not necessary to address or mitigate any environmental impacts of the Project but nevertheless are recommended herein by City Staff. These recommendations will be considered by decision makers during the course of Project review and may be imposed as Project-Specific Conditions of Approval.

Other “Project-Specific Conditions of Approval” supplement SCAs and are specific to the Project as they are identified in technical studies or reports prepared for the Project. Project-Specific Conditions of Approval are identified in the *Geology, Soils and Geohazards* and the *Public Services and Recreation Facilities* sections of this EIR, as well as in Table II-1t.

C. Alternatives

Chapter V, Alternatives, presents the analysis of the following reasonable range of alternatives to the Proposed Project:

- **No Project/No Build Alternative** – No change to existing conditions, which would remain consistent with the existing environmental setting described in this EIR.
- **Alternative 1: South Tower Build Only**– This alternative would construct only the proposed South Tower, generally as described for Phase I of the Proposed Project. The 42-story North Tower would not be built. This alternative would include 552,000 square feet of office space and 46,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative, as with the Project.
- **Alternative 2: Onsite Maximum Reduced Impacts** – This Alternative would be similar to Alternative 1 in that only the South Tower would be constructed. However, in order to reduce the maximum number of SU impacts that occur on the Project Site, the size of the South Tower is reduced from 34 stories (Proposed Project) to 11 stories. The South Tower would have 222,000 square feet of office space and 46,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative as with the Project.
- **Alternative 3: Offsite Maximum Reduced Impacts** – This alternative would construct a 268,000 square foot office tower at an offsite location immediately north of the Project Site. The total floor area is the same as Alternative 2, however no commercial/retail area would be developed, primarily due to the limited street frontage available along the site. This Alternative is intended to avoid most of the impacts identified with the Proposed Project by avoiding SU historic resources and roof garden level wind hazards impacts. The offsite location, which is currently a 1-acre private pay parking lot bounded by 21st Street on the south, an existing 11-story commercial office building that fronts Webster Street on the west, 22nd Street on the north, and Kaiser Plaza Street on the east. Under this alternative, Kaiser Center would remain in its current state, with no improvements or demolition of existing facilities.

The No Project/No Build Alternative is considered the environmentally superior alternative in the strictest sense that environmental impacts associated with the Proposed Project’s implementation would avoid all of the significant impacts identified with the Proposed Project. However, the No Project/No Build Alternative would fail to achieve any of the Project’s Objectives.

Alternative 3, Offsite Maximum Reduced Impacts, has generally the same development program designed to avoid as many of the significant impacts of the Project. Alternative 3 would avoid the significant cultural resources and roof garden wind hazards impacts which are specific to the Kaiser Center Site and that occur with Alternative 2, Onsite Maximum Reduced Impacts. Although Alternative 3 would avoid the significant wind hazards impact that would occur at the roof garden (as Alternative 3 does not include a roof garden), the significant wind hazards at

ground level identified with the Project is conservatively considered also to potentially occur with Alternative 3. Therefore, Alternative 3 is the Environmentally Superior Alternative.

D. Areas of Controversy

No areas of controversy are known to the City of Oakland as of publication of this Draft EIR. While not controversial, the following scoping topics were raised in written or oral comments received in response to the Notice of Preparation (NOP) of this EIR. This summary list is compiled based on written comments received (which are included in Appendix A to this EIR) and comments stated during the City's scoping meetings held by the Landmarks Preservation Advisory Board and then the Oakland Planning Commission. Each of these topics is addressed in this Draft EIR.

- **Aesthetics, Shadow and Wind**
 - Wind and shadow studies to show effects on roof garden.
 - Light and glare
 - Views from downtown, Lake Merritt, skyline
- **Air Quality**
 - BAAQMD attainment status
 - Evaluations of the Project's construction, operational, and cumulative air quality impacts.
 - Toxic air contaminants
 - Project's energy demand
 - LEED or sustainable construction methods
 - Greenhouse gas emissions (AB32).
 - Dust emissions from construction activities on roof garden and Lake Merritt open space areas.
- **Cultural Resources**
 - Conduct a cultural resources records search, prepare archaeological inventory survey if needed, contact Native American Heritage Commission, and include appropriate mitigation for unknown archaeological finds.
 - Responsible treatment of historic roof garden.
- **Land Use, Plans and Policies**
 - Access to open space areas
- **Noise**
 - Noise from traffic
- **Population and Housing**
 - Business relocation
- **Traffic, Transportation, and Circulation and Parking**
 - Address bicycle and pedestrian circulation
 - Reduce or eliminate additional automobile parking
 - Use of Alameda County Congestion Management Agency Countywide traffic model.

- Discuss Project impacts on public transit systems.
- Proximity to and effects on BART station
- Reduction in greenhouse gas emissions due to BART use.
- Prepare traffic impact study.
- Use of Traffic Demand Models
- Measure DD program
- Changes to the “Y” driveway at 20th and Harrison.
- Key traffic intersections.
- **Utilities, and Service Systems and Energy**
 - Water supply and conservation measures
 - Adequate wastewater capacity.

TABLE II-1
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.A Aesthetics, Wind, and Shadow		
Impact AES-1: The Proposed Project would not adversely affect a scenic vista or substantially damage scenic resources. (Less than Significant)	None Required	Less than Significant
Impact AES-2: The Proposed Project would alter the existing visual conditions on the Project Site, but would not substantially degrade the existing visual character or quality of the site and its surroundings. (Less than Significant)	None Required	
Impact AES-3: The Proposed Project would create a new source light or glare, but would not adversely affect day or nighttime views in the area. (Less than Significant)	Standard Condition of Approval AES-1, <i>Lighting Plan</i> Standard Condition of Approval BIO-5, <i>Bird Collision Reduction</i>	
Impact AES-4: The Proposed Project would result in additional shadow on adjacent areas. However, it would not cast shadow that would substantially impair the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors; would not cast shadow that would substantially impair the beneficial use of any public or quasi-public park, lawn, garden, or open space; and would not cast shadow on a historic resource. (Less than Significant)	None Required	
Impact AES-5: The Proposed Project would be consistent with the policies and regulations addressing the provision of adequate light related to appropriate uses. (Less than Significant)	None Required	Conservatively Deemed Significant and Unavoidable
Impact AES-6: The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. (Potentially Significant)	Mitigation Measure AES-1: At the time of submittal of the Final Development Plan, the Applicant shall develop and, at the time of construction pursuant to the Final Development Plan, the Applicant shall implement a wind reduction plan that reduces wind hazards at the street level and roof garden to the maximum feasible extent, subject to review and approval by the City. The wind reduction plan shall include the results of wind tunnel testing for hazardous wind speeds of the Project conducted on the Project consistent with the Final Development Plan. The wind reduction plan shall include, but not be limited to, structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. Examples of these measures include tree plantings, dense bamboo planting, arbors, canopies and lattice fencing. The Applicant shall develop the wind reduction plan in coordination with the required landscape plan for the roof garden and be submitted to the City's Landmarks Preservation Advisory Board (LPAB) for review and recommendation to the Planning Commission, consistent with Mitigation Measure CUL -2.1 Historically-Sensitive Roof Garden Design. The LPAB will make advisory recommendations to the Planning	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.A Aesthetics, Wind, and Shadow (cont.)		
Impact AES-6 (cont.)	Commission for its approval as part of its approval of the Final Development Plan, and the Applicant shall implement the approved wind reduction plan. However, implementation of the measures cannot determine if these design features will be effective in reducing this impact to a less than significant impact until they are in place.	
Impact AES-7: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to wind hazards at the roof garden (Potentially Significant)	Aesthetics, Light and Shadow: None Required Wind Mitigation Measure AES-2: Implement Mitigation Measure AES-1.	Aesthetics, Light, and Shadow: Less than Significant Wind: Conservatively Deemed Significant and Unavoidable
IV.B Air Quality		
Impact AIR-1: Construction and demolition activities associated with new development under the Proposed Project would generate short-term emissions of fugitive dust. (Less than Significant)	Standard Condition of Approval AIR-1 <i>Dust Control Plan</i> Mitigation: None Required.	Less than Significant
Impact AIR-2: Activities associated with demolition, site preparation, and construction throughout development of the Proposed Project would generate emissions of criteria pollutants, including equipment exhaust emissions. (Potentially Significant Phase 2 ROG emissions)	Standard Condition of Approval AIR-2 <i>Construction Emissions</i> Mitigation Measure AIR-1: To reduce the significant Phase 2 ROG emissions, the Project applicant shall use low VOC architectural coatings. Use of low VOC coatings will reduce ROG emissions to below significance thresholds (37.8 pounds per day).	Less than Significant
Impact AIR-3: The Proposed Project would result in increased emissions of criteria pollutants. (Significant PM ₁₀ emissions at Buildout)	Standard Condition of Approval TRANS-1 <i>Transportation Demand Management Plan</i> Mitigation: Not feasible because none available. PM ₁₀ emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduced vehicle GHG emissions, including PM ₁₀ , but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project's Applicant's control are known to reduce vehicle trips and related emissions.	Significant and Unavoidable PM ₁₀ emissions.
Impact AIR-4: The Proposed Project would not result in increased emissions of criteria pollutants due to poor ventilation in the Parking Garage. (Less than Significant)	None Required	
Impact AIR-5: The Proposed Project would not contribute to CO concentrations exceeding the State AAQS of 9 ppm averaged over 8 hours and 20 ppm for 1 hour. (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.B Air Quality (cont.)		
Impact AIR-6: The Proposed Project would not frequently and, for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial number of people, specifically in residential uses, schools, daycare centers, nursing homes, or medical centers. (Less than Significant).	None Required	
Impact AIR-7: The Proposed Project would not generate or expose persons to substantial levels of toxic air contaminants (TACs) or PM _{2.5} concentrations. (Less than Significant)	None Required	
Impact AIR-8: Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. (Significant Operational PM ₁₀ Emissions)	Mitigation Measure AIR-2: Construction: None required. Operations: Not feasible because none available. PM ₁₀ emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduce vehicle GHG emissions, including PM ₁₀ , but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project's Applicant's control are known to reduce vehicle trips and related emissions	Construction: Less than Significant. Operations: Significant and Unavoidable PM ₁₀ emissions.
Impact AIR-9: Construction and operation of the Proposed Project would result in a cumulatively considerable increase in GHG emissions. (Potentially Significant)	<p>Standard Condition of Approval TRANS-1, <i>Parking and Transportation Demand Management</i>,</p> <p>Standard Condition of Approval UTIL-1 – <i>Waste Reduction and Recycling</i></p> <p>Standard Conditions of Approval <i>Landscape Requirements and Tree Replacement</i></p> <p>Standard Condition of Approval GHG-1- <i>GHG Reduction Plan</i></p> <p>Mitigation Measure AIR-3: GHG Reduction Plan: The project applicant shall retain a qualified air quality consultant to develop a GHG Reduction Plan for City review and approval. The applicant shall implement the approved GHG Reduction Plan.</p> <p>The goal of the GHG Reduction Plan shall be to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the Bay Area Quality Management District's (BAAQMD's) CEQA Thresholds of Significance (1,100 metric tons of CO₂e per year and 4.6 metric tons of CO₂e per year per service population) to help achieve the City's goal of reducing GHG emissions. The GHG Reduction Plan shall</p>	Less than Significant

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.B Air Quality (cont.)		
Impact AIR-9 (cont.)	<p>include, at a minimum, (a) a detailed GHG emissions inventory for the project under a "business-as-usual" scenario with no consideration of project design features, or other energy efficiencies; (b) an adjusted" baseline GHG emissions inventory for the project, taking into consideration energy efficiencies included as part of the project (including the City's Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements); and (c) a comprehensive set of quantified additional GHG reduction measures available to further reduce GHG emissions beyond the adjusted GHG emissions. If the project is to be constructed in phases, the GHG Reduction Plan shall provide GHG emission scenarios by phase.</p> <p>Potential additional GHG reduction measures to be considered include, but are not be limited to, measures recommended in BAAQMD's latest CEQA Air Quality Guidelines, the California Air Resources Board Scoping Plan (December 2008, as may be revised), the California Air Pollution Control Officers Association (CAPCOA) CEQA and Climate Change Guidance Document (January 2008, as may be revised), the California Attorney General's website, and Reference Guides on Leadership in Energy and Environmental Design (LEED) published by the U.S. Green Building Council.</p> <p>The proposed additional GHG reduction measures must be reviewed and approved by the City. The types of allowable GHG reduction measures include the following (listed in order of City preference): (1) physical design features; (2) operational features; and (3) the payment of fees to fund GHG-reducing programs (i.e., the purchase of "carbon credits"). For proposed reduction measures involving the purchase of carbon credits, the City will give preference to proposed payments to the City to offset the costs associated with implementation of GHG reduction strategies identified in the draft City's Energy and Climate Action Plan (ECAP).</p> <p>The allowable locations of the GHG reduction measures include the following (listed in order of City preference): (1) the project site; (2) off-site within the City of Oakland; (3) off-site within the San Francisco Bay Area Air Basin; and (3) off-site within the State of California.</p> <p>For physical GHG reduction measures to be incorporated into the design of the project, the measures shall be included on the drawings submitted for construction-related permits. For operational GHG reduction measures to be incorporated into the project, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of project completion (or at the completion of the project phase for phased projects).</p>	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.B Air Quality (cont.)		
Impact AIR-9 (cont.)	<p>For physical GHG reduction measures to be incorporated into off-site projects, the measures shall be included on drawings and submitted to the City for review and approval and then installed prior to completion of the subject project (or prior to completion of the project phase for phased projects). For operational GHG reduction measures to be incorporated into off-site projects, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of completion of the subject project (or at the completion of the project phase for phased projects).</p> <p>For GHG reduction measures involving the purchase of carbon credits (either to fund GHG-reducing activities identified in the draft ECAP or to fund non-ECAP GHG-reducing activities), evidence of the payment/purchase shall be submitted to the City for review and approval prior to completion of the subject project (or prior to completion of the project phase for phased projects).</p>	
Impact AIR-10: The Proposed Project would conflict with an applicable plan, policy or regulation of an appropriate regulatory agency adopted for the purpose of reducing greenhouse gas emissions (Potentially Significant)	<p>Standard Condition of Approval AIR-1 <i>Dust Control Plan</i></p> <p>Standard Condition of Approval AIR-2 <i>Construction Emissions</i></p> <p>Mitigation Measure AIR-4: Implement Mitigation Measure AIR-3.</p>	Less than Significant
IV.C Biological Resources		
Impact BIO-1: The Proposed Project would not adversely affect special-status species. (Less than Significant)	None Required	
Impact BIO-2: The Proposed Project would not adversely affect sensitive natural communities. (Less than Significant)	None Required	
Impact BIO-3: The Proposed Project would not adversely affect wetlands. (Less than Significant)	None Required	
Impact BIO-4: Project construction and operations have the potential to affect migratory and breeding birds, and wildlife, corridors, and nursery sites, through building collisions, increases in night lighting, increases in noise pollution due to Project construction, shading of existing habitat, and vegetation removal. (Less than Significant)	<p>Standard Condition of Approval BIO-3 <i>Tree Replacement Plantings</i></p> <p>Standard Condition of Approval BIO-5 <i>Bird Collision Reduction</i></p>	Less than Significant
Impact BIO-5: The Proposed Project would not adversely affect adopted Habitat Conservation Plans. (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.C Biological Resources (cont.)		
Impact BIO-6: The Proposed Project would not adversely affect the City's Tree Preservation or Removal Ordinance. (Less than Significant)	Standard Condition of Approval BIO-1 <i>Tree Removal During Breeding Season</i> Standard Condition of Approval BIO-2 <i>Tree Removal Permit</i> Standard Condition of Approval BIO-3 <i>Tree Replacement Plantings</i> Standard Condition of Approval BIO-4 <i>Tree Protection During Construction</i>	Less than Significant
Impact BIO-7: The Proposed Project would not adversely affect the City's Creek Protection Ordinance. (Less than Significant)	Standard Condition of Approval GEO-1 <i>Erosion and Sedimentation Control Plan</i> Standard Condition of Approval HAZ-1 <i>Hazards Best Management Practices</i> Standard Condition of Approval HYD-1 <i>Erosion and Sedimentation Control Plan and Standard</i> Standard Condition of Approval HYD-2 <i>Stormwater Pollution Prevention Plan</i> Standard Condition of Approval HYD-3 <i>Post-Construction Stormwater Pollution Management Plan</i>	Less than Significant
Impact BIO-8: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in impacts on special-status species, wetlands, and other waters of the U.S. (Less than Significant)	Standard Condition of Approval BIO-1 <i>Tree Removal During Breeding Season</i> Standard Condition of Approval BIO-2 <i>Tree Removal Permit</i> Standard Condition of Approval BIO-3 <i>Tree Replacement Plantings</i> Standard Condition of Approval BIO-4 <i>Tree Protection During Construction</i> Standard Condition of Approval BIO-5 <i>Bird Collision Reduction</i>	Less than Significant
IV.D Cultural Resources		
Impact CUL-1: The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. (Potentially Significant)	Standard Condition of Approval CUL-4 <i>Compliance with Policy 3.7 of the Historic Preservation Element (Property Relocation Rather than Demolition)</i> Mitigation Measure CUL-1.1. The Project applicant shall modify the design of the base of the new structures to retain the existing street level design and character, and shall prepare a salvage program.	Conservatively Deemed Significant and Unavoidable

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.D Cultural Resources (cont.)		
Impact CUL-1 (cont.)		
	<p>Mitigation Measure CUL-1.2. HABS /HALS Level Recordation: The Project applicant shall complete a recordation of the Kaiser Center which meets the requirements of the National Park Service's Historic American Buildings Survey (HABS) and the Historic American Landscape Survey (HALS).</p> <p>Mitigation Measure CUL-1.3. Financial Contributions to a historic resource related program such as the Façade Improvement Program or the Property Relocation Assistance Program: If Mitigation Measure CUL-1.1 is not satisfied, the Project applicants shall make a financial contribution to the City of Oakland, which can be used to fund other historic preservation projects at the Project Site or in the immediate vicinity.</p>	
<p>Impact CUL-2: The proposed new construction would adversely affect remaining portion of the qualified historic resource on the Project Site. (Potentially Significant)</p>	<p>Standard Condition of Approval CUL-5 <i>Vibration Adjacent to Historic Structures</i></p> <p>Mitigation Measure CUL-2.1. Historically-Sensitive Roof Garden Design: The Project applicant shall ensure that a qualified Historic Landscape Architect under the Historic Preservation Professional Qualifications Standards familiar with landscape history and historic resources designs a roof garden addition that is differentiated from the old and compatible with the historic design to protect the integrity of the historic roof garden.</p> <p>Mitigation Measure CUL-2.2. Historically Sensitive Tower Design: The Proposed Project shall be compatible with, yet clearly differentiated from, the existing Kaiser Center Office Tower.</p> <p>Mitigation Measure CUL-2.3. Protection During Demolition and Construction: The Project applicant shall prepare a historic resources protection plan which describes how the resource (both building and landscape) will be protected from vibration, equipment, storage of materials, and dust resulting from demolition and construction activities.</p>	<p>Conservatively Deemed Significant and Unavoidable</p>
<p>Impact CUL-3: The Proposed Project Would Have Indirect Shadow Effects on the Historic roof garden (Less than Significant).</p>	<p>None Required</p>	
<p>Impact CUL-4: The Proposed Project Could Affect the Eligibility of the Lake Merritt Historic District (Less than Significant).</p>	<p>None Required</p>	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.D Cultural Resources (cont.)		
Impact CUL-5: Construction of the Proposed Project could cause substantial adverse changes to the significance of archaeological resources at the Project Site. Archaeological resources are potentially historical resources as defined in CEQA Section 15064.5(a) or unique archaeological resources as defined in CEQA Section 21083.2(g). (Less than Significant)	Standard Condition of Approval CUL-1 <i>Archaeological Resources</i>	Less than Significant
Impact CUL-6: The Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant)	Standard Condition of Approval CUL-3 <i>Paleontological Resources</i>	Less than Significant
Impact CUL-7: The Proposed Project may adversely affect unidentified human remains at the Project Site. (Less than Significant)	Standard Condition of Approval CUL-2 <i>Human Remains</i>	Less than Significant
Impact CUL-8: The Proposed Project Could Have a Cumulative Impact to Historic Architectural Resources (Less than Significant).	None Required	
IV.E Geology, Soils, and Seismicity		
Impact GEO-1: Redevelopment in the Project area could expose people or structures to seismic hazards such as groundshaking or liquefaction. (Less than Significant).	Standard Condition of Approval GEO-4 <i>Geotechnical Report</i>	Less than Significant
Impact GEO-2: Redevelopment in the Project area could be subjected to geologic hazards, including expansive soils and differential settlement. (Less than Significant).	Standard Condition of Approval GEO-4 <i>Geotechnical Report</i>	Less than Significant
Impact GEO-3: The development proposed as part of the Proposed Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, would not result in significant cumulative impacts with respect to geology, soils or seismicity. (Less than Significant)	Standard Condition of Approval GEO-1 <i>Erosion and Sedimentation Control Plan</i>	Less than Significant
	Standard Condition of Approval GEO-2 Vibrations Adjacent to Historic Structures	
	Standard Condition of Approval GEO-3 <i>Soils Report</i>	
	Standard Condition of Approval GEO-4 <i>Geotechnical Report</i>	
	Project-specific Conditions of Approval to further implement SCA GEO-4:	
	<ul style="list-style-type: none"> • Structural foundation support may have to be obtained from the competent soil of the Temescal or San Antonio formation located approximately 10 to 20 feet below ground surface. 	
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TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.E Geology, Soils, and Seismicity (cont.)		
Impact GEO-3 (cont.)	<ul style="list-style-type: none"> • Use a rigid mat foundation designed for both short-term elastic settlement during construction and long-term consolidation settlement of the deep clay underlying the site, and/or the use of deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system. • Use tiedown anchors to prevent buoyancy of the building if the proposed structures are not heavy enough to overcome the hydrostatic uplift pressure of the groundwater (Treadwell and Rollo, 2008). 	
IV.F Hazardous Materials		
Impact HAZ-1: Demolition of existing structures that contain hazardous building materials, such as lead-based paint, asbestos, and PCBs could expose workers, the public, or the environment to these hazardous materials and would generate hazardous waste. (Less than Significant)	<p>Standard Condition of Approval HAZ-4 <i>Asbestos Removal in Structures</i></p> <p>Standard Condition of Approval HAZ-5 <i>Lead-Based Paint/ Coatings, Asbestos, or PCB Occurrence Assessment</i></p> <p>Standard Condition of Approval HAZ-7 <i>Lead-based Paint Remediation</i></p>	Less than significant
Impact HAZ-2: The Proposed Project would involve the transportation, use, and storage of hazardous chemicals, which could present public health and/or safety risks to facility workers, patients and visitors, and the surrounding area. (Less than Significant)	<p>Standard Condition of Approval HAZ-1 <i>Hazards Best Management Practices</i></p> <p>Standard Condition of Approval HAZ-2 <i>Site Review By Fire Services Division</i></p> <p>Standard Condition of Approval HAZ-3 <i>Phase I and/or Phase II Reports</i></p> <p>Standard Condition of Approval HAZ-4 <i>Asbestos Removal in Structures</i></p> <p>Standard Condition of Approval HAZ-5 <i>Lead-Based Paint/ Coatings, Asbestos, or PCB Occurrence Assessment</i></p> <p>Standard Condition of Approval HAZ-6 <i>Environmental Site Assessment Remediation</i></p> <p>Standard Condition of Approval HAZ-8 <i>Other Materials Classified as Hazardous Materials</i></p> <p>Standard Condition of Approval HAZ-9 <i>Health and Safety Plan per Assessment</i></p> <p>Standard Condition of Approval HAZ-10 <i>Best Management Practices for Soil and Groundwater Hazards</i></p> <p>Standard Condition of Approval HAZ-11 <i>Hazardous Materials Business Plan</i></p>	Less than significant

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.F Hazardous Materials (cont.)		
Impact HAZ-3: Hazardous materials used onsite during construction activities (i.e. solvents) could be spilled through improper handling or storage, potentially increasing public health and/or safety risks to Kaiser Center workers, patients and visitors, and the surrounding area. (Less than Significant)	Standard Condition of Approval HAZ-1 <i>Hazards Best Management Practices</i>	Less than Significant
	Standard Condition of Approval HAZ-2 <i>Site Review By Fire Services Division</i>	
	Standard Condition of Approval HAZ-3 <i>Phase I and/or Phase II Reports</i>	
	Standard Condition of Approval HAZ-4 <i>Asbestos Removal in Structures</i>	
	Standard Condition of Approval HAZ-5 <i>Lead-Based Paint/ Coatings, Asbestos, or PCB Occurrence Assessment</i>	
	Standard Condition of Approval HAZ-6 <i>Environmental Site Assessment Remediation</i>	
	Standard Condition of Approval HAZ-7 <i>Lead Based Paint Remediation</i>	
	Standard Condition of Approval HAZ-8 <i>Other Materials Classified as Hazardous Materials</i>	
	Standard Condition of Approval HAZ-9 <i>Health and Safety Plan</i>	
	Standard Condition of Approval HAZ-10 <i>Best Management Practices for Soil and Groundwater Hazards</i>	
Impact HAZ-4: Hazards at the Project Site could contribute to cumulative hazards in the vicinity of the Project Site. (Less than Significant)	None Required.	
IV.G Hydrology and Water Quality		
Impact HYD-1: Project construction would involve activities (excavation, soil stockpiling, and grading) that could generate loose, erodable soils that could violate water quality standards or waste discharge requirements, result in substantial erosion or siltation, create or constitute substantial polluted runoff, or otherwise substantially degrade water quality. (Less than Significant)	Standard Condition of Approval HYD-1 <i>Erosion and Sedimentation Control Plan and Standard</i>	Less than Significant
	Standard Condition of Approval HYD-2 <i>Stormwater Pollution Prevention Plan</i>	
Impact HYD-2: Project excavation activities would not deplete groundwater supplies nor substantially interfere with groundwater recharge or cause contaminated groundwater discharge to surface water. (Less than Significant)	None Required	
Impact HYD-3: The Proposed Project would result in new development that could substantially alter existing drainage pattern of the Project Site or the surrounding area (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.G Hydrology and Water Quality (cont.)		
Impact HYD-4: The Proposed Project would not result in a net increase in impervious surfaces and would not cause an increase in the volume of stormwater runoff. The Project would not violate any waste discharge requirements that would create substantial runoff and result in substantial flooding onsite or offsite. The Project would not exceed the capacity of the stormwater drainage system. (Less than Significant)	Standard Condition of Approval HYD-3 <i>Post-Construction Stormwater Pollution Management Plan</i> Standard Condition of Approval HYD-4 <i>Maintenance Agreement for Stormwater Treatment Measures</i>	Less than Significant
Impact HYD-5: The Proposed Project would not result in flooding due to its proximity to a 100-year flood hazard area, or expose people or structures to other substantial risk related to flooding, seiche, tsunami, or mudflow. (Less than Significant)	None Required	
Impact HYD-6: The increased construction activity and new development resulting from the Proposed Project, in conjunction with past, present, pending and reasonably foreseeable projects in the city, would not result in cumulatively considerable impacts on hydrology and water quality conditions (Less than Significant)	None Required	
IV.H Land Use, Plans and Policies		
Impact LU-1: The Proposed Project would redevelop buildings at the Kaiser Center property on the northwest corner of Webster and 20th Streets in Downtown Oakland, but would not result in the physical division of an existing community. (Less than Significant)	None Required	
Impact LU-2: The Proposed Project would not conflict with applicable land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effects. (Less than Significant)	None Required	
Impact LU-3: The Proposed Project would not result in a fundamental conflict between adjacent and nearby land uses, particularly with respect to any applicable habitat conservation plan or natural community conservation plan. (Less than Significant)	None Required	
Impact LU-4: The Proposed Project would not result in a significant cumulative land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect from past, present, pending or reasonably foreseeable development. (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.I Noise		
Impact NOI-1: Construction activities associated with the Proposed Project would temporarily generate noise levels that could conflict with standards established in the City noise ordinance. (Less than Significant)	Standard Condition of Approval NOI-1 <i>Days/Hours of Construction Operation</i>	Less than Significant
	Standard Condition of Approval NOI-2 <i>Noise Control</i>	
	Standard Condition of Approval NOI-3 <i>Noise Complaint Procedures</i>	
	Standard Condition of Approval NOI-5 <i>Pile Driving and Other Extreme Noise Generators</i>	
	Standard Condition of Approval NOI-6 <i>Vibration Adjacent to Historic Structures</i>	
Impact NOI-2: Project operations would increase noise levels in the Project vicinity that could result in the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. (Less than Significant)	None Required	
Impact NOI-3: Project traffic could substantially increase traffic noise levels in the Project area. (Less than Significant)	Standard Condition of Approval TRANS-1 <i>Transportation Demand Management</i>	Less than Significant
Impact NOI-4: Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. (Potentially Significant)	Standard Condition of Approval TRANS-1 <i>Transportation Demand Management</i>	Significant and Unavoidable
	Mitigation Measures: Not feasible because none available.	
IV.J Population, Employment, and Housing		
Impact POP-1: The Project would displace existing businesses and jobs, but not in substantial numbers necessitating construction of replacement facilities elsewhere, in excess of that anticipated in the City's General Plan. (Less than Significant)	None Required.	
Impact POP-2: The Project would not induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	None Required.	
Impact POP-3: The Project in combination with other past, present, pending and reasonably foreseeable projects, would not cumulatively induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	None Required.	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.K Public Services and Recreation Facilities		
Impact PUB-1: The Project could result in an increase in calls for police protection services, but would not require new or physically altered police facilities in order to maintain acceptable performance objectives. (Less than Significant)	None Required.	
Impact PUB-2: The increased population and density resulting from the Project would not involve or require new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection and emergency medical services and facilities. (Less than Significant)	<p>Standard Condition of Approval PUB-1 <i>Conformance with other Requirements</i></p> <p>Standard Condition of Approval PUB-2 <i>Fire Safety Phasing Plan</i></p> <p>Project-specific Conditions of Approval: To further implement SCA PUB-2, the Project will incorporate building design elements to enhance fire-fighting and rescue capabilities beyond basic code requirements. Elements would include, but are not limited to, one elevator designed for fire-fighter use and rescue air stations at every fifth floor.</p>	Less than Significant
Impact PUB-3: The Project could result in new students for local schools, but would not require new or physically altered school facilities to maintain acceptable performance objectives. (Less than Significant)	None Required	
Impact PUB-4: The Project could increase the demand for parks, recreational facilities, and library facilities, but would not result in substantial physical deterioration of such facilities or require new or physically altered facilities in order to maintain acceptable performance objectives. (Less than Significant)	None Required	
Impact PUB-5: The Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, could result in cumulative impacts to the provision of public services. (Less than Significant)	None Required.	
IV.L Transportation and Circulation		
Impact TRANS-1a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions (Significant).	<p>Mitigation Measure TRANS-1a: Implement the following measures at the Oakland Avenue / Perry Place / I-580 Eastbound Ramps intersection:</p> <ul style="list-style-type: none"> Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. 	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would still be a significant and unavoidable impact under Existing plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-1a (cont.)	<ul style="list-style-type: none"> • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <p>Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and</p> <ul style="list-style-type: none"> • ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> - 2070L Type Controller - GPS communication (clock) - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines - City Standard ADA wheelchair ramps - Full actuation (video detection, pedestrian push buttons, bicycle detection) - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines - Countdown Pedestrian Signals - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet - Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-1b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (Existing). (Significant)</p>	<p>Mitigation Measure TRANS-1b: Implement the following measures at the Harrison Street / 27th Street / 24th Street intersection:</p> <ul style="list-style-type: none"> Prohibit westbound left turns from Bay Place (to Harrison Street and 24th Street) during the PM peak hour. Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. Coordinate the signal timing at this intersection with the adjacent intersections that are in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> 2070L Type Controller GPS communication (clock) Accessible pedestrian crosswalks according to Federal and State Access Board guidelines Full actuation (video detection, pedestrian push buttons, bicycle detection) Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines Countdown Pedestrian Signals Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements. 	<p>Conservatively Deemed Significant and Unavoidable</p> <p>If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.</p> <p>If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Existing plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-1c: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (Existing). (Significant)</p>	<p>Mitigation Measure TRANS-1c: Implement the following measures at the Harrison Street / 20th Street / Kaiser Center Access Road intersection:</p> <ul style="list-style-type: none"> Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> 2070L Type Controller GPS communication (clock) Accessible pedestrian crosswalks according to Federal and State Access Board guidelines Countdown Pedestrian Signals Full actuation (video detection, pedestrian push buttons, bicycle detection) Accessible Pedestrian Signals, audible and tactile according to Federal Access Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	<p>Less than Significant</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-1d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-1d: Mitigation Measure TRANS-1d: Implement the following measures at the Oak Street / 5th Street / I-580 Southbound On-Ramp intersection:</p> <ul style="list-style-type: none"> Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> 2070L Type Controller GPS communication (clock) Accessible pedestrian crosswalks according to Federal and State Access Board guidelines City Standard ADA wheelchair ramps Full actuation (video detection, pedestrian push buttons, bicycle detection) Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines Countdown Pedestrian Signals Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-1e: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-1e: Implement the following measures at the Grand Avenue / El Embarcadero intersection:</p> <ul style="list-style-type: none"> Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. Coordinate the signal timing at this intersection with the adjacent intersections in the same coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <p>Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:</p> <ul style="list-style-type: none"> 2070L Type Controller GPS communication (clock) Accessible pedestrian crosswalks according to Federal and State Access Board guidelines City Standard ADA wheelchair ramps Full actuation (video detection, pedestrian push buttons, bicycle detection) Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines Countdown Pedestrian Signals Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	<p>Less than Significant</p> <p>If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-1f: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp) (Existing). (Significant)</p>	<p>Mitigation Measure TRANS-1f: Mitigation Measure TRANS-1f: Implement the following measures at the Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp intersection:</p> <ul style="list-style-type: none"> Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> 2070L Type Controller GPS communication (clock) Accessible pedestrian crosswalks according to Federal and State Access Board guidelines City Standard ADA wheelchair ramps Full actuation (video detection, pedestrian push buttons, bicycle detection) Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines. Countdown Pedestrian Signals Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-2a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero) (Existing). (Significant)</p>	<p>Mitigation Measure TRANS-2a: Implement the following measures on Grand Avenue between Harrison Street and El Embarcadero:</p> <ul style="list-style-type: none"> Optimize traffic signals (to include determination of allocation of green time for each intersection approach) at intersections along Grand Avenue (i.e., Harrison Street, Bay Place, Park View Terrace / Bellevue Avenue, Perkins Street, Staten Avenue, Euclid Avenue, and El Embarcadero) for the AM and PM peak hours in tune with the relative traffic volumes on those approaches. Coordinate the signal timing at the intersections in the road segment. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> Plans, Specifications, and Estimates (PS&E) to modify the intersections. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersections should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> 2070L Type Controller GPS communication (clock) Accessible pedestrian crosswalks according to Federal and State Access Board guidelines City Standard ADA wheelchair ramps Full actuation (video detection, pedestrian push buttons, bicycle detection) Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines Countdown Pedestrian Signals Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements. 	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-2b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (Existing). (Significant)	Mitigation Measure TRANS-2b: Implement Mitigation Measures TRANS-1a and TRANS-1b.	Significant and Unavoidable If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.
Impact TRANS-3a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	Mitigation Measure TRANS-3a: Implement Mitigation Measure TRANS-1a.	Significant and Unavoidable If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.
Impact TRANS-3b: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015), which would operate at an unacceptable LOS E during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	Mitigation Measure TRANS-3b: Implement Mitigation Measure TRANS-1b.	Conservatively Deemed Significant and Unavoidable If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable. If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.
Impact TRANS-3c: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	Mitigation Measure TRANS-3c: Implement the following measures at the Harrison Street / Grand Avenue intersection: <ul style="list-style-type: none"> Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. 	Significant and Unavoidable If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-3c (cont.)	<ul style="list-style-type: none"> • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> - 2070L Type Controller - GPS communication (clock) - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines - City Standard ADA wheelchair ramps - Full actuation (video detection, pedestrian push buttons, bicycle detection) - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines Countdown Pedestrian Signals - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet - Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-3d: Phase I of the proposed Project, when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)</p>	<p>Mitigation Measure TRANS-3d: Implement Mitigation Measure TRANS-1c.</p>	<p>Less than Significant</p> <p>If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I) impacts at this location would be Significant and Unavoidable.</p> <p>If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.</p>
<p>Impact TRANS-3e: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015), which would operate at an unacceptable LOS E during the AM peak hour under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-3e: Mitigation Measure TRANS-3e: Implement the following measures at the Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp intersection:</p> <ul style="list-style-type: none"> • Restripe the northeast Oakland Avenue approach from the current configuration of one shared through-left lane and two through lanes to one exclusive left-turn lane, one shared through-left lane, and one through lane. • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches. 	<p>Less than Significant</p> <p>If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-3e (cont.)	<ul style="list-style-type: none"> • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> - 2070L Type Controller - GPS communication (clock) - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines - City Standard ADA wheelchair ramps - Full actuation (video detection, pedestrian push buttons, bicycle detection) - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines - Countdown Pedestrian Signals - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet - Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-4a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	Mitigation Measure TRANS-4a: Implement Mitigation Measure TRANS-2b.	Significant and Unavoidable If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.
Impact TRANS-5a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	Mitigation Measure TRANS-5a: Implement Mitigation Measure TRANS-1a.	Significant and Unavoidable If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015). (Significant)	Mitigation Measure TRANS-5b: Implement Mitigation Measure TRANS-1b.	Conservatively Deemed Significant and Unavoidable If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable. If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5c: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2015). (Significant)	Mitigation Measure TRANS-5c: Mitigation Measure TRANS-5c: Implement the following measures at the Telegraph Avenue / 27th Street intersection: <ul style="list-style-type: none"> Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches. 	Less than Significant If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-5c (cont.)	<ul style="list-style-type: none"> • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. • Redesigned the signal plan to give the northbound left-turn movement protected-permitted phasing. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> - 2070L Type Controller - GPS communication (clock) - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines - City Standard ADA wheelchair ramps - Full actuation (video detection, pedestrian push buttons, bicycle detection) - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines - Countdown Pedestrian Signals - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet - Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-5d: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-5d: Implement Mitigation Measure TRANS-3c.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-5e: The addition of Project-generated traffic (Phase I and II) would cause the PM peak-hour LOS to degrade from an acceptable LOS C under Near-Term (2015) without Project Conditions to an unacceptable LOS F at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road). Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)</p>	<p>Mitigation Measure TRANS-5e: Implement Mitigation Measure TRANS-1c.</p>	<p>Less than Significant</p> <p>If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I and II) impacts at this location would be Significant and Unavoidable.</p>
<p>Impact TRANS-5f: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp) (2015), which would operate at an unacceptable LOS F during both peak hours under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-5f: Implement Mitigation Measure TRANS-1d.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-5g: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-5g: Implement Mitigation Measure TRANS-1e.</p>	<p>Less than Significant</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-5h: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-5h: Implement Mitigation Measure TRANS-1f.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-5i: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-5i: Implement the following measures at the Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp:</p> <ul style="list-style-type: none"> • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> – 2070L Type Controller – GPS communication (clock) – Accessible pedestrian crosswalks according to Federal and State Access Board guidelines – City Standard ADA wheelchair ramps – Full actuation (video detection, pedestrian push buttons, bicycle detection) 	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-5i (cont.)	<ul style="list-style-type: none"> - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines - Countdown Pedestrian Signals - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet - Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	<p>Less than Significant</p> <p>If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-5j: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015). (Significant)</p>	<p>Mitigation Measure TRANS-5j: Implement Mitigation Measure TRANS-3e.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this roadway segment would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-6a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-6a: Implement Mitigation Measure TRANS-2a.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-6b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-6b: Implement Mitigation Measure TRANS-2b.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7a: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7a: Implement Mitigation Measure TRANS-1a.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-7b: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7b: Implement Mitigation Measure TRANS-1b, and also prohibit westbound left turns during the AM peak hour (in addition to the PM peak hour).</p>	<p>Conservatively Deemed Significant and Unavoidable</p> <p>If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.</p> <p>If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7c: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2030). (Significant)</p>	<p>Mitigation Measure TRANS-7c: Implement Mitigation Measure TRANS-5c.</p>	<p>Less than Significant</p> <p>If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7d: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7d: Implement Mitigation Measure TRANS-3c, and also prohibit southbound left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7e: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour at Intersection #13 (Harrison Street / 21st Street) (2030). (Significant)</p>	<p>Mitigation Measure TRANS-7e: Implement the following measures at the Harrison Street / 21st Street intersection:</p> <ul style="list-style-type: none"> Prohibit eastbound right turns from 21st Street to Harrison Street during the PM peak period, which will increase capacity on the critical eastbound left-turn movement Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. 	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-7e (cont.)	<ul style="list-style-type: none"> Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> 2070L Type Controller GPS communication (clock) Accessible pedestrian crosswalks according to Federal and State Access Board guidelines City Standard ADA wheelchair ramps Full actuation (video detection, pedestrian push buttons, bicycle detection) Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines Countdown Pedestrian Signals Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet Signal timing plans for the signals in the coordination group. <p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-7f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2030). (Significant)</p>	<p>Mitigation Measure TRANS-7f: Implement Mitigation Measure TRANS-1c.</p>	<p>Less than Significant</p> <p>If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Cumulative (2030) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Cumulative Phase I and II) impacts at this location would be Significant and Unavoidable.</p> <p>If only Phase I of the Project were built, this intersection would still be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7g: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 SB On-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7g: Implement Mitigation Measure TRANS-1d.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7h: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7h: Implement Mitigation Measure TRANS-1e.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7i: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7i: Implement Mitigation Measure TRANS-1f.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-7j: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7j: Implement Mitigation Measure TRANS-5i.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7k: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the AM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7k: Implement Mitigation Measure TRANS-3e.</p>	<p>Less than Significant</p> <p>If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-7l: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-7l: Implement the following measures at the Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue intersection:</p> <ul style="list-style-type: none"> • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. <p>To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:</p> <ul style="list-style-type: none"> • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: <ul style="list-style-type: none"> – 2070L Type Controller – GPS communication (clock) – 	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-7I (cont.)	<ul style="list-style-type: none"> - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines - City Standard ADA wheelchair ramps - Full actuation (video detection, pedestrian push buttons, bicycle detection) - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines - Countdown Pedestrian Signals - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet - Signal timing plans for the signals in the coordination group. 	
<p>Impact TRANS-8a: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on Segment #3 (I-880 from Oak Street to 5th Avenue) (2030). (Significant)</p>	<p>The Project sponsor shall fund, prepare, and install the approved plans and improvements.</p>	
<p>Impact TRANS-8b: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-8a: There are no feasible measures to mitigate the Project's impact, given the existing alignment and constraints due to lack of right-of-way for both the roadway on the west end of the channel and possibly for support columns above the Union Pacific right-of-way. The segment of I-880 from Oak Street to 5th Avenue consists of two four-lane aerial structures, with the segment immediately west of Lake Merritt Channel bordered on the north by the Laney College parking lot and on the south by industrial uses. The aerial structure continues east of the channel, crossing over the existing Union Pacific railroad right-of-way. Increasing capacity on the freeway would likely require increasing the number of travel lanes. Also, any proposed mitigation measure would also require Caltrans project approval. Therefore, the Project impacts on this roadway segment are significant and unavoidable.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
	<p>Mitigation Measure TRANS-8b: Implement Mitigation Measure TRANS-2a.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
<p>Impact TRANS-8c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)</p>	<p>Mitigation Measure TRANS-8c: Implement Mitigation Measure TRANS-2b.</p>	<p>Significant and Unavoidable</p> <p>If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.</p>
<p>Impact TRANS-9: The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)</p>	<p>Mitigation Measure TRANS-9: Prohibit delivery and service vehicles from accessing the loading docks during the AM and PM peak periods in order to minimize the impact of loading operations on access for the Kaiser Center Garage. The section of the Access Road from Harrison Street / 20th Street to the garage entrance should be restricted to delivery and service vehicles during off-peak hours. During off-peak periods, the Access Road approach onto Harrison Street / 20th Street should be separated off by bollards or other removable barriers to prevent passenger vehicles from crossing the site and expand pedestrian space in this immediate area. Adequate additional site management staff should be made available to direct loading maneuvers to improve the safety of pedestrians, bicyclists, and drivers during deliveries into and out of this dock. Concurrent with the submittal of a Final Development Plan, the Project Applicant shall prepare and submit a loading dock plan and operational analysis which demonstrates there are no conflicts with vehicular, pedestrian, and bicycle access to or adjacent to the site for City review and approval. The Project Applicant shall implement the approved plan.</p>	<p>Less than Significant</p>
<p>Impact TRANS-10: The Project proposes vehicular site access out of an existing garage exit located along 21st Street (just east of Kaiser Plaza) which is currently designed in such a way that could be hazardous to pedestrians on the sidewalk. (Significant)</p>	<p>Mitigation Measure TRANS-10: The Project applicant shall redesign the East Exit of the Kaiser Center Garage along 21st Street to allow for sufficient distance and visibility for drivers to see pedestrians and stop. Redesign options shall include sidewalk widening, wherever feasible. In the event that this is structurally infeasible, the Project applicant shall install audible and visible warning devices such as bells and lights to alert pedestrians, and a speed hump to force drivers exiting the garage to slow down and be more alert.</p>	<p>Less than Significant</p>
<p>Impact TRANS-11: Potential short-term construction impacts generated by the Proposed Project would include the impacts associated with the delivery of construction materials and equipment, removal of construction debris, and parking for construction workers. (Less than Significant).</p>	<p>Standard Condition of Approval TRANS-1 <i>Parking and Transportation Demand Management.</i></p>	<p>None</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
ALTERNATIVE MEASURE DD IMPACTS		
If the City elects to implement the Alternative Measure DD project, then the following impacts would occur, necessitating different mitigation measures than those identified for the Project assuming the original Measure DD project.		
<p>Impact ALT DD TRANS-1 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I), Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection (Significant)</p>	<p>Mitigation Measure ALT DD TRANS-1: The Project applicant shall add an additional lane and reconfigure the northbound Harrison Street approach as a shared left-through lane (to westbound 20th Street and Kaiser Center Access Road) and two exclusive right-turn lanes (one lane to northbound Harrison Street, the other to northbound Harrison Street and eastbound 20th Street / Lakeside Drive). This would require curb setback of about 10 feet and a corresponding reduction in park space and removal of up to five on-street parking spaces along the west side of Snow Park.</p> <p>In addition, the left turns from the Kaiser Center Access Road to eastbound 20th Street / Lakeside Drive would need to be prohibited in order to allow the northbound movement along Harrison Street to run concurrently with the Access Road phase.</p> <p>To implement these measures, the Project Applicant shall submit to City of Oakland's Transportation Services Division for review and approval a PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction.</p> <p>The Project Applicant shall fund, prepare, and install the approved plans and improvements.</p> <p>Also, implement Mitigation Measure TRANS-1c.</p>	<p>Conservatively Deemed Significant and Unavoidable. If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable.</p> <p>After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts.</p> <p>If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation if the City determines additional mitigation measures feasible, and a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
<p>Impact ALT DD TRANS-2 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I and Phase II), Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area.</p> <p>Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. (Significant)</p>	<p>Mitigation Measure ALT DD TRANS-2:</p> <p>Implement Mitigation Measure ALT DD TRANS-1 and Mitigation Measure TRANS-1c.</p>	<p>Conservatively Deemed Significant and Unavoidable. If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable.</p> <p>After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts.</p> <p>If only Phase I of the Project were built, this intersection would still remain a less than significant impact after mitigation if the City determines additional mitigation measures feasible, and a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.</p>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
<p>Impact ALT DD TRANS-3 - Project with Alternative Measure DD - Cumulative (2030) plus Project (Phase I and Phase II) Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection is located within the Downtown area.</p> <p>Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection. (Significant)</p>	<p>Mitigation Measure ALT DD TRANS-3:</p> <p>Implement Mitigation Measure ALT DD TRANS-1 and Mitigation Measure TRANS-1c.</p>	<p>Conservatively Deemed Significant and Unavoidable. If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable.</p> <p>After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts.</p> <p>If only Phase I of the Project were built, this intersection would still remain a less than significant impact after mitigation if the City determines additional mitigation measures feasible, and a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.</p>
IV. M Utilities and Service Systems		
<p>Impact UTIL-1: The Proposed Project would not exceed water supplies available to serve the project from existing entitlements and resources, nor require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)</p>	None Required	
<p>Impact UTIL-2: The Proposed Project's projected wastewater generation would not result in the City of Oakland exceeding its citywide projected base flow allocation or its base flow allocation for Subbasin 52-05. (Less than Significant)</p>	Standard Condition of Approval UTIL-2: <i>Stormwater and Sewer</i>	Less than Significant

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV. M Utilities and Service Systems (cont.)		
Impact UTIL-3: The Proposed Project would not require or result in construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)	Standard Condition of Approval UTIL-2: <i>Stormwater and Sewer</i> Standard Condition of Approval HYD-2 <i>Stormwater Pollution Prevention Plan</i> Standard Condition of Approval HYD-3 <i>Post-Construction Stormwater Pollution Management Plan</i>	Less than Significant
Impact UTIL-4: The Proposed Project would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs, and would not require or result in construction of landfill facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)	Standard Condition of Approval UTIL-1 <i>Waste Reduction and Recycling</i>	Less than Significant
Impact UTIL-5: The Proposed Project would not violate applicable federal, state and local statutes and regulations relating to energy standards; nor would result in a determination by the energy provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new energy facilities or expansion of existing facilities. (Less than Significant)	None Required	
Impact UTIL-6: The increased development resulting from the Proposed Project, in conjunction with population and density of other past, present, pending and reasonably foreseeable development in the City, would not result in cumulative impacts on utilities and service systems. (Less than Significant)	None Required	
NON-CEQA RECOMMENDED PROJECT-SPECIFIC CONDITIONS		
Recommendation TRANS-1: Increase sidewalk capacity on the north side of 20th Street between Broadway and Harrison Street.	Recommendation TRANS-1 includes: <ul style="list-style-type: none">Between Broadway and Franklin Street, remove parking and widen the sidewalk.Between Franklin Street and Webster Street, widen the sidewalk.Between Webster Street and Harrison Street, redesign the Project frontage to be pedestrian-friendly.	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-2: Reduce cycle times of signals at the intersections of Franklin Street / 20th Street and Webster Street / 20th Street.	Recommendation TRANS-2 includes: Reducing the cycle length of these signals from 80-second to 60- or 70-seconds.	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-3: Construct the 20th Street bikeway between Broadway and Harrison Street.	Recommendation TRANS-3 includes: Complete the Class 2 bicycle facilities (bicycle lanes) network between on 20th Street between Harrison Street and Franklin Street	Not Applicable. No CEQA Impact Identified.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
NON-CEQA RECOMMENDED PROJECT-SPECIFIC CONDITIONS (cont.)		
Recommendation TRANS-4: Improve bus waiting areas on 20th Street directly adjacent to the Project Site.	Recommendation TRANS-4 includes: <ul style="list-style-type: none"> • A large, visible system map (currently only a small area map is provided for the immediate vicinity surrounding the stop) and comprehensive area map showing bus stop locations for other lines in the area; • Bus schedules; and, • Real-time arrival information. • Wayfinding signage to transit facilities should also be provided on major pedestrian routes, such as 20th Street to and from the 19th Street BART Station. 	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-5: Close the Stanley Place approach at Intersection #1 (Harrison Street / Stanley Place / I-580 EB Off-Ramp).	Recommendation TRANS-5 includes: Closure of the Stanley Place minor approach at Intersection #1 (Harrison Street / Stanley Place / I-580 EB Off-Ramp).	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-6: Installation of a signalized mid-block crossing across Harrison Street between 20th Street and 21st Street.	Recommendation TRANS-6 includes: Installation of a signalized mid-block pedestrian crossing across Harrison Street between 20th Street and 21st Street under the Alternative Measure DD Configuration would require signal coordination with adjacent traffic signals at Harrison Street / 21st Street, Harrison Street / 20th Street / Kaiser Center Access Road, and other signals in the same signal coordination group. Due to the coordination, the pedestrian phase could be timed to coincide with periods of low arriving traffic flow from upstream intersections such that no additional intersection delay would be created. Instead, the signalized mid-block crossing would potentially improve operations along this corridor by "metering" traffic entering the ultimate bottleneck intersections at Harrison Street / Grand Avenue and Harrison Street / 20th Street / Kaiser Center Access Road. As a result, the crossing itself would not result in secondary impacts to other modes.	Not Applicable. No CEQA Impact Identified.

CHAPTER III

Project Description

A. Project Location and Site Characteristics

Project Location and Site Designations

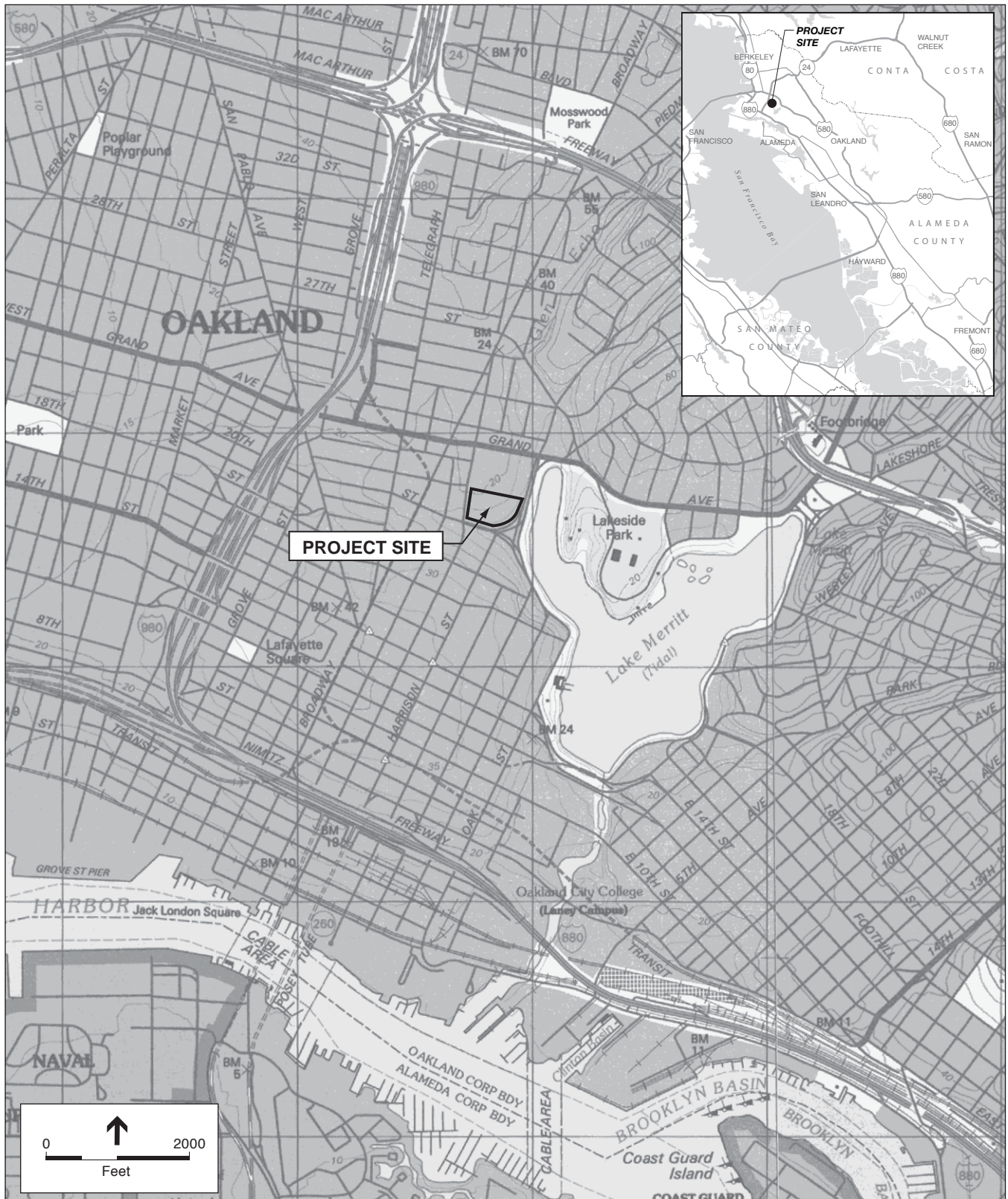
The Proposed Project would redevelop approximately 2.2 acres at the westernmost portion of the 7.2-acre Kaiser Center property (“Project Site”). The Kaiser Center Office Project site is located at the corners of Webster and 20th Streets, and Webster and 21st Streets, in the vicinity of downtown Oakland. As shown in **Figure III-1**, Regional and Site Location Map, and **Figure III-2**, Project Site and Surrounding Land Uses, the Project Site is bounded by Webster Street to the west, 20th Street to the south, Harrison Street to the east, and 21st Street to the north.

The Project Site is within the Central Business District land use designation identified in the Oakland General Plan. The zoning on the Project Site at the time the Project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone.¹ Zoning on the Project Site is shown in **Figure III-3**, General Plan Land Use Designations and Zoning. The intent of each of the relevant zoning districts is discussed in Section IV.H, *Land Use, Plans and Policies*, in Chapter IV of this EIR.

The entire Project Site is also located within the Lake Merritt Historic District. The Lake Merritt Historic District is described in detail in Chapter IV, Section D, *Cultural Resources*, of this EIR.

The Project Site is currently identified as Alameda County Assessor’s Parcel Number (APN) 008-0652-001-05. The parcel is owned by SIC-Lakeside Drive, LLC, an affiliate of The Swig Company, LLC (the Project Applicant). The Proposed Project seeks to subdivide the Project Site into four parcels, as shown in **Figure III-4**, Proposed Vesting Tentative Parcel Map. This would create a new parcel on the eastern side of the Project Site containing the existing Kaiser Center office tower, although no physical changes would occur to that portion of the Project Site or the building.

¹ Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial. However, pursuant to Section 6 of the rezoning ordinance, the Proposed Project is “grandfathered” under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such. Notwithstanding the project’s grandfathered status, the land uses proposed by the Project are generally consistent with the new CBD-C zoning.



SOURCE: USGS; ESA

Kaiser Oakland . 206213

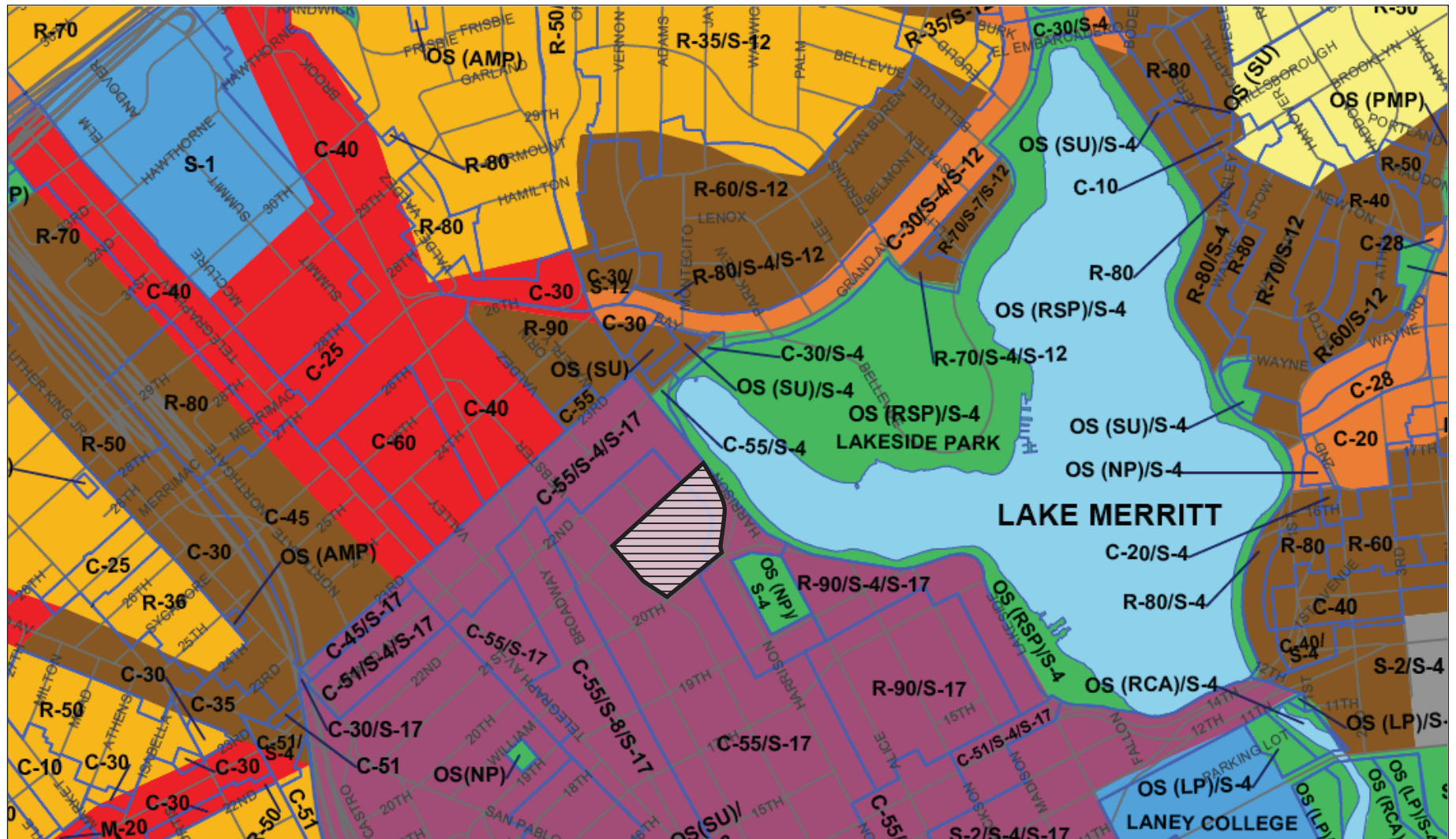
Figure III-1
Regional and Site Location Map



SOURCE: ESA

Kaiser Oakland . 206213

Figure III-2
Project Site and Surrounding Land Uses



RESIDENTIAL ZONING
 R-35 Special One-Family
 R-50 Medium Density
 R-60 Medium High Density
 R-70 High Density
 R-80 High-Rise Aptment
 R-90 Downtown Apartment

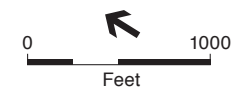
COMMERCIAL ZONING
 C-10 Local Retail
 C-20 Shopping Center
 C-25 Office Commercial
 C-28 Commercial Shopping District
 C-30 District Shopping
 C-35 District Shopping
 C-36 Boulevard Service
 C-40 Community Thoroughfare
 C-51 Central Business
 C-55 Central Core
 C-60 City Service

OPEN SPACE ZONING
 OS(LP) Local Retail
 OS(AMP) Shopping Center
 OS(NP) Office Commercial
 OS(RCA) Commercial Shopping District
 OS(RSP) District Shopping
 OS(SU) District Shopping

SPECIAL ZONING
 S-1 Medical Center
 S-2 Civic Center
 S-4 Design Review
 S-17 Downtown Residential
 Usable Open Space

GENERAL PLAN LAND USE
 Detached Unit Residential
 Mixed Housing Type Residential
 Urban Residential
 Neighborhood Center Mixed Use
 Community Commercial
 Housing and Business Mix
 Central Business District
 Institutional
 Urban Open Space

ZONING
 Zoning
 Project Site



SOURCE: City of Oakland

Kaiser Oakland . 206213

Figure III-3
 General Plan Land Use Designations and Zoning



Site Access

Principal roadways that provide local access to the Project Site include 20th Street, Webster Street, Harrison Street, and Grand Avenue. Regional access to the Project Site is provided by Interstate 580 (I-580), Interstate 880 (I-880), Interstate 980 (I-980), and State Route 24 (SR 24). The nearest access point to and from the regional network (via I-580) is approximate 1.5 miles east of the Project Site, at Grand Avenue. The 19th Street Oakland Bay Area Rapid Transit (BART) Station is located 2 blocks west of the Project Site with access to the station at Broadway and 20th Street.

Existing Project Site Characteristics

Existing Buildings and Uses

The Project Site is currently occupied by the 29-story Kaiser Center office tower at Harrison Street and Lakeside Drive, the 20th Street Mall, the Webster Street Mall, and a roof garden that is accessible by visitors to the Kaiser Center during business hours. The Proposed Project affects only the 20th Street Mall, the Webster Street Mall and a minor portion of the roof garden – a total of approximately 2.2 acres at the westernmost area of the Project Site. The 29-story Kaiser Center office tower is located on the eastern side of the Project Site, which will not be physically affected by the Proposed Project.

The 20th Street Mall is a three-story retail/office building that fronts Webster and 20th Streets and is approximately 58,190 square feet in floor area. Retail uses include a retail drug store, travel agency, florist, shoe repair, tax preparation, photocopying, and other similar small businesses on the first floor, and office space accounts for uses on the upper floors. The uppermost level of this building opens onto the existing Kaiser Center roof garden that is atop the existing parking garage (see Figure III-2, Project Site and Surrounding Land Uses). The roof garden was the first to be built in the United States after World War II. It is meticulously maintained and open to visitors to the Kaiser Center via pedestrian access from interior escalators from the street level of the 20th Street Mall, from the parking garage, and from a pedestrian bridge from the adjacent Kaiser Center office tower located on the east portion of the parcel.

The Webster Street Mall is an approximately three-story building along Webster Street and below the westernmost portion of the roof garden. It contains approximately 38,190 square feet of retail uses (currently a health club) and a portion of the existing parking garage. Access to the Webster Street Mall health club is from the existing parking garage or from the street.

A five-story parking garage exists in the central portion of the Project Site, below the roof garden, and has 1,340 spaces to serve the existing Mall buildings, the existing Kaiser Center office tower, and the Ordway Building (subject to the terms of a parking lease between the owner of the Ordway Building and the owner of the Project Site) across 21st Street to the north of the Project Site. There is vehicular access to the existing garage from 20th and 21st Streets.

Surrounding Area Characteristics

To the east the Project Site is bound by Harrison Street, and Lakeside Park and Lake Merritt exist immediately beyond Harrison Street and Lakeside Drive.

The 4.2-acre Snow Park is located southeast of the Project Site, across Harrison and 20th Streets, and uses south of the Project Site, across 20th Street, include the 27-story Lake Merritt Plaza tower and low-rise street-level retail uses.

Uses to the west, across Webster Street, include low- to mid-rise commercial uses (primarily financial institutions and commercial offices) and surface parking lots.

Uses to the north, across 21st Street, include the 20-story Pacific Bell/City National Bank Building tower, the 28-story Ordway Building tower, the 15-story AT&T Building and surface parking lots. The 148-foot tall Cathedral of Christ the Light is located one block northeast of the Project Site, at Grand Avenue and Harrison Street.

Figure III-2, Project Site and Surrounding Land Uses, shows the existing Project buildings and surrounding land use and development patterns.

B. Previous Approvals and Site Alterations

In 1982, Kaiser Center, Inc. obtained approval of a Preliminary Planned Unit Development (PUD) application to construct a phased integrated Master Plan commercial development of approximately 4.4 million square feet of a 14.7-acre site bounded by 20th Street, Webster Street, Harrison Street, and West Grand Avenue. The Master Plan area encompassed the current Proposed Project. The Master Plan was refined in 1986 to construct a phased integrated commercial development of approximately 3.5 million square feet of retail and office space on the 14.7-acre site. The Master Plan project was to be phased over a 15-year period. For unspecified reasons, both the 1982 and the 1986 Master Plans were never fully implemented, including on the Proposed Project Site.

Historically, the Kaiser Center Project Site was first designed and constructed between 1955 and 1959. The Center included the 29-story office tower, with three basement levels; a three-story department store; a five-level, 1,200-car parking garage; and a 3.5-acre garden (Kaiser Center roof garden) on the roof of the parking garage. From 1968 to 1970, a 28-story office tower (the Ordway Building) was planned and constructed to the north of the existing tower. In a 1971 site plan, an \$85 million expansion project was proposed, including a third office tower on the Project Site, but was never completed. In 2004, an Addendum EIR for the Cathedral of Christ the Light, adjacent to the Ordway Buildings, was prepared and subsequently adopted.

Subsequent alterations have occurred over several years in the 20th Street and Webster Street Mall buildings on the Project Site, including repairs and structural improvements after the Loma Prieta Earthquake in 1989. According to City of Oakland building permits records, tenant improvements to the interior of the 20th Street Mall occurred between 1965 and 1993 and to the interior of the Webster Street Mall between 1961 and 1991.

C. Objectives of the Proposed Project

The following Objectives are sought by the Proposed Project:

- Develop a high-quality office, retail and commercial Project which implements many area-specific and City-wide goals, objectives and policies of the General Plan and other City policies.
- Promote Downtown Oakland's position as a dynamic economic center for the region, by adding new jobs (achieving a better jobs/housing balance in the City), and retail and other business opportunities in high-quality, high-rise buildings in close proximity to BART and AC Transit lines.
- Further develop, support, revitalize and promote the distinct, attractive urban character of Kaiser Center and the Lake Merritt District through development of a Project that revitalizes Kaiser Center while also respecting its character defining features, maximizing the use of existing public and private infrastructure as well as mass transit, and enhancing the long-term social, cultural, environmental and economic sustainability of Kaiser Center, the District and the City.
- Fulfill other long-standing goals of more intensive development of Kaiser Center and the Kaiser Center Master Plan Area, which were initially established 28 years ago in the first long-range Master Plan for Kaiser Center approved by the City of Oakland in the 1982 Preliminary Development Plan (PDP) and subsequently reaffirmed in the 1986 Master Plan PDP Amendment and subsequent City development approvals based thereon.
- Create a modern, attractive and economically viable street-level retail promenade along 20th and Webster Streets in place of the dated and obsolete existing retail "Malls," thereby replacing the current poor pedestrian experience with a more vibrant pedestrian-friendly commercial area linking the Downtown core with Lake Merritt and Snow Park.
- Create a visually interesting and effective project design in harmony with the greater Kaiser Center and its immediate neighborhood that will respect and enhance important views in and of Downtown Oakland both from the new towers and the historic roof garden, and provide an attractive and lasting contribution to Oakland's urban fabric and skyline.
- Increase the size of and create greater public access to the historic roof garden, both from street level and through the new towers at the garden level, and create an enhanced pedestrian linkage between the street and garden.
- Retain and enhance the cohesive historic integrity of Kaiser Center, and maintain and enhance the integrity of the historic Lake Merritt District, through a project design that is compatible with yet differentiated from the design and materials of the existing Kaiser Center office tower and roof garden.
- Meet contemporary energy and design objectives by ensuring that the new towers meet mandatory performance standards equivalent to CALGreen requirements, and provide the opportunity for the Project, as part of its Greenhouse Gas Reduction Plan, to exceed such standards where feasible.
- Create an economically viable Project capable of attracting both construction and permanent financing and Class A office building tenants.

D. Project Components

This section describes the components of the Proposed Project, which constitute the CEQA “Project” analyzed in this EIR.

Proposed Development

The Proposed Project would demolish approximately 280,002 square feet of office and commercial/retail uses and construct approximately 1.47 million square feet (msf) of office and commercial/retail uses in two high-rise towers (see **Table III-1**, Proposed Project Compared to Existing Conditions). The existing development on the 2.2-acre portion of the Project Site would be demolished and replaced as part of the Proposed Project; the Kaiser Center roof garden will mostly remain intact, but will be reconfigured and expanded in some areas as described under *Open Space and Landscaping*, further in this chapter. A Proposed Project Site Plan is shown in **Figure III-5**.

A South Tower, 34 stories tall (469 feet tall), would be constructed at the corner of Webster and 20th Streets and a North Tower, 42 stories tall (573 feet), would be constructed at the corner of Webster and 21st Streets. Overall, the development would entail two to three underground parking levels, a three to four-story podium containing street-level retail, lobbies for the office towers, and two to three above-ground parking levels, and 28 to 36 office floors within the South and North Towers, respectively, above the podium. See **Figures III-6 and III-7** (Proposed Project Elevation Sections) and **Figures III-8, III-9 and III-10** (Conceptual Basement, First and Second Level Floor Plans).

The two towers would include a total of 1.32 million gross square feet of office space (replacing a total of 232,000 sf existing), and a total of 46,200 square feet of new commercial/retail space (replacing a total 48,000 sf existing). A total of approximately 22,300 square feet of commercial/retail space would be at street level on Webster and 20th streets frontages, as depicted in Figures III-6 and III-7 (Proposed Project Sections) and Figures III-9 and III-10 (Conceptual First and Second Level Floor Plans); and approximately 11,400 square feet and 12,500 square feet of commercial/retail space on the 6th floors (“Amenity Floors”) of the North Tower and South Tower, respectively. (The distribution of uses within each of the proposed towers and within the Amenity Floors is summarized in greater detail in Table III-2, Summary of Minor Project Changes Since the NOP.)

**TABLE III-1
PROPOSED PROJECT REDEVELOPMENT COMPARED TO EXISTING CONDITIONS**

	Total Existing	Existing to be Demolished	Existing to Remain	New (Proposed Project)	Total	Change (Net New)
Entire Kaiser Center Site (7.2 acres)						
Total Lot Area	311,741 GSF (7.2 acres)	0	311,741 GSF	0	311,741 GSF	0%
Total Building Footprint Area	197,460 GSF	74,900 GSF	122,560 GSF	80,168 GSF	202,728 GSF	+3% (5,268 GSF)
Total Floor Area	1,690,879 GSF	280,002 GSF	1,410,877 GSF ^b	1,830,984 GSF	3,241,861 GSF	+92% (1,550,982 GSF)
Building Height						
Maximum Stories (Built)	29	NA	29	34/42	NA	NA
Maximum Feet (Built)	386 feet	NA	386 feet	±573.5 feet	±573.5 feet	±573.5 feet
Number of Parking Spaces ^a	1,340	155	1185	852	2,037	+52% (697)
Total Proposed Project Square Footage (2.2 acres)						
Office	232,002 GSF	232,002 GSF	0	1,320,040 GSF	1,320,040 GSF	+469% (1,088,038 GSF)
Commercial / Retail	48,000 GSF	48,000 GSF	0	46,200 GSF	46,200 GSF	-4% (-1,800 GSF)
Other/Mech ^c	--	--	0	108,752 GSF	108,752 GSF	--
Total New Area Attributable to FAR:					1,474,992 GSF	--
Parking (stalls)	1,340	155	1,185	852	2,037	--
Total Project Floor Area (with parking)					1,830,984 GSF	--

GSF – gross square feet

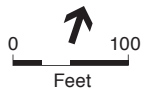
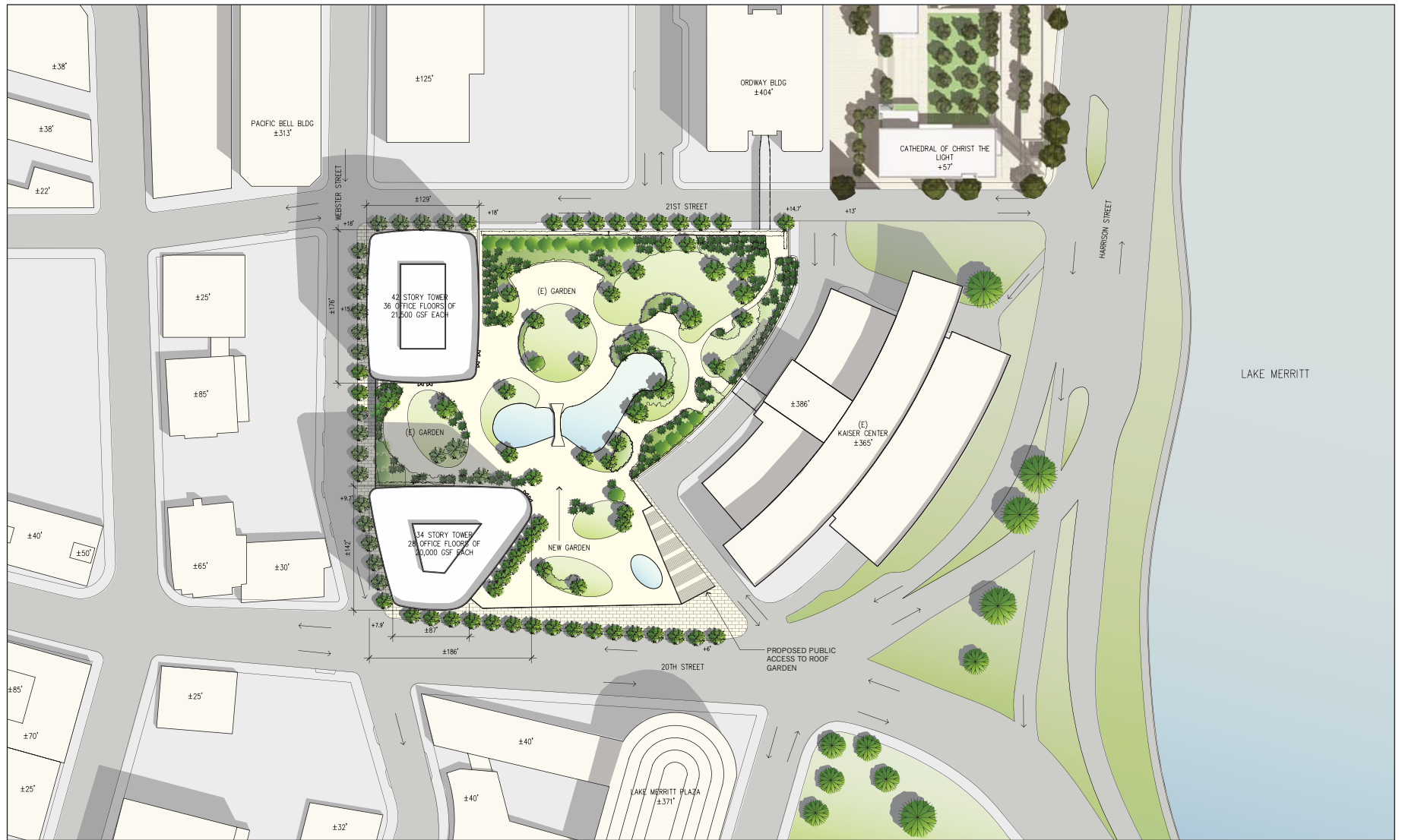
SF – square feet

a. Parking includes spaces reserved for existing Kaiser Center Office Tower and the Ordway Building.

b. Square footage figures for the existing 29-story Kaiser Center office building are not being altered as part of the proposed project.

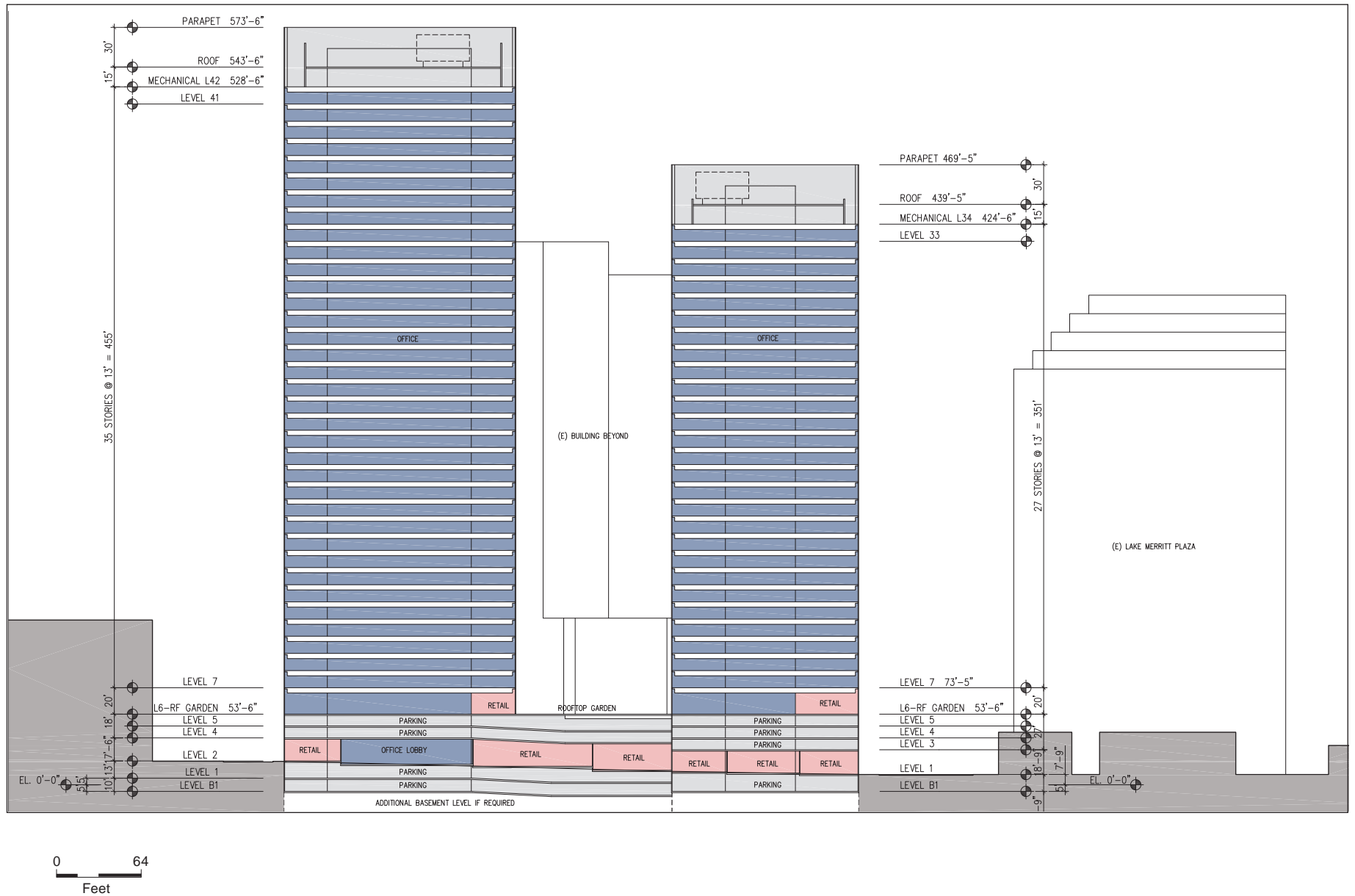
c. Other/Mechanical GSF and Parking GSF are included here to account for total GSF of the project; however, inclusion of these GSFs do not affect other analysis such as trip generations since this data would be included in the office/retail uses.

SOURCE: SOM, Project and Lot Information, Sheet ASK-047R2 and ASK 059R2, June 24, 2009; and The Swig Company, Memo to the City of Oakland, August 13, 2008 (memo incorrectly dated 2009).



SOURCE: SOM

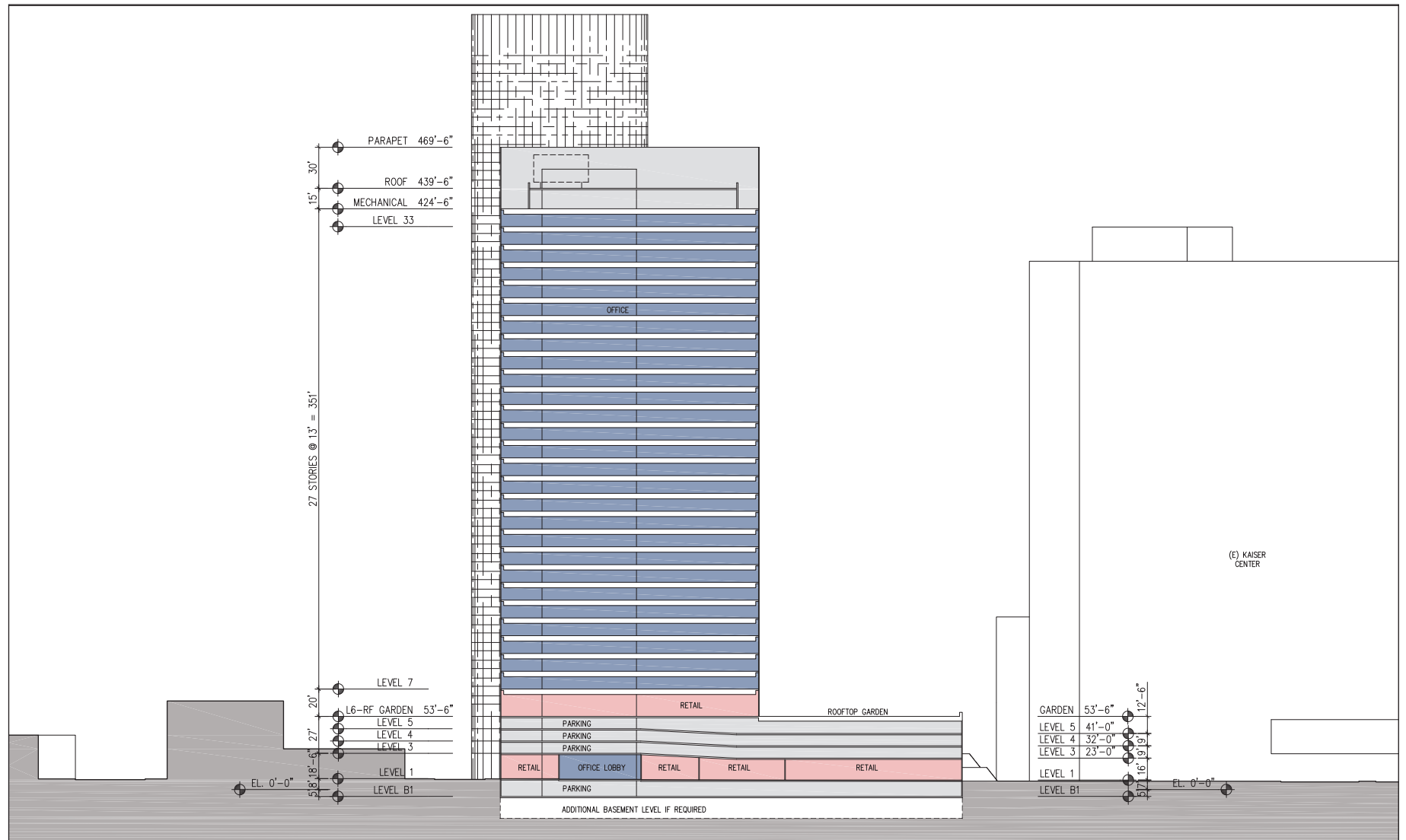
Kaiser Oakland . 206213
Figure III-5
 Proposed Project Site Plan



SOURCE: SOM

Kaiser Oakland . 206213

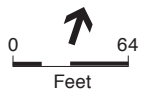
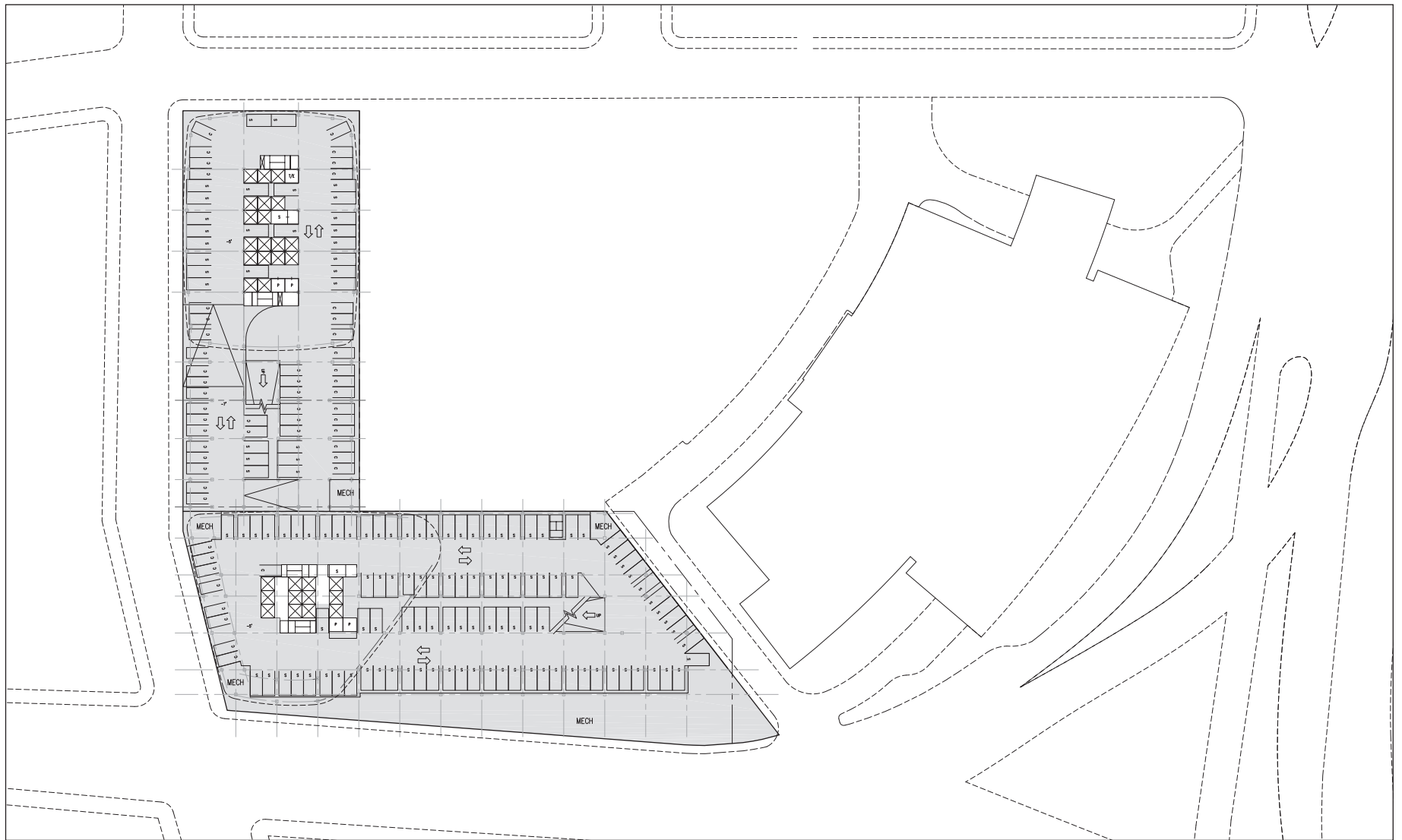
Figure III-6
Conceptual Project Building Section Looking East



SOURCE: SOM

Kaiser Oakland . 206213

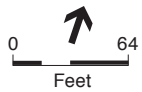
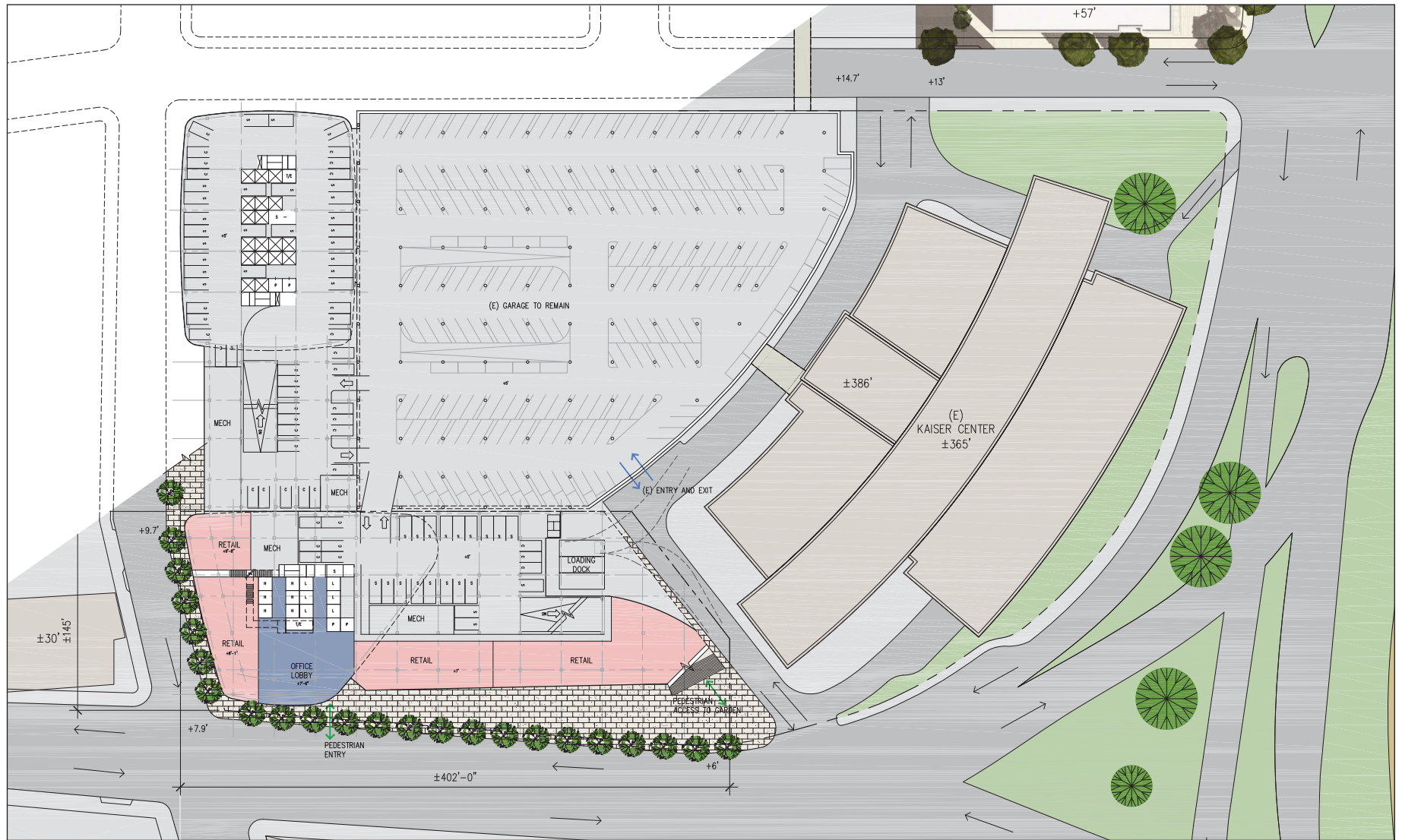
Figure III-7
Conceptual Project Building Section Looking North



SOURCE: SOM

Kaiser Oakland . 206213

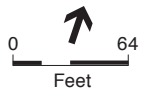
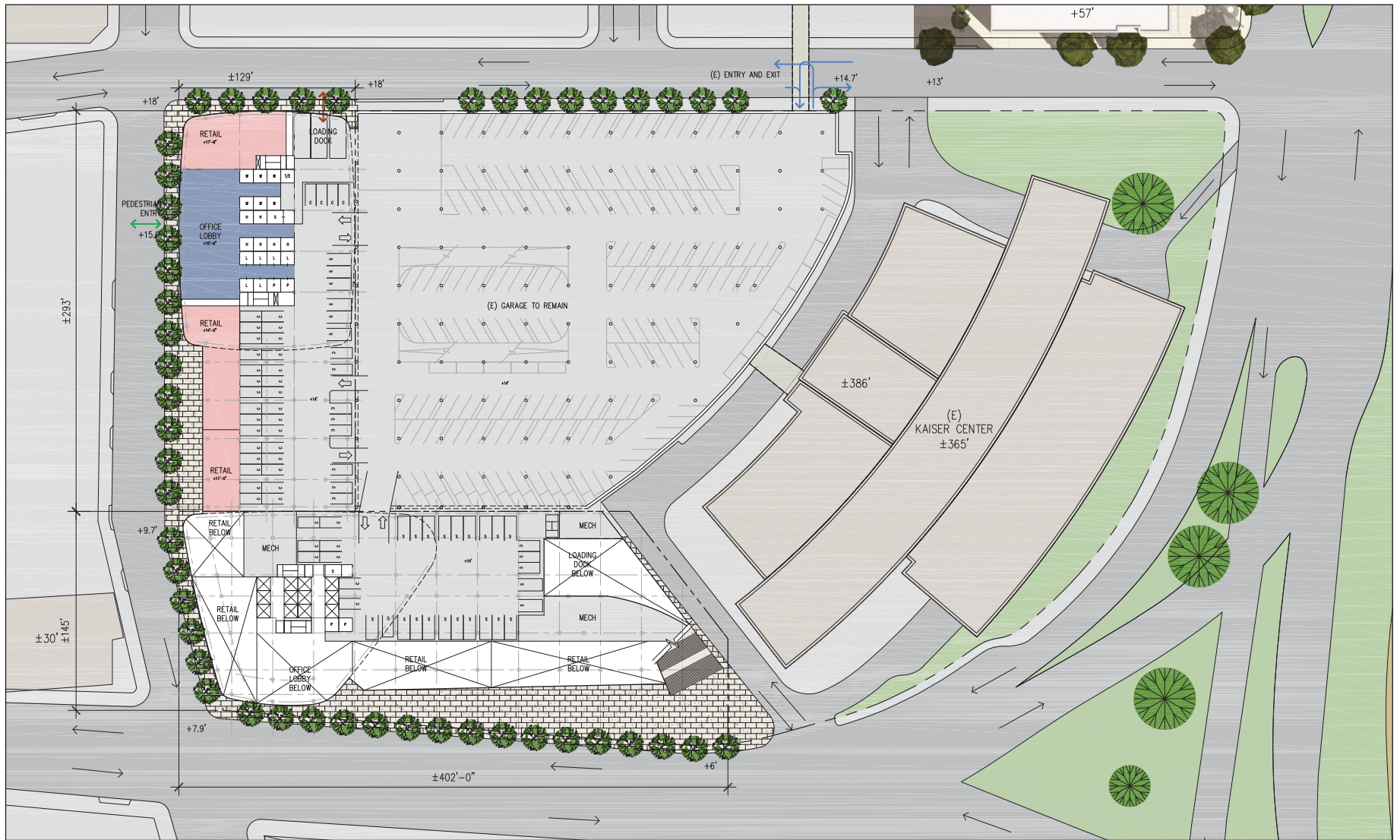
Figure III-8
 Conceptual Project -
 Basement Level Floor Plan



SOURCE: SOM

Kaiser Oakland . 206213

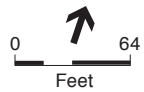
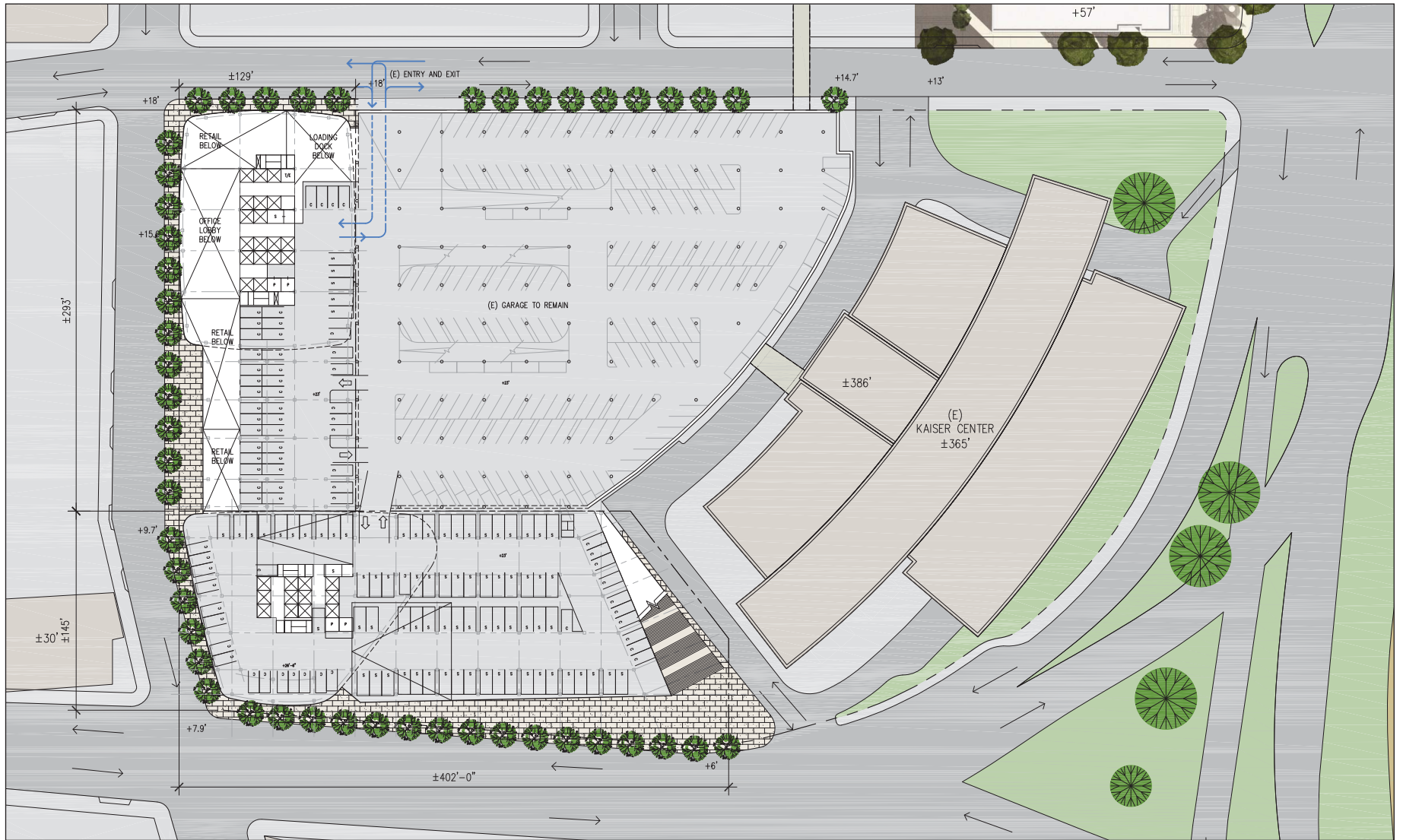
Figure III-9
Conceptual Project -
First Level Floor Plan



SOURCE: SOM

Kaiser Oakland . 206213

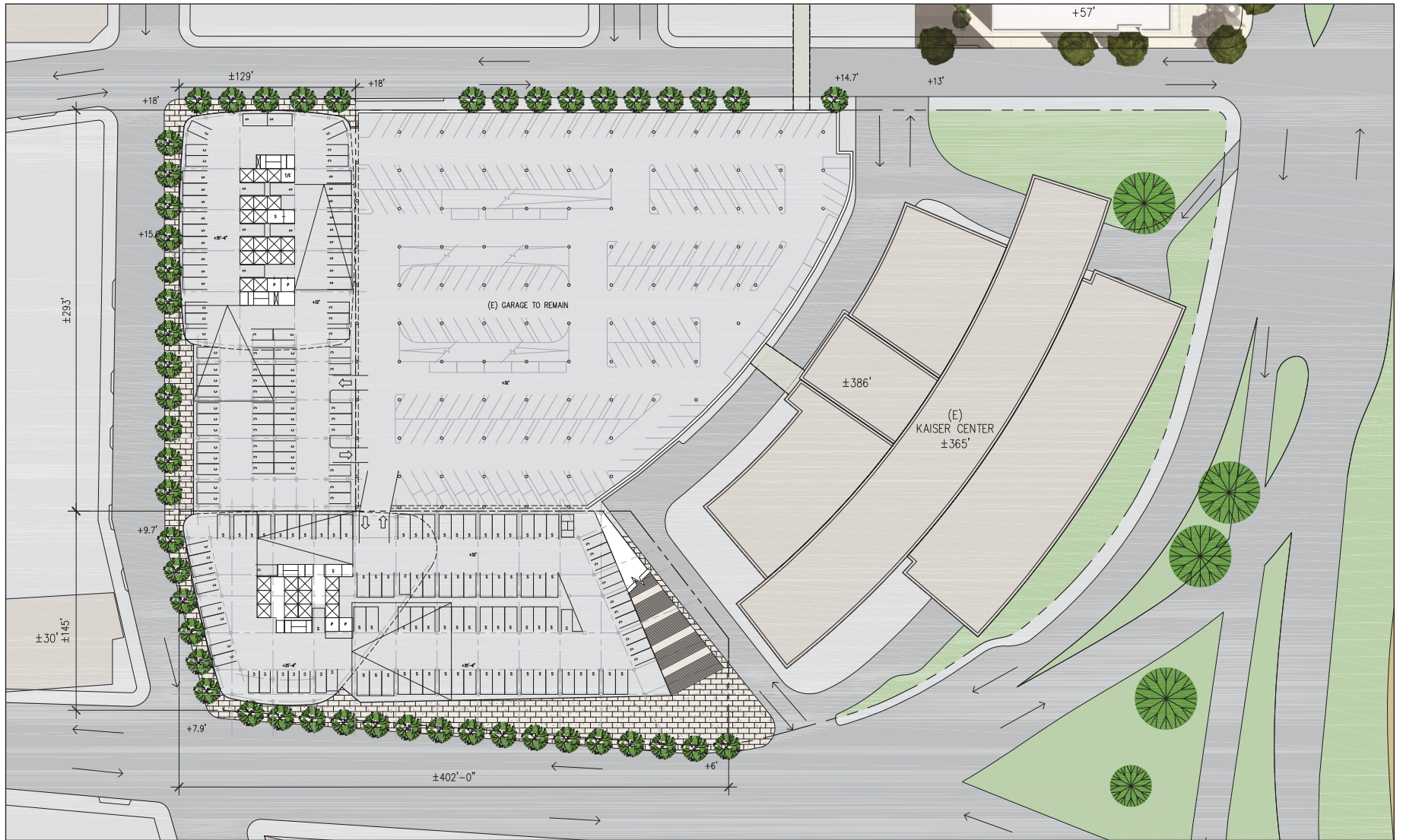
Figure III-10
 Conceptual Project -
 Second Level Floor Plan



SOURCE: SOM

Kaiser Oakland . 206213

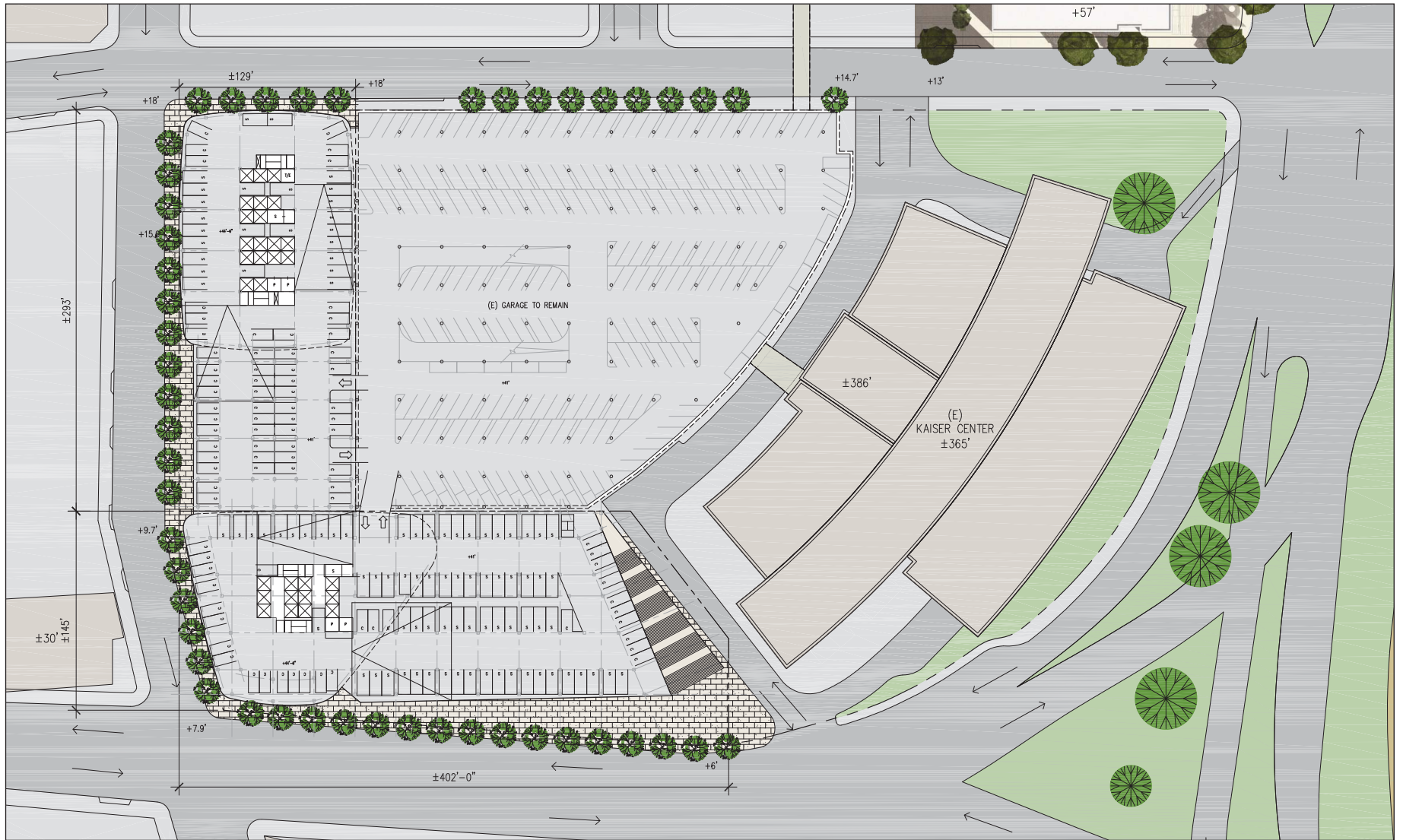
Figure III-11
Conceptual Project -
Third Level Floor Plan



SOURCE: SOM

Kaiser Oakland . 206213

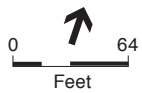
Figure III-12
Conceptual Project -
Fourth Level Floor Plan



SOURCE: SOM

Kaiser Oakland . 206213

Figure III-13
Conceptual Project -
Fifth Level Floor Plan



SOURCE: SOM

Kaiser Oakland . 206213

Figure III-14
 Conceptual Project -
 Sixth Level Floor Plan

Minor Modifications to the Building Program Since the NOP

In August 2008, the Project Applicant submitted to City of Oakland minor modifications to its original submittal for development and environmental review, which proposed the project generally described in the May 2008 NOP of this EIR. The proposed changes included:

- Designating a portion of the 6th floor level in the North Tower and the South Tower for commercial/retail uses instead of office uses as previously proposed; the 6th floor level (which is the Kaiser Center roof garden level) would be referred to as an “Amenity Floor” in each tower. Potential commercial/retail uses contemplated include office, restaurant, fitness facility, and other retail.
- Increasing the height of the 6th floor level Amenity Floor in the North Tower and the South Tower from 13 feet of floor-to-floor clear span to approximately 20 feet to accommodate the contemplated Amenity Floor uses.

**TABLE III-2
SUMMARY OF MINOR PROJECT CHANGES SINCE THE NOP**

	NOP Project	Proposed EIR Project	Difference
North Tower			
6th Floor Clear Height	13 feet	20 feet	+ 7 feet
Total Tower Height	566.5 feet	573.5 feet,	+ 7 feet
Total Stories (<i>unchanged</i>)	42	42	No difference
Total Square Footage (<i>unchanged</i>)	786,900 square feet	786,900 square feet	No difference
Office	779,500 square feet	768,100 square feet	- 11,400 square feet
6th Floor Commercial/Retail (approximate)	0 square feet	11,400 square feet	+ 11,400 square feet
Street Level Retail (<i>unchanged</i>)	7,400 square feet	7,400 square feet	No difference
South Tower			
6th Floor Clear Height	13 feet	20 feet	+ 7 feet
Total Tower Height	462.5 feet	469.5 feet	+ 7 feet
Total Stories (<i>unchanged</i>)	34	34	No difference
Total Square Footage (<i>unchanged</i>):	579,340 square feet	579,340 square feet	No difference
Office	564,440 square feet	551,940 square feet	- 12,500 square feet
6th Floor Commercial/Retail (approximate)	0 square feet	12,500 square feet	+ 12,500 square feet
Street Level Retail (<i>unchanged</i>)	14,900 square feet	14,900 square feet	No difference
Total Project			
Total Square Footage (<i>unchanged</i>):	1,366,240 square feet	1,366,240 square feet	No difference
Office	1,343,940 square feet	1,320,040 square feet	- 23,900 square feet
6th Floor Commercial/Retail (approximate)	0 square feet	23,900 square feet	+ 23,900 square feet
Street Level Retail (<i>unchanged</i>)	22,300 square feet	22,300 square feet	No difference

SOURCE: The Swig Company, 2008

The result of the 6th floor use changes (which is reflected in Table III-1) increases the proposed maximum height of the North Tower by approximately 7 feet and the South Tower by 7 feet², and alters the composition of designated uses in the Proposed Project. A tabulation of the changes is shown in Table III-2, Summary of Minor Project Changes Since the NOP.

Parking, Access and Circulation

The Project Site currently has 1,340 parking spaces. The Proposed Project would remove 155 existing parking spaces, and add approximately 852 new parking spaces in new subterranean and above-grade parking, resulting in an additional 697 net new parking spaces onsite (852 minus 155), for a total of 2,037 parking spaces and will be operated as a single garage shared between the existing Kaiser Center tower and the Project.³ Parking changes by Phase is as follows, and there would be no interim parking shortfall between Phases:

- Phase 1 (South Tower) of the Project would construct 467 new spaces, but would not demolish any existing spaces, resulting in a net increase of 467 spaces; and,
- Phase 2 (North Tower) of the Project would demolish 155 existing spaces and construct 385 new spaces, resulting in a net increase of 230 spaces.

After completion of the Project, the Kaiser Center Garage would have a capacity of 2,037 parking spaces and be operated as a single garage shared between the existing Kaiser Center tower and the Proposed Project towers.

Vehicular entrances to the Project Site would be via driveways on Harrison Street, 20th Street, and 21st Street, similar to existing access to the Project Site. Vehicular access to the garage structure would be provided via the existing entrances and exits located on 21st Street and via the access road on the eastern portion of the block.

Pedestrian entrances to the new office towers would be located on Harrison Street, Webster Street, and 20th Street. New pedestrian access to the Kaiser Center roof garden will be created with a new exterior “grand stairway” from 20th Street as well as from the 6th floor level of the North and South Towers (see **Figure III-14**, Conceptual Project, Sixth Level Floor Plan).

Open Space and Landscaping

The Proposed Project would relocate approximately 18,369 square feet of the northwest portion of the existing 122,606 square foot (total) roof garden (which is existing private open space accessible by visitors to the Kaiser Center located at the same level as the proposed 6th floor level of the new high-rise towers) to the southern portion of the site, which would result in a net increase of the roof garden by approximately 4,500 square feet. A new exterior staircase from

² The SOM diagram used as the basis of the NOP contained a typographical error identifying the proposed South Tower as 436'6", while in fact the proposed height of the South Tower in the NOP was 462'6."

³ For the purposes of the analysis in this EIR, all existing spaces in the Kaiser Center Garage, including spaces that would be removed and replaced as part of the Project, are not considered part of the Project's proposed parking supply. The proposed parking supply is equivalent to the net new parking as a result of the Project—in this case, 697 spaces.

20th Street up to the roof garden would be constructed to improve public access to the roof garden. Street trees would be planted along the perimeter of the site on 20th Street, Webster Street, and 21st Street. Proposed landscaping is shown in Figure III-14.

Utilities

The Project Site is fully developed and currently served by all existing utilities provided by local providers: water and wastewater (sewer) (East Bay Municipal Utilities District), stormwater drainage (Alameda County Flood Control and Water Conservation District and Oakland Public Works Agency, electricity and gas service (Pacific Gas & Electric), as well as solid waste service (Waste Management of Alameda County). A detailed description of the existing site utilities is presented in Section IV.M, *Utilities and Service Systems*, of this Draft EIR.

Demolition and Construction Phasing

It is anticipated that the Proposed Project would be constructed in two phases over a period of approximately seven years, with the actual start dates and construction periods depending upon market conditions at the time. The first phase would construct the 34-story South Tower (replacing the 20th Street Mall building), including the additional roof garden space and the access stairs from 20th Street. The second phase would begin after the South Tower is near complete and would construct the 42-story North Tower (replacing the Webster Street Mall building), including removal of the westernmost portion of the roof garden.

Phase 1 (South Tower) demolition and construction activities would occur for approximately four years: Demolition of the existing 20th Street Mall building would occur approximately from late in year two through early year three. Construction of the South Tower would begin approximately at the beginning of the year three and continue through the end of year four. Occupancy of the South Tower is anticipated in year four. As discussed above, in Phase 1 (South Tower), the Project would construct 467 new parking spaces, but would not demolish any existing parking spaces, resulting in a net increase of 467 parking spaces.

Phase 2 (North Tower) demolition and construction activities would occur for approximately four years. Demolition of the existing building and designated areas of the roof garden is projected to begin a few months after completion of the South Tower in year four, and continue for approximately six months. Construction of the North Tower would begin in year five and continue for approximately two years thereafter, to year seven. Occupancy of the North Tower is anticipated to occur approximately at the end of year seven. As discussed previously, Phase 2 (North Tower) would demolish 155 existing parking spaces and construct 385 new parking spaces, resulting in a net increase of 230 parking spaces.

Demolition and Construction Activities

The Proposed Project would demolish the existing retail frontage and mall buildings along 20th and Webster Streets to construct the new development. Some of the structures that would be demolished may have asbestos-containing materials and lead-based paint, which would be removed in accordance with all regulatory requirements prior to demolition. The Proposed Project

will also require demolition of paving and other site materials to accommodate new circulation, parking and site development areas. The Kaiser Center roof garden will mostly remain intact, but will be reconfigured in some areas as described under *Open Space and Landscaping*, above.

Excavation will be required to accommodate subsurface development of new parking areas. Construction of the new office towers may be supported on deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system.

The Project Applicant proposes to establish a construction debris recycling program throughout demolition and construction of the Project, which would assume 50 percent materials recycled or reused. Concrete materials, in particular, not needed for the Proposed Project would be hauled from the site for recycled material reuse.

Table III-3 below presents a preliminary summary of proposed construction activity anticipated for the Proposed Project and relevant to the environmental analysis:

**TABLE III-3
PRELIMINARY CONSTRUCTION ACTIVITY SUMMARY**

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Construction Vehicle Type/Number of Trips		
Off Haul Trucks (excavation materials)	3,100 truck loads	100 truck loads
Debris Box Trucking	260 truck loads	300 truck loads
Delivery Trucks	5,500 truck loads	6,000 truck loads
Passenger Vehicles (incl. construction employees)	140 cars per day average, 250 cars peak	140 cars per day average, 250 cars peak
Mobile Cranes	Intermittent use	Intermittent use
Construction Traffic Routes		
Interstate 580	To Harrison St to job site	To Harrison St to job site
Interstate 880	To Harrison St job site	To Harrison St job site
Interstate 980	To 27th St to Harrison St to job site	To 27th St to Harrison St to job site
Staging Areas/Lane or Street Closures		
Street	Close one lane (no parking) of 20th St and one lane (parking) of Webster St.	Close one lane (parking) of Webster St and one lane (parking) of 21st St
Sidewalk	Close 20th St and Webster St sidewalks (adjacent to Project Site)	Close sidewalks on Webster and 21st streets (adjacent to Project Site)
Construction Workers/Day		
Average number of workers	212	212
Peak	380	380
Parking	Existing onsite garage or surface lots in the vicinity	Existing onsite garage or surface lots in the vicinity
Estimated Cut/Fill; Mass Excavation	31,000 cubic yards	Minimal (existing building demolition)
Number of Truck Trips (Off Haul)		
Demolition Debris	800 truck loads	1,000 truck loads
Excavated Material	3,100 truck loads	100 truck loads

TABLE III-3 (CONTINUED)
PRELIMINARY CONSTRUCTION ACTIVITY SUMMARY

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Anticipated Disposal Sites		
Disposal of demolition debris	Pursuant to Oakland Municipal Code 15.34: To obtain a Building Permit for demolition and construction of non-residential projects, Project Applicant is required to have an approved Waste Reduction & Recycling Plan (WRRP) demonstrating compliance with the City's goal of reducing the quantity of construction and demolition debris disposed of at landfills by 50% or greater. 50% to be recycled. Demolition debris will be trucked to Davis Street Transfer Station in San Leandro. 50% will be landfilled.	
Disposal of excavated materials	Legal disposal site, pursuant to Env. Site Assessment	Legal disposal site, pursuant to Env. Site Assessment
Pile Driving		
Number, location, duration	525 piles; 20 piles per day = approx. 6 weeks.	525 piles; 20 piles per day = approx. 6 weeks.
Solider pile shoring	28,000 sq ft; approx. 6 weeks duration	28,000 sq ft; approx. 6 weeks duration
Water Runoff Plan		
SWPPP Plan	Compliance with SWPPP, which will include all necessary measures to minimize stormwater runoff from the site during construction. Stormwater runoff to be filtered at runoff locations and storm drain inlets. Dust and mud to be contained onsite.	Compliance with SWPPP, which will include all necessary measures to minimize stormwater runoff from the site during construction. Stormwater runoff to be filtered at runoff locations and storm drain inlets. Dust and mud to be contained onsite.
Containment	Onsite storage tanks to contain stormwater and groundwater.	Onsite storage tanks to contain stormwater and groundwater.
Filtration	Filtration at all points of runoff from the site with hay bales and filter fabric. Add'l filtration at all city storm drain inlets.	Filtration at all points of runoff from the site with hay bales and filter fabric. Add'l filtration at all city storm drain inlets.
Estimated Energy Consumption		
Electricity	1,300,000 kW hours	1,450,000 kW hours
Diesel	Negligible except for delivery trucks	Negligible except for delivery trucks
Estimated Water Consumption	55,000 gallons	65,000 gallons
Anticipated Building Materials	Steel, Concrete, Glass, Aluminum, Precast Concrete, Lumber	Steel, Concrete, Glass, Aluminum, Precast Concrete, Lumber

SOURCE: Turner Construction, February 23, 2009, Revised February 26, 2009

E. Required Public Agency Approvals and Utility Providers

As discussed in Chapter I (Introduction), the City of Oakland Community and Economic Development Agency (CEDA) is the Lead Agency responsible for preparation and certification of this EIR (pursuant to CEQA Guidelines Section 15051). This EIR is intended to be used to provide CEQA clearance for all required discretionary actions for the Proposed Project. The Planning Commission will make decisions on the required discretionary actions. At the time this EIR was prepared, the

discretionary actions and other considerations and approvals anticipated to be required for the Proposed Project include those listed below, without limitation.

City of Oakland

Preliminary Development Plan (PDP) and Design Review for a Planned Unit Development (PUD) (Oakland Planning Code Chapter 17.140) – The Project Applicant seeks approval of a Planned Unit Development (PUD), for which it is required to prepare and obtain approval for an overall Preliminary Development Plan (PDP) for the entire Project Site and, subsequently, one or more Final Development Plan(s) (FDPs) and Final Design Reviews prior to implementation of each site during phased development. The Project Applicant would be required to prepare the FDP that provides more detailed building and landscaping plans and elevations; plans for street improvements; grading or earth-moving plans; the location of water, sewer, and drainage facilities; among other detailed documents regarding site development. The FDP process provides flexibility in making design adjustments and responding to market conditions as the Project develops. The Planning Commission would be required to review the PDP and FDP and conduct Final Design Review(s). To the extent that the City determines any proposed future changes to the Project substantially exceed the Project described and analyzed herein, further environmental review would be conducted pursuant to CEQA Guidelines Sections 15162, 15163 or 15164.

- **Vesting Tentative Parcel Map (VTM)** (Oakland Municipal Code Title 16) – The Project would be required to obtain approval from the City for a vesting tentative map and parcel map to subdivide the Project Site. The Applicant's application for the required VTM was determined by the City to be complete as of March 16, 2010.
- **Tree Removal Permit** (Oakland Municipal Code Chapter 12.36) - Pursuant to the City's Protected Trees Ordinance, the Project Applicant would be required to obtain an approved Tree Removal Permit prior to removal of (or construction activity near) a "Protected Tree," as defined in Oakland Municipal Code Chapter 12.36.020. Tree permits would require approval by the Oakland Public Works Agency – Tree Division.
- **Encroachment Permits** (Oakland Municipal Code Chapter 12.08) – The Project would require City approval of encroachment permits to work within various public rights of way.
- **Demolition Permits** (Oakland Municipal Code Chapter 15.36) – The Project would require administrative approval of demolition permits to demolish existing buildings and structures on the Project Site.
- **Excavation Permits** (Oakland Municipal Code Chapter 12.12) – The Project would require City approval of excavation permits to conduct excavation activities on the Project Site.
- **P-Job Permit** (Oakland Municipal Code Chapter 12.20) – The Project would require City approval of a P-Job permit for the privately-sponsored construction of improvements within the public right-of-way.
- **Other Various Building Permits** (Oakland Municipal Code Title 15) - The Project would require City approval of all other permits required for Project construction on the Project Site.
- **Development Agreement** (Oakland Municipal Code Chapter 17.138). At the time of publication of this Draft EIR, Applicant has not elected to seek approval of a development Agreement with the City, but Applicant reserves the right to do so.

Other Agencies

The Proposed Project may also require review and approval by other public and quasi-public agencies and jurisdictions that have purview over specific aspects of the Project, and include those listed below, without limitation. These other agencies may also consider this EIR in their review and decision-making processes. A description and discussion of each action and agency/jurisdiction is included within the relevant topical analysis sections in Chapter IV, Environmental Setting, Impacts, SCAs, and Mitigation Measures, of this EIR. These potential other agencies with purview over aspects of the Proposed Project are listed below:

- California State Water Resource Control Board – San Francisco Region (RWQCB)
- California Department of Toxic Substances Control (DTSC)
- Alameda County Airport Land Use Commission (ALUC)
- California Department of Transportation (Caltrans)
- Federal Aviation Administration (FAA)

References – Project Description

CFR Title 14 Part 77.13

SOM, Project and Lot Information, Sheet ASK-047R2 and ASK 059R2, June 24, 2009.

The Swig Company, Memo to City of Oakland, August 13, 2008 (memo incorrectly dated 2009).

Turner Construction, “Kaiser Towers DEIR: Construction Impact Summary Data Matrix,” February 23, 2009, revised February 26, 2009.

CHAPTER IV

Environmental Setting, Impacts, Standard Conditions of Approval and Mitigation Measures

This Draft EIR has been prepared in accordance with CEQA, as amended (Public Resources Code Section 21000, et seq.), and the State CEQA Guidelines (California Code of Regulations sections 15000 through 15378).

This chapter contains the analysis of the Proposed Project's potential effects to environmental topics considered under CEQA. Sections A through M of this chapter describe the existing setting for each topic, the potential impacts that could result from the Proposed Project, relevant plans and policies, and Standard Conditions of Approval (SCAs) that would minimize or avoid potential adverse environmental effects that could result from the Proposed Project, and mitigation measures necessary to reduce the potential impacts resulting from the Proposed Project.

The following provides an overview of the scope of the analysis included in this chapter, organization of the sections, the methods for determining what impacts are significant, and the applicability of the City's "Uniformly Applied Development Standards and Standard Conditions of Approval."

Environmental Topics

The following environmental topics are analyzed in the following section in this chapter, as presented in the Table of Contents at the front of this document:

- A. Aesthetics, Shadow and Wind
- B. Air Quality
- C. Biological Resources
- D. Cultural Resources
- E. Geology, Soils and Geohazards
- F. Hazards and Hazardous Materials
- G. Hydrology and Water Quality
- H. Land Use, Plans and Policies
- I. Noise
- J. Population and Housing
- K. Public Services and Recreation Facilities
- L. Traffic, Transportation, Circulation and Parking
- M. Utilities, Service Systems and Energy

Agricultural Resources and Mineral Resources were determined not to be directly relevant to the Proposed Project and are briefly discussed in Chapter VI, *Impact Overview and Growth Inducement*, under Section E, Effects Found Not to be Significant.

Format of Environmental Topic Sections, Impact Statements, and Mitigation Measures

Each environmental topic section generally includes two main subsections:

- *Existing Setting*, which includes baseline conditions, regulatory setting, Thresholds/Criteria of Significance, and identification of applicable Standard Conditions of Approval (which are discussed under subheading D, below); and
- *Impacts Analysis*, which identifies and discusses the potential impact and cites applicable Standard Conditions of Approval and mitigation measures that would, to the extent possible, reduce or eliminate adverse impacts identified in this chapter.

This EIR identifies all impacts with an abbreviated designation that corresponds to the environmental topic addressed (e.g., “HAZ” for hazardous materials). The topic designator is followed by a number that indicates the sequence in which the impact statement occurs within the section. For example, “Impact HAZ-1” is the first (i.e., “1”) hazardous materials impact identified in the EIR. All impact statements are presented in bold text.

Similarly, each mitigation measure is numbered to correspond with the impact that it addresses. Where multiple mitigation measures address a single impact, each mitigation measure is numbered sequentially. For example “Mitigation Measure HAZ-1.1” is the first mitigation identified to address the first hazardous materials impact (i.e., “HAZ”). All mitigation measure statements are presented in bold text.

Thresholds/Criteria of Significance

Under CEQA, a significant effect is determined as a substantial, or potentially substantial, adverse change in the environment (Public Resources Code Section 21068). Each *Impact Analysis* discussion in this chapter is prefaced by significance criteria, which are the thresholds for determining whether an impact is significant.

The significance criteria used in this EIR are from the City of Oakland’s Thresholds/Criteria of Significance Guidelines. The City has established these Thresholds/Criteria of Significance Guidelines to help clarify and standardize analysis and decision-making in the environmental review process in the City of Oakland. The Thresholds are offered as guidance in preparing environmental review documents. The City requires use of its Thresholds unless the location of the project or other unique factors warrants the use of different thresholds. The Thresholds are intended to implement and supplement provisions in the CEQA Guidelines for determining the significance of environmental effects, including CEQA Guidelines Sections 15064, 15064.5, 15065, 15382, and Appendix G,

and form the basis of the City's Initial Study and Environmental Review Checklist (although one was not prepared for this Proposed Project to scope this EIR).

The Thresholds are intended to be used in conjunction with the City's "Uniformly Applied Development Standards and Conditions of Approval" (see discussion under subheading D, below), which are incorporated into projects as Conditions of Approval regardless of the determination regarding a project's environmental impacts.

Uniformly Applied Development Standards and Conditions of Approval

The City's Uniformly Applied Development Standards and Conditions of Approval (referred to in the EIR as "Standard Conditions of Approval" or SCA) are incorporated into projects as conditions of approval regardless of a project's environmental determination. As applicable, the SCAs are adopted as requirements of an individual project when it is approved by the City and are designed to, and will, substantially mitigate environmental effects.

In reviewing project applications, the City determines which SCAs are applied, based upon the zoning district, community plan, and the type(s) of permit(s)/approval(s) required for the project. Depending on the specific characteristics of the project type and/or project site, the City will determine which SCAs apply to a specific project. For example, SCAs related to creek protection permits will only be applied to projects on creekside properties.

All relevant SCAs have been incorporated as part of the Kaiser Center Project and are appropriately identified in each environmental topic section. Because SCAs are mandatory City requirements, the impact analysis assumes that these will be imposed and implemented by a project. If a SCA would reduce a potentially significant impact to less than significant, the impact is determined to be less than significant and no mitigation is imposed.

The SCAs incorporate development policies and standards from various adopted plans, policies, and ordinances, such as the Oakland Planning and Municipal Codes, Oakland General Plan Elements, including Land Use and Transportation Element (LUTE), Open Space Conservation and Resources (OSCAR), and Historic Preservation Element (HPE); Oakland Creek Protection, Stormwater Management and Discharge Control Ordinance, Oakland Tree Protection Ordinance, Oakland Grading Regulations, National Pollutant Discharge Elimination System [NPDES] permit requirements, California Building Code, and Uniform Fire Code, which have been found to substantially mitigate environmental effects. Where there are peculiar circumstances associated with a project or project site that will result in significant environmental impacts despite implementation of the SCAs, the City will determine whether there are feasible mitigation measures to reduce the impact to less than significant levels.

Recommended Conditions and Project-Specific Conditions of Approval

Although not required by CEQA, certain “Recommended Conditions” are included the *Transportation and Circulation* section of this EIR with respect to certain improvements that are not necessary to address or mitigate any environmental impacts of the Project but nevertheless are recommended herein by City Staff. These recommendations will be considered by decision makers during the course of Project review and may be imposed as Project-Specific Conditions of Approval.

Other “Project-Specific Conditions of Approval” supplement SCAs and are specific to the Project as they are identified in technical studies or reports prepared for the Project. Project-Specific Conditions of Approval are identified in the *Geology, Soils and Geohazards* and the *Public Services and Recreation Facilities* sections of this EIR, as well as in Table II-1.

Impact Classifications

The following level of significance classifications are used throughout the impact analysis in this EIR:

- **Less than Significant (LS)** – The impacts of the Proposed Project, either before or after implementation of SCAs or feasible mitigation measures, do not reach or exceed the defined Threshold/Criteria of Significance. Generally, no mitigation measure is required for a LS impact.
- **Potentially Significant (PS)** – The impact of the Proposed Project may reach or exceed the defined Threshold/Criteria of Significance, however it is not evident that, even in the theoretical worst-case standard conditions, a significant impact would occur. Where feasible, SCAs and/or mitigation measures are identified to reduce the PS impact to LS.
- **Significant (S) and Significant Unavoidable (SU)** – The impact of the Proposed Project reaches or exceeds the defined Threshold/Criteria of Significance. No SCA or feasible mitigation measure is available to reduce the S impact to LS. In these cases, feasible mitigation measures are identified to reduce the S impact to the maximum feasible extent, and the significant impact is considered SU. Impacts are also classified as SU if a feasible mitigation measure is identified that would reduce the impact to LS, but the approval and/or implementation of the mitigation measure is not within the City of Oakland’s or the project Applicant’s sole control, in which case the analysis cannot presume implementation of the mitigation measure and the resulting LS impact. It is important to clarify that SU is an impact classification that only applies *after* consideration of feasible mitigation measures.
- **No Impact** – No noticeable adverse effect on the environment would occur.

Environmental Baseline

Overall, pursuant to Section 15125(a) of the CEQA Guidelines, this EIR measures the physical impacts of the proposed project against a “baseline” of physical environmental conditions at and near the Proposed Project. The environmental “baseline” is the combined circumstances existing around the time the NOP of the EIR was published, which is March 2008.¹ In most cases, the

¹ Except as specified otherwise, any reference to “existing” conditions throughout this EIR refers to the baseline condition as of about March 2008.

baseline condition relevant to the environmental topic being analyzed is described within each environmental topic section in this chapter. In some cases (such as Section IV.B, *Aesthetics*, Section IV.C, *Transportation, Circulation and Parking*, and IV.K, *Population, Housing and Employment*), discussion of the baseline condition is detailed or restated in the *Impacts Analysis* to provide the impact analysis in the most reader-friendly format and organization. The baseline also includes the policy and planning context in which the project is proposed. This is discussed in detail within Section IV.H, *Land Use, Plans and Policies*, and identifies any inconsistencies between the Proposed Project and applicable, currently adopted plans and policies.

Cumulative Analysis

Approach

CEQA defines cumulative as “two or more individual effects which, when considered together, are considerable, or which can compound or increase other environmental impact.” Section 15130 of the CEQA Guidelines requires that an EIR evaluate potential environmental impacts when the project’s incremental effect is cumulative considerable. “Cumulatively considerable” means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. These impacts can result from a combination of the Proposed Project together with other projects causing related impacts. “The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonable foreseeable probable future projects.” The City of Oakland’s analysis approach specifies that “past, present, existing, approved, pending and reasonably foreseeable future projects” should be included as part of the cumulative analysis.

Context

The context used for assessing cumulative impacts typically varies depending on the specific topic being analyzed. For example, considerations for the cumulative air quality analysis are different from those used for the cumulative analysis of aesthetics. In assessing aesthetic impacts, only development within the vicinity of the project would contribute to a cumulative visual effect. In assessing air quality impacts, on the other hand, all development within the air basin contributes to regional emissions of criteria pollutants, and basin-wide projections of emissions is the best tool for determining the cumulative effect. Accordingly, the geographic setting and other parameters of each cumulative analysis discussion can vary.

Generally, to establish a partial baseline for cumulative analysis, the City of Oakland’s Major Projects list was used, in part, to determine past, present, existing, approved, pending and reasonably foreseeable future projects in the vicinity of the Kaiser Center. The geographic areas near the Project Site include Downtown/Central Oakland, Uptown, and Lake Merritt Business District. Major projects from the City’s Major Projects List that pertain to the Kaiser Center vicinity are summarized in **Table IV-1**, below. The major projects listed in Table IV-1 are not inclusive of all

possible past major projects; projects not listed were no longer maintained on the City's list as of March 2008 but are part of the baseline assumptions for the analysis in this EIR. Additional development projects that are not on the City's Major Projects list have also been considered for the cumulative assessment of certain topic areas and are identified in the appropriate environmental topic section in Chapter IV of this Draft EIR. Specifically, a more detailed cumulative list of projects was identified in order to analyze cumulative visual, wind and shadow effects in the project area, given the site specific and localized nature of these effects. Moreover, the transportation analyses (and transportation-related traffic and air quality) used the Alameda County Congestion Management Analysis (ACCMA) travel demand model which requires inputs at the traffic analysis zones (TAZ) level.

**TABLE IV-1
LIST OF RELEVANT CUMULATIVE PROJECTS FROM THE CITY'S MAJOR PROJECT LIST
(MAR-APRIL 2008)**

Project Name	Components
Emerald Views Development Project (Formerly 222 19th Street Development Project)	<ul style="list-style-type: none"> ▪ 370 residential units ▪ 933 s.f. cafe
1938 Broadway	<ul style="list-style-type: none"> ▪ approx. 85,200 s.f. retail/fitness club ▪ approx. 829,500 s.f. commercial space ▪ 220 residential units ▪ 384 parking stalls ▪ Rehabilitation of the Tapscott Building
401 Alice Street	<ul style="list-style-type: none"> ▪ 58 condominium units ▪ 5 flex units
1309 Madison Street	<ul style="list-style-type: none"> ▪ 72 condominium units
Uptown Parcel 4 (Telegraph/19th Street)	<ul style="list-style-type: none"> ▪ 370 residential units
1443 Alice Street	<ul style="list-style-type: none"> ▪ 245 residential units
325 7th Street	<ul style="list-style-type: none"> ▪ 382 residential units ▪ 9,000 s.f. commercial
Broadway West Grand (formerly known as Negherbon Mixed Use Project) 2345 Broadway	Parcel B <ul style="list-style-type: none"> ▪ 367 residential units ▪ 8,500 s.f. retail
1640 Broadway Mixed Use Project	<ul style="list-style-type: none"> ▪ 177,600 s.f. of office ▪ 4,710 s.f. ground floor retail ▪ Structured parking ▪ Alternative approved for 254 residential units with ground floor retail
Jack London Square Redevelopment	<ul style="list-style-type: none"> ▪ 1.2 million s.f. of mixed-use retail, commercial, and office ▪ 1,700 seat movie theater ▪ 250 room hotel ▪ Supermarket, restaurants, and offices
Mandela Transit Village 1357 5th Street	<ul style="list-style-type: none"> ▪ 120 residential units ▪ 38,500 s.f. commercial
188 11th Street	<ul style="list-style-type: none"> ▪ 287 residential units ▪ 3,660 s.f. retail
Valdez & 23rd Street Project	<ul style="list-style-type: none"> ▪ 281 residential units ▪ 500 car parking structure including 250 public spaces ▪ 12,000 s.f. retail
2538 Telegraph Ave	<ul style="list-style-type: none"> ▪ 97 residential units ▪ 9,000 s.f. commercial space

TABLE IV-1 (CONTINUED)
LIST OF RELEVANT CUMULATIVE PROJECTS FROM THE CITY'S MAJOR PROJECT LIST
(MAR-APRIL 2008)

Project Name	Components
Gateway Community Development Project	<ul style="list-style-type: none"> 810 residential units 26,000 s.f. commercial
MacArthur Transit Village Project	<ul style="list-style-type: none"> ± 540 residential units 30,000 s.f. retail/commercial space
Mandela Grand Mixed Use Project	<ul style="list-style-type: none"> 1,577 residential units approx. 300,000 s.f. non-residential
Oak Knoll Project	<ul style="list-style-type: none"> 960 residential units (408 SFD, 248 townhomes, 304 condominiums) 82,000 s.f. commercial
Oak to Ninth Mixed Use Development	<ul style="list-style-type: none"> General Plan Amendment to Estuary Policy Plan (Central City East Redevelopment Plan Amendment) and Central District Urban Renewal Plan Amendment New Planned Waterfront Zoning District Zoning Map Amendments 3,100 residential units 200,000 s.f. commercial 3,950 structured parking spaces 32 acres public open space 2 renovated marinas; 170 boat slips Wetlands restoration area
Wood Street Development (formerly "Central Station")	<ul style="list-style-type: none"> 1557 residential units (including 186 live/work units) 13,000 s.f. commercial 1.39 acres public open space 2.82 acres private open space Renovation of train station
Kaiser Permanente Medical Center Building	<ul style="list-style-type: none"> Master Plan for new Hospital Phase II 1,216 space parking structure Hospital building (346 beds, approx. 1.06 MSF) Central utility plant Phase III Demolition of existing hospital tower and low-rise (except for recent Emergency Department addition and Fabiola Building) Conversion of ground-floor Parking on Site 7 (38 spaces) to accommodate an additional 6,000 SF. of retail Conversion of Emergency Department addition to temporary medical services use Construction of parking lot of approximately 189 spaces Construction of a new Central Administration MSB (approx. 60,000 SF)

SOURCE: City of Oakland, 2010

References – Setting

City of Oakland, CEDA Major Projects List, March-April, 2008

City of Oakland, Uniformly Applied Development Standards and Conditions of Approval, 2008

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A. Aesthetics, Shadow and Wind

This section describes the existing visual conditions of the Kaiser Center Project Site and vicinity and analyzes how the Proposed Project may affect the existing aesthetic character in the area surrounding the Project Site. The analysis includes how the Proposed Project may affect the visual quality and visual character of the area, as well as scenic vistas and resources viewed from surrounding public areas, and lighting and glare. Further, this section presents a shadow study of the Proposed Project's effects. This section also summarizes the results of the wind test that was conducted to establish how the Proposed Project would alter ground-level wind speeds in the vicinity of the Project Site. Appropriate City of Oakland SCAs are listed and mitigation measures are identified for significant effects, followed by identification of the residual impact significance after mitigation measures are implemented.

Environmental Setting

Visual Character

Project Vicinity

Overview

The Project Site is located in a developed urban area, within the northeastern corner of Oakland Central Business District (CBD). The general Project vicinity is fully urbanized and is characterized by a mix of commercial and office buildings that vary in terms of age, architectural style and height. The vicinity is visually dominated by urbanized development (roadways, concrete and asphalt, parking, etc.), however, Lakeside Park and the open waters of Lake Merritt is located immediately east of the Project Site, and Snow Park is located immediately southeast of the Project Site. The Project vicinity is a flat terrain.

West

The visual character of areas immediately west of the Project Site is developed with low- to mid-rise commercial structures, 25 to 65 feet in height, and surface parking lots. This area lacks any particularly distinctive visual characteristics that would make it unique. Further west is the Broadway transportation corridor, which includes local retail, restaurants, and commercial office buildings and apartments ranging from three stories to more than ten stories in height. Further southeast is the downtown area, which contains primarily mid-rise and high-rise commercial and civic structures.

South

Land uses directly south of the Project Site consist of interspersed commercial office buildings, ranging in heights of three to more than twenty stories. Lake Merritt Plaza (1999 Harrison Street), at 371 feet tall, is the closest and most prominent high-rise structure just south of the Project Site. Further south, the visual character is dominated by mid- and high-density residential complexes. As noted above, directly southeast of the Project Site is the 4.2-acre Snow Park, a manicured park that includes a miniature course and golf putting green. The park acts as a visual continuation of the Lake Merritt recreational areas and also provides views of the Project Site.

East

Just beyond Harrison Street and Lakeside Drive which border the east side of the Project Site is the 3.4-acre Lake Merritt and surrounding Lakeside Park. The Park provides open space and recreational facilities, including a walking promenade along the perimeter of the lake, tennis facilities, and a local boating center. The Lake and the surrounding recreational areas characterize the area east of the existing Kaiser Center office tower that dominates the eastern portion of the Project Site, and these open space areas possess high visual quality associated with the open waters and vegetation (grasses, shrubs and trees). The visual character of areas visible to the east of Lake Merritt include primarily dense residential neighborhoods comprised of multifamily and single-family residences, fairly uniform in scale and size.

North

Uses north of the Project Site, opposite 21st Street, include a variety of commercial services uses and interspersed office buildings, including the Pacific Bell/City National Bank Building (313 feet tall), the Ordway Building (404 feet tall), the AT&T Building (125 feet tall), and a scattering of surface parking lots. One block northeast of the Project Site is The Cathedral of Christ the Light (57 feet tall), a contemporary structure constructed in the shape of a cone, giving it a distinctive appearance. Northeast of the Project Site, uses include a number of high-density apartment/condominium developments along Grand Avenue, which abuts the northern perimeter of Lake Merritt. North of Grand Avenue uses include residential neighborhoods with low-rise apartment buildings in a dense development pattern.

The Project Site is also in close proximity to major roadways, including two major transportation corridors, Grand Avenue and Broadway, as well as Harrison Street and Lakeside Drive. These roadways are four to six lanes wide and contribute to the visual character of the Project vicinity.

Project Site

The Project Site is located in the western portion of the already developed Kaiser Center Complex, which also includes four high-rise office buildings, a secondary parking facility, and the Cathedral of Christ the Light. The four high-rise office buildings are the Kaiser Building (a 29-story tower at 300 Lakeside Drive), Ordway Building (a 28-story tower at One Kaiser Plaza), Lake Merritt Tower (a 10-story building at 155 Grand Avenue), and the Caltrans Building/ Nicholas C. Petris State Building (a 15-story building at 111 Grand Avenue).

The Project Site itself is currently occupied by a 5-story parking structure that contains 1,340 parking stalls, and approximately 38,190 square feet of commercial space on the ground level (known as the “Webster Street Mall” and “20th Street Mall”, or together as “Mall structure”), which provides a wide range of services, including a fitness center, drugstore, bank and several restaurants.

The Kaiser Center roof garden exists on the roof of the parking structure and includes landscaped walkways, sitting areas, and three small manmade pools. While the existing Mall structure (the 20th Street Mall and Webster Street Mall, together), built in a contemporary/utilitarian style with dolomite panels and projecting eave, does not exhibit any distinctive visual characteristics, the landscaped roof garden is considered to offer a high aesthetic quality.

Views of the Project Site

The photographs of existing conditions presented in this section collectively reflect the baseline condition against which the Proposed Project's effects to visual character and scenic resources views are measured. The viewpoint locations are shown in **Figure IV.A-1**.

In views from West Grand Avenue near Bay Place looking southwest (see **Figure IV.A-2**), the Ordway Building and the Cathedral of Christ the Light dominate the midrange, with the Kaiser Center office tower seen in the distance on the left side of the view. The Grand Avenue streetscape, containing limited vegetation of either side, is seen in the foreground and reaches toward the horizon to the right. A portion of Lake Merritt's northernmost shore is visible, however views from this viewpoint are of urbanized development that includes high-rise towers and other moderately scaled commercial buildings.

From Broadway at 20th Street looking east toward the Project Site (see **Figure IV.A-3**), the view is dominated by the urban environment along 20th Street, with the five-story building on the northeastern corner of this intersection dominating the foreground. Beyond that, the low-rise California Bank building is visible, with the top portion of the Kaiser Center office tower seen in the distance beyond the bank building. A few street trees along Broadway and 20th Streets can also be seen. Views of the Project Site are not available from this vantage point due to intervening buildings.

Existing view from Webster Street at 17th Street looking northeast (see **Figure IV.A-4**) illustrates the Webster Street streetscape, with low-rise commercial buildings in the foreground and high-rise towers along or to the right of Webster Street in the background. Available in the distance are the partial views of the Ordway Building in the center of the visual corridor, and portions of the Kaiser Center office tower and Lake Merritt Plaza on the right hand side. In the distance (two blocks away), the scale of the southern façade of the 20th Street Mall on the Project Site is visible, although individual building elements are not discernable from this distance.

Existing view from Lakeside Drive near Madison Street looking northwest (see **Figure IV.A-5**) shows the northernmost edge of Lake Merritt and the Lakeside Drive streetscape in the foreground. High-rise structures surrounding the Project Site are visible in the distance. The curved eastern façade of the Kaiser Center office tower dominates this view. To the right of the Kaiser Center office tower are the Ordway building and the Cathedral of Christ the Light; to the left is the partially obscured Lake Merritt Plaza. The Project Site itself is hidden by these other structures and cannot be easily seen from this vantage point.



2 ●→ Candidate Simulation Photo Viewpoint

SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-1
Simulation Photo Viewpoint Locations



Existing view from West Grand Avenue near Bay Place looking southwest



Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.



Existing view from Broadway at 20th Street looking east



Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.



Existing view from Webster Street at 17th Street looking northeast



Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.



Existing view from Lakeside Drive near Madison Street looking northwest



Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.

Light and Glare

The Project Site is located in a built-out urban environment that has existing sources of light and glare associated with nearby land uses typical for an urban setting. Major light and glare sources in the area include the street lighting along Webster, 20th and 21st Streets; building lights from the existing retail and parking uses on the Project Site; and lighting emanating from other commercial and parking uses in the immediate area.

Shadow

The existing Mall structure on the Project Site is approximately three stories in height and is generally built to the edge of the property lines along the northern, western, and southern boundaries, with set backs from the boundary line that range from about 5 to about 50 feet. The 386-foot tall, 29-story curved Kaiser Center office tower and other existing high-rise structures in the Project area are the primary sources of existing shadow on the Project Site. Parcels south and north of the Project Site include a number of high-rise office towers, which generate existing shadow in the Project area.

Shadow diagrams that illustrate the existing shadow environment are provided in **Figures IV.A-6 through IV.A-17**. (These figures also illustrate the Proposed Project's shadow effects, which are discussed under *Impacts* further in this Section.) The figures depict existing shadow for representative times of day (9:00 a.m., 12:00 noon, and 3:00 p.m.) at the spring equinox (March 21st), on the summer solstice (June 21st), at the autumn equinox (September 21st), and on the winter solstice (December 21st). Shadows on any other day of the year would be within the range of shadows presented during the seasons and times of day.

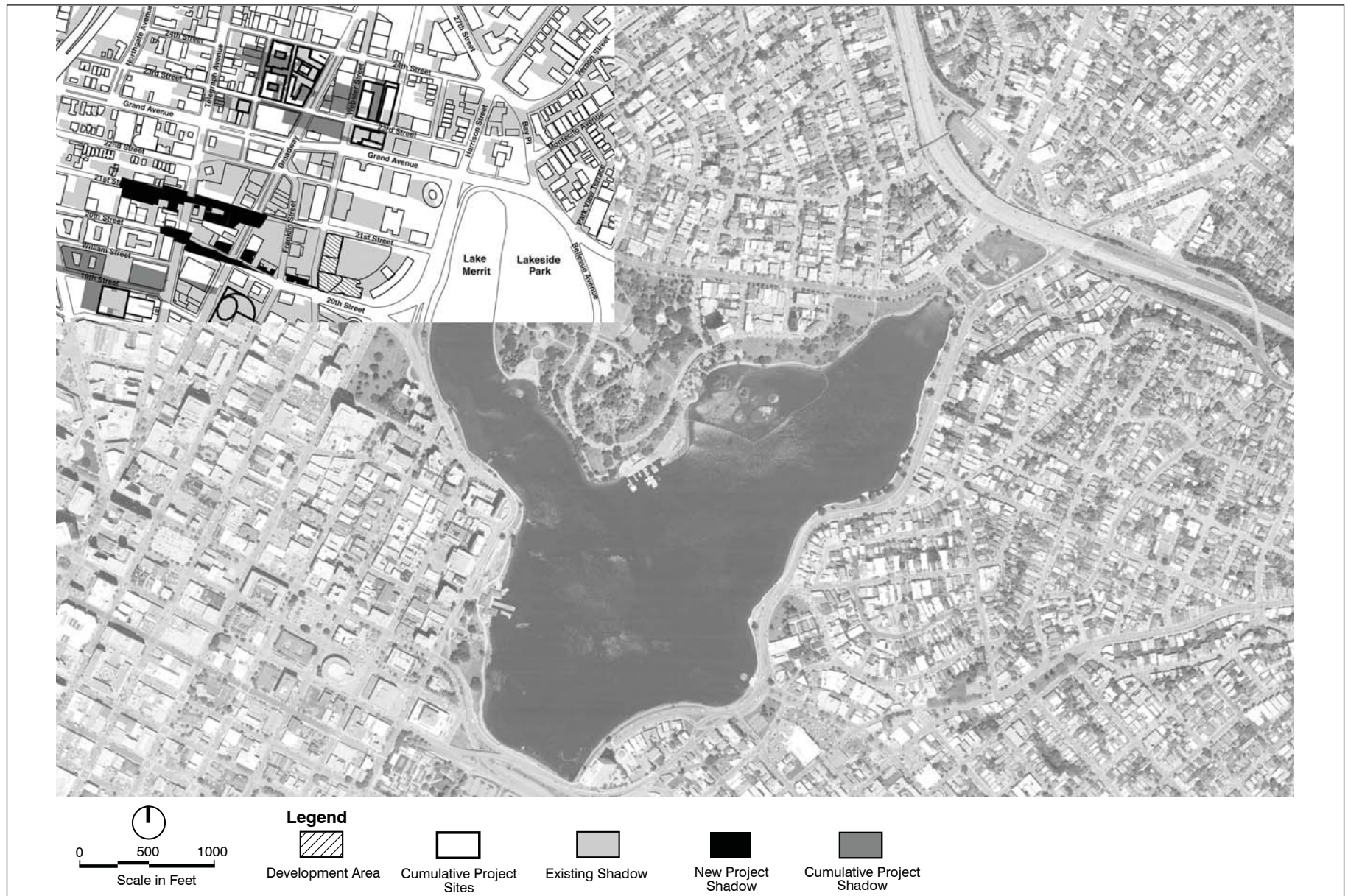
Overall, existing shadow cast on the Project Site occurs primarily in the morning and afternoon hours during late fall and early winter, when the sun is lowest on the horizon.

The site reconnaissance conducted for this analysis by the EIR preparers, in addition to review of the City's inventory of solar facilities (as of August 6, 2010), did not identify any passive solar heat collectors, solar collectors for hot water heating, or photovoltaic solar collectors in the areas adjacent to the Project Site. A solar facility at 555 19th Street, located mid-way between Telegraph Avenue and San Pablo Avenue east of the Project Site, approximately 1,700 feet away, is the nearest to the Project Site. No Project shadow is cast near that location at any time of the year.

Wind

General Wind Conditions

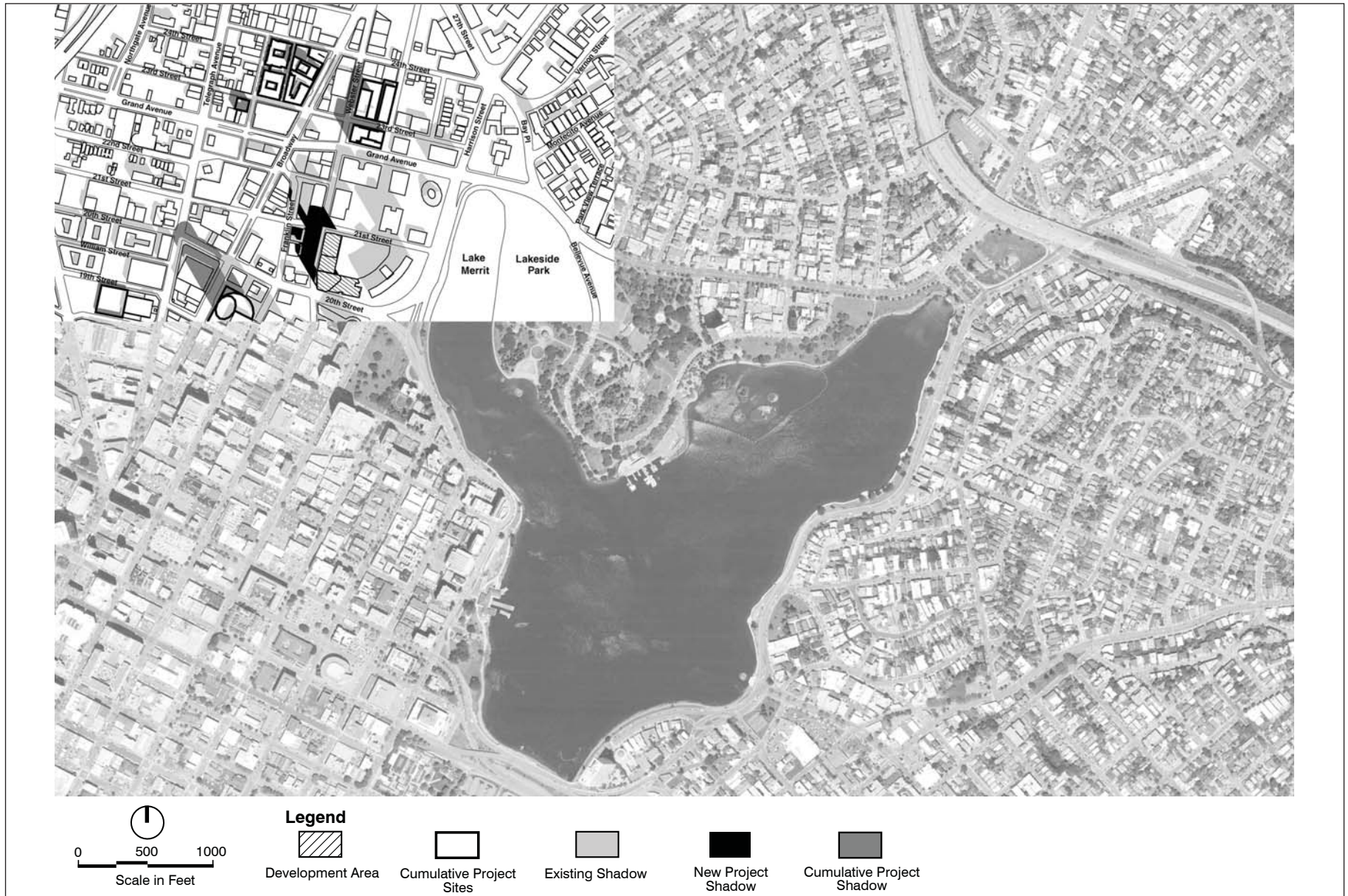
The Project Site lies within a climatological sub region of the San Francisco Bay Area Air Basin where the marine air that travels through the Golden Gate, as well as across San Francisco and the San Bruno Gap, is a dominant weather factor. The Oakland-Berkeley Hills cause the westerly flow of marine air to split off to the north and south of Oakland; this phenomenon tends to diminish wind speeds in Oakland.



SOURCE: Environmental Vision

Kaiser Oakland . 206213

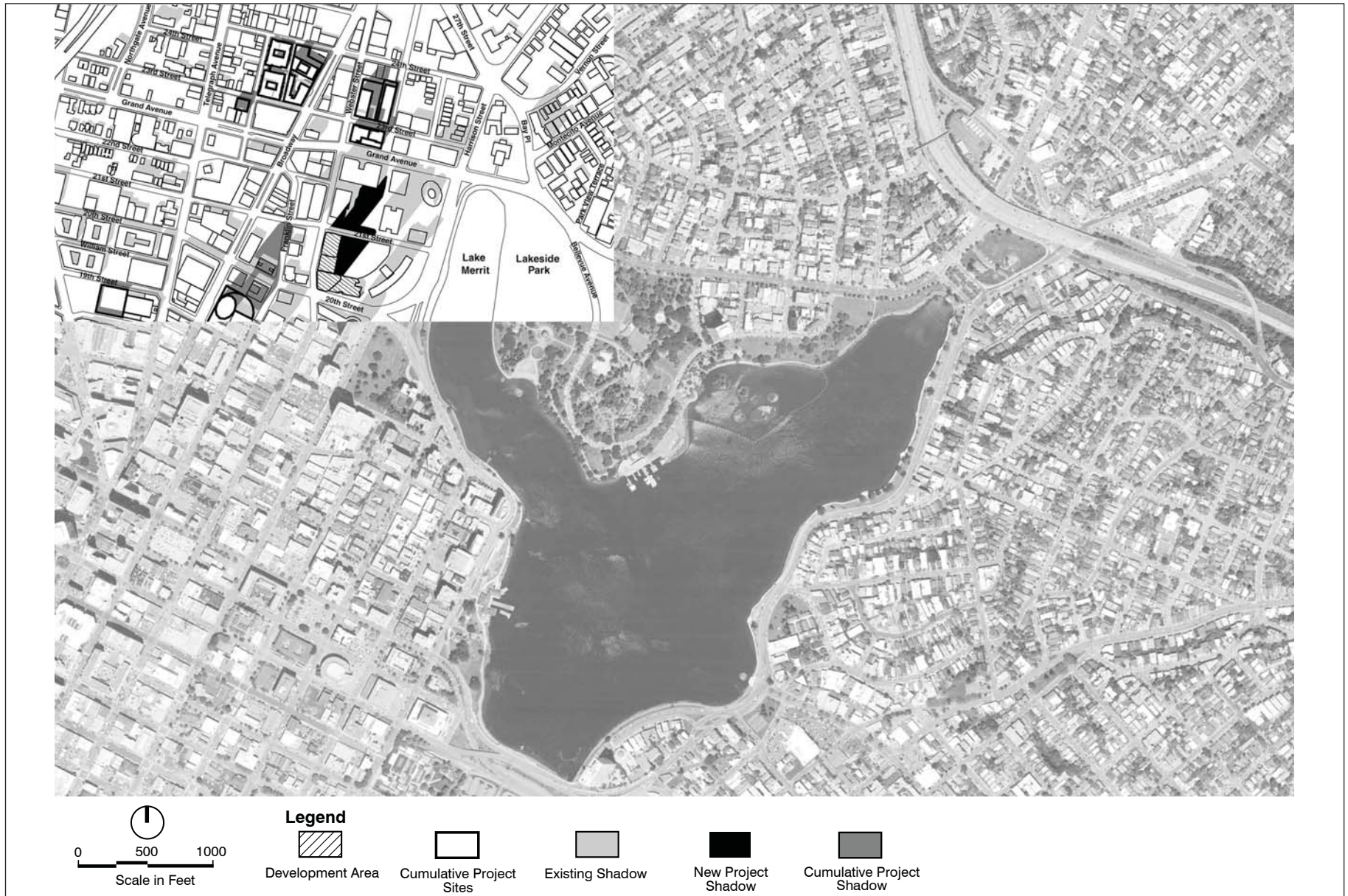
Figure IV.A-6
Project and Cumulative Shadow,
March 21, 9:00 am PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

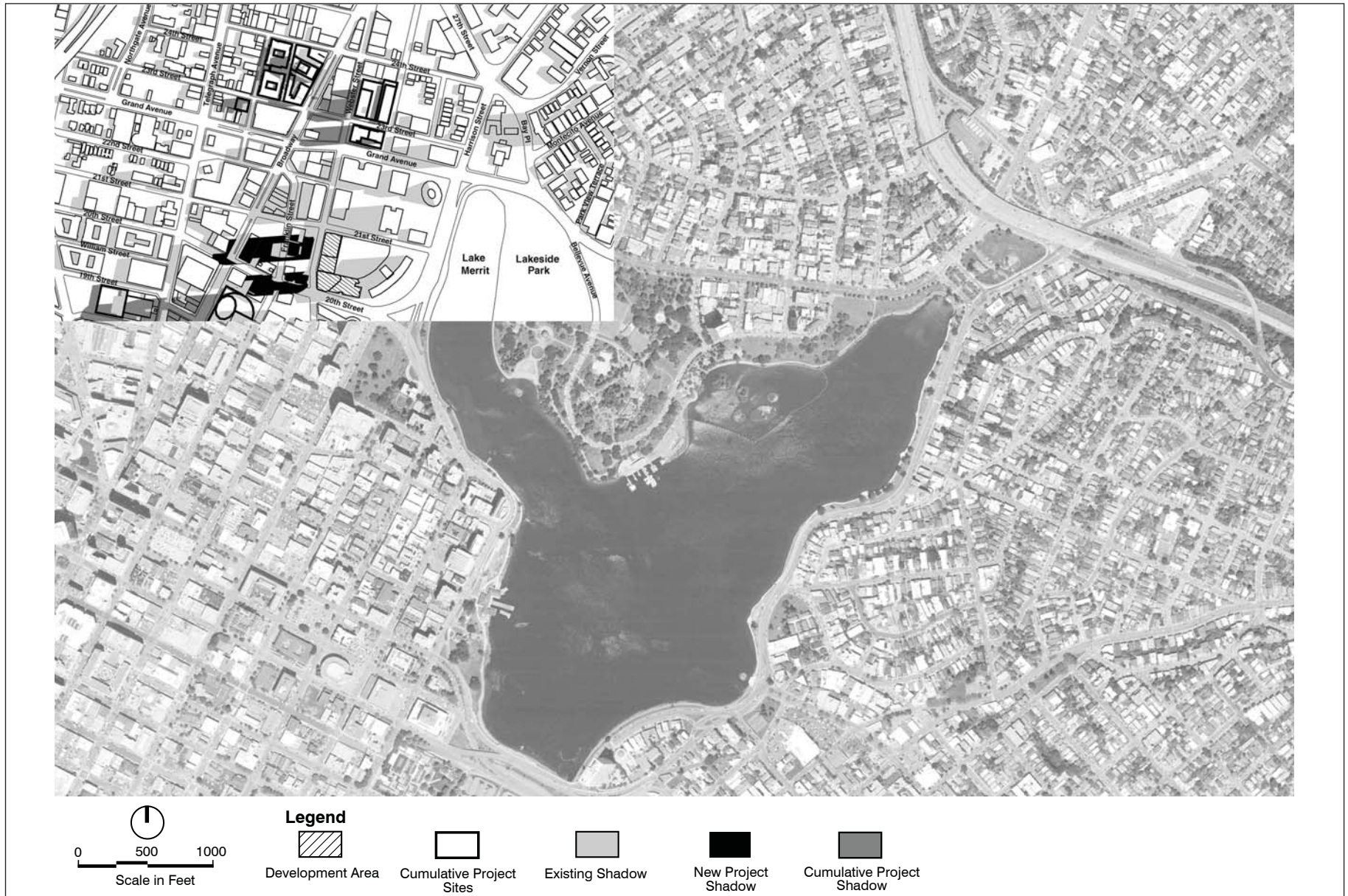
Figure IV.A-7
Project and Cumulative Shadow,
March 21, 12:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

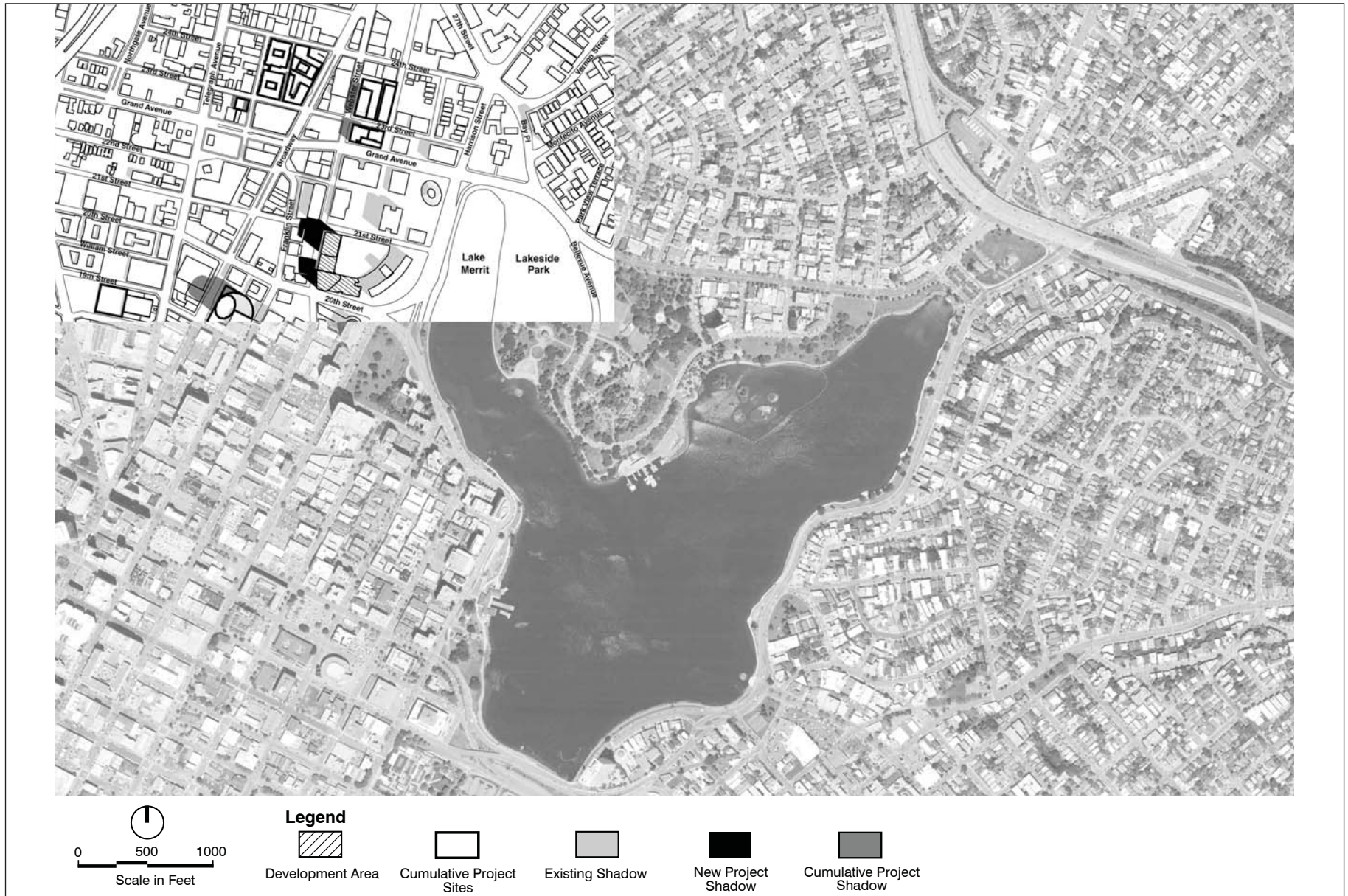
Figure IV.A-8
Project and Cumulative Shadow,
March 21, 3:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

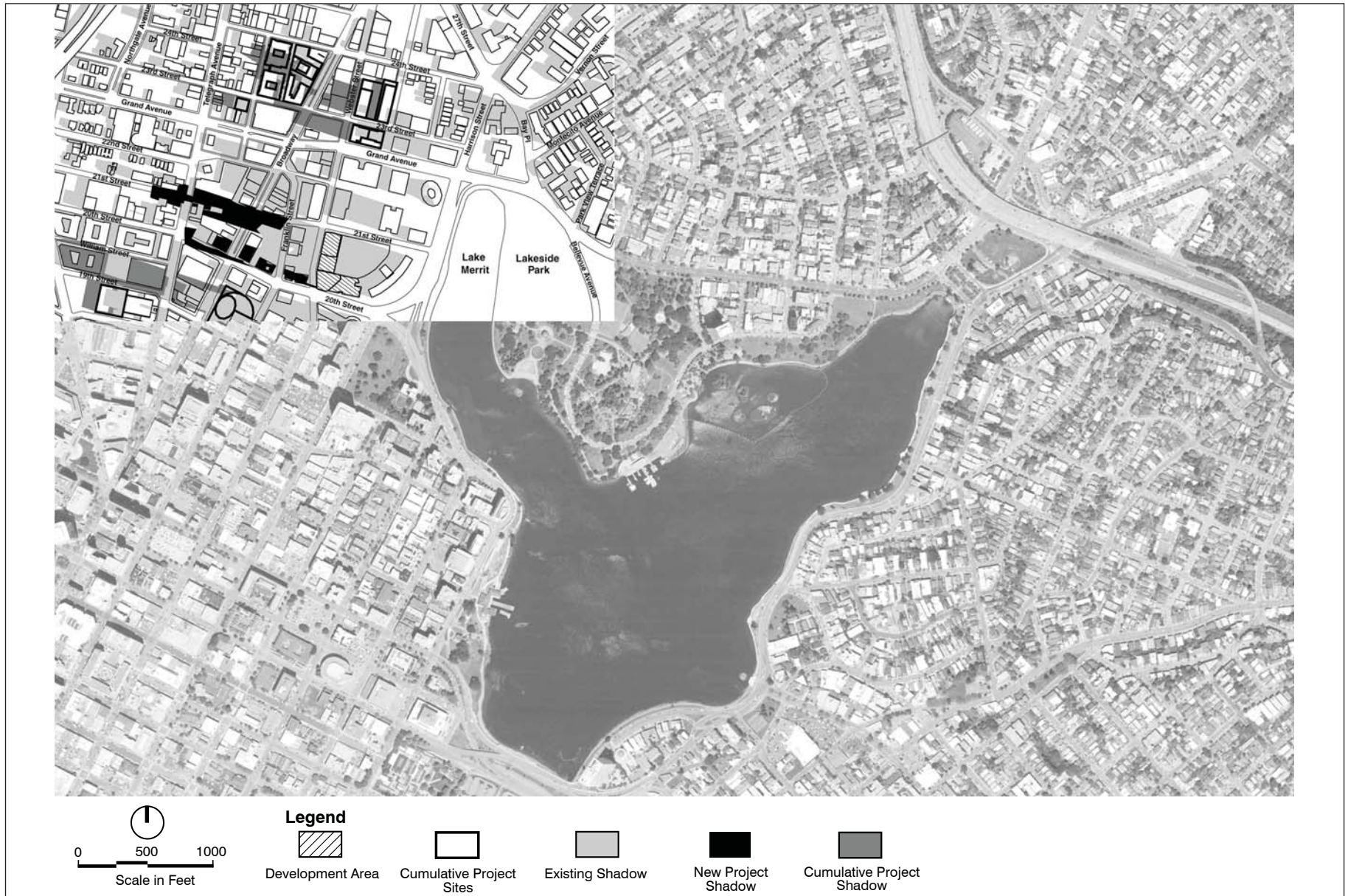
Figure IV.A-9
Project and Cumulative Shadow,
June 21, 9:00 am PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

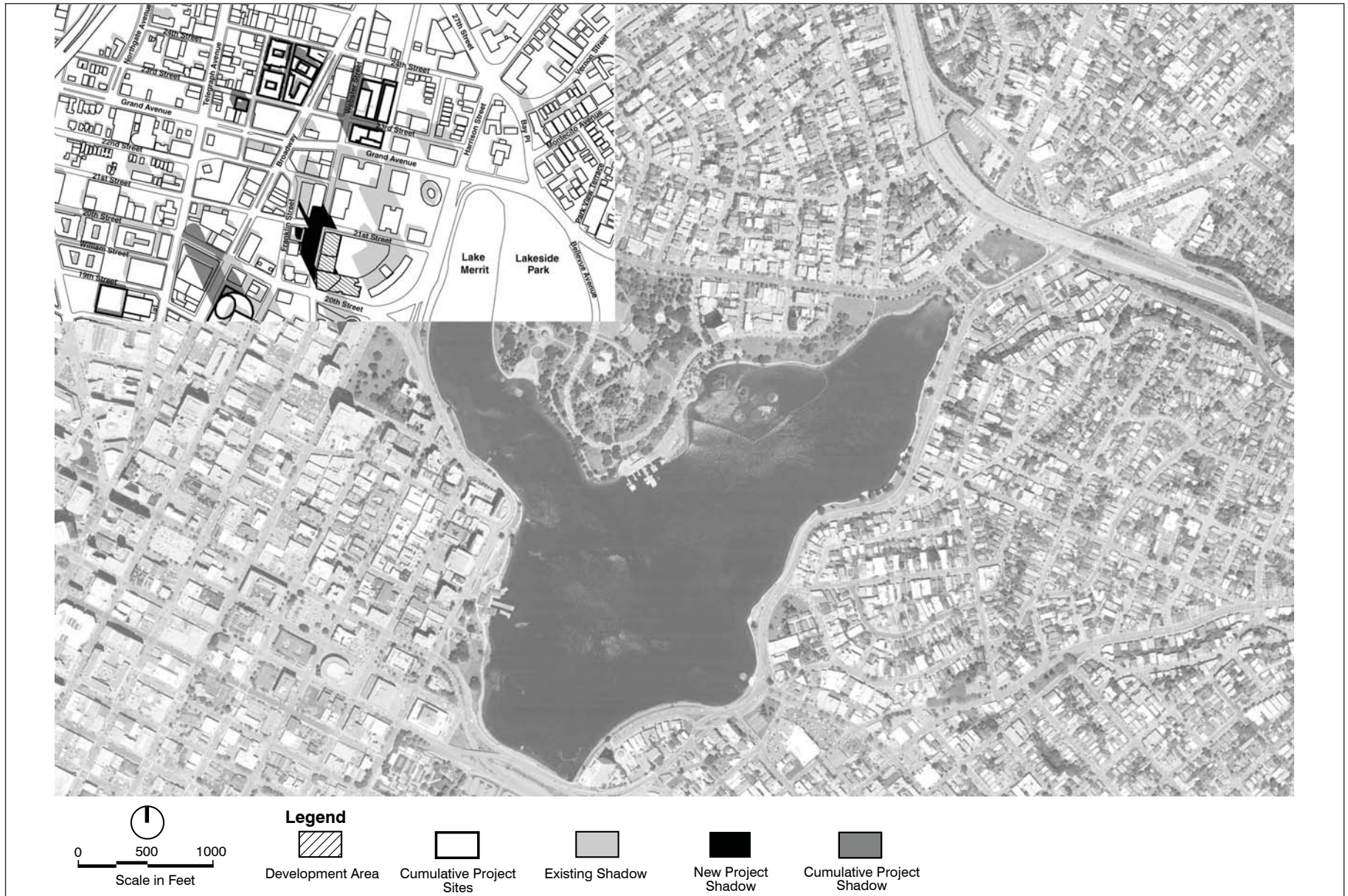
Figure IV.A-10
Project and Cumulative Shadow,
June 21, 12:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

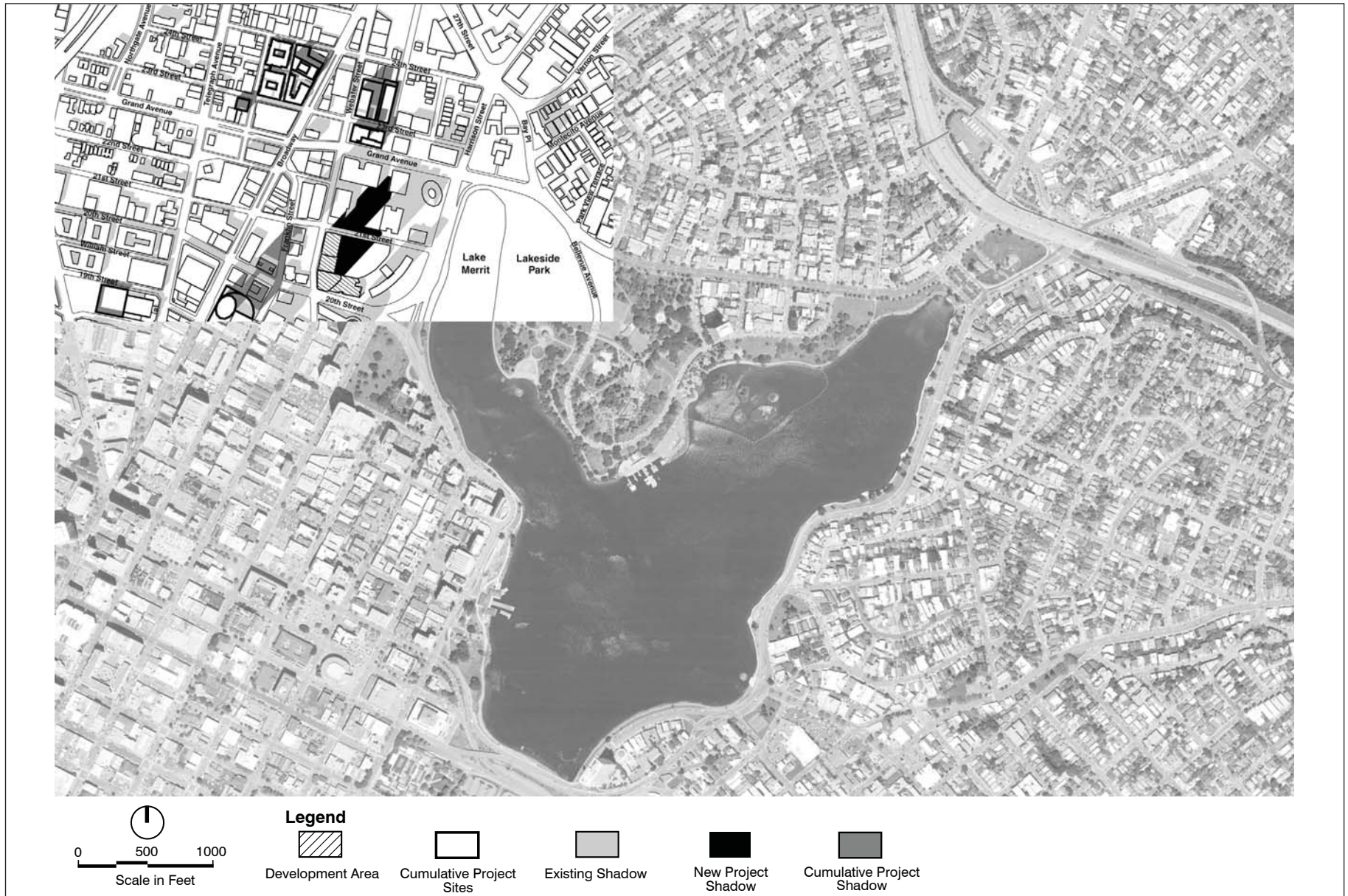
Figure IV.A-12
Project and Cumulative Shadow,
September 21, 9:00 am PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

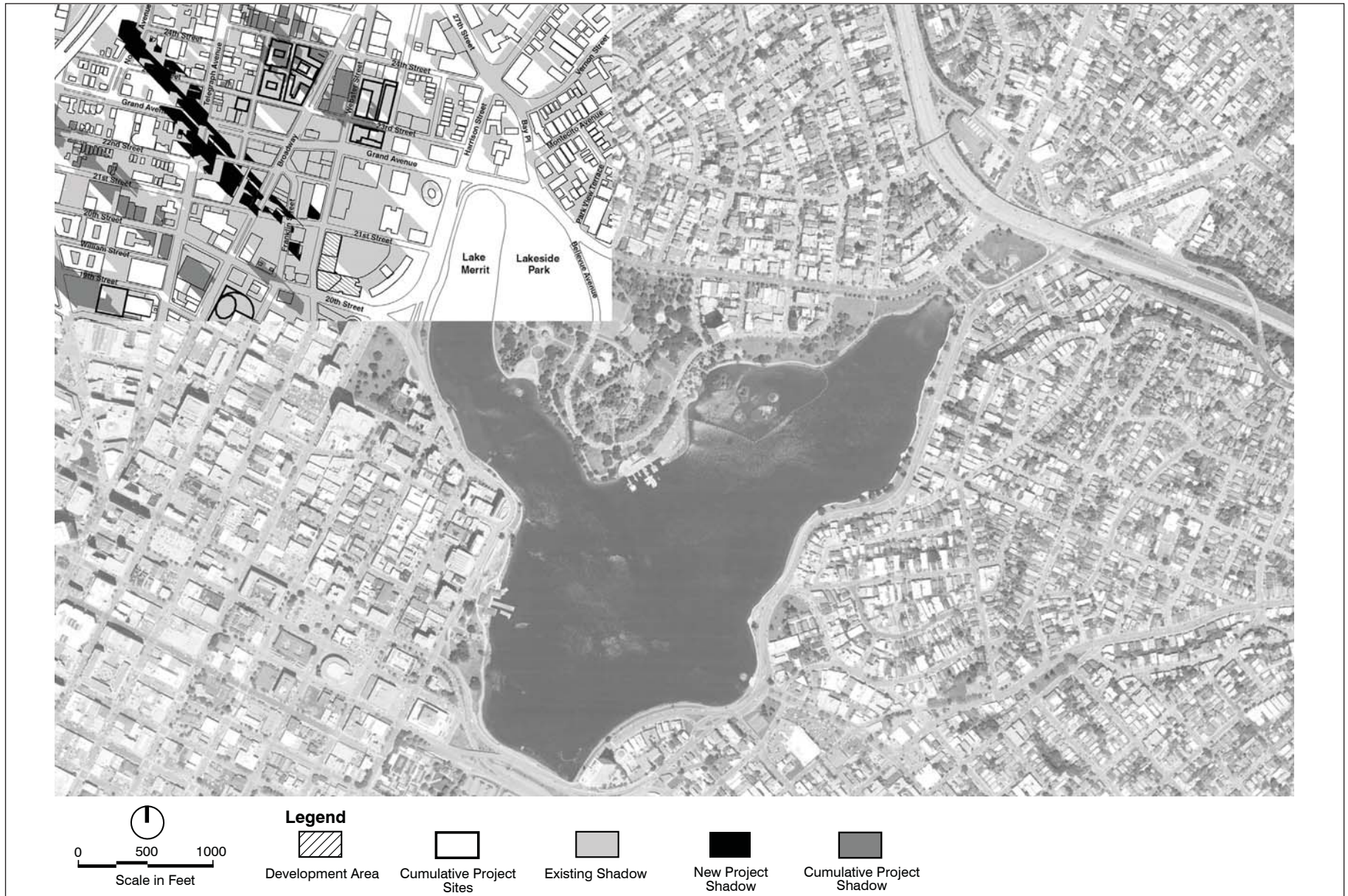
Figure IV.A-13
Project and Cumulative Shadow,
September 21, 12:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

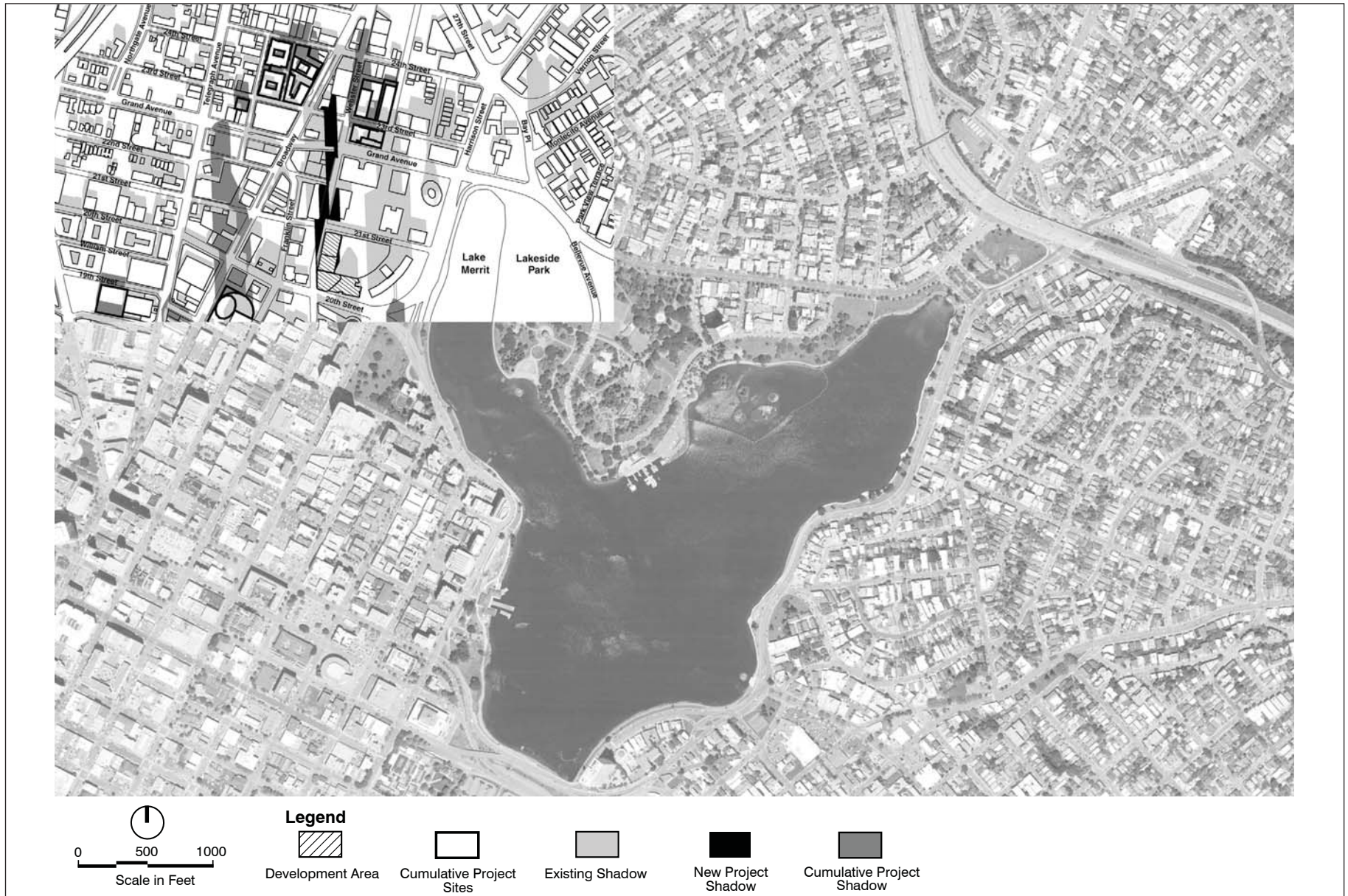
Figure IV.A-14
Project and Cumulative Shadow,
September 21, 3:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

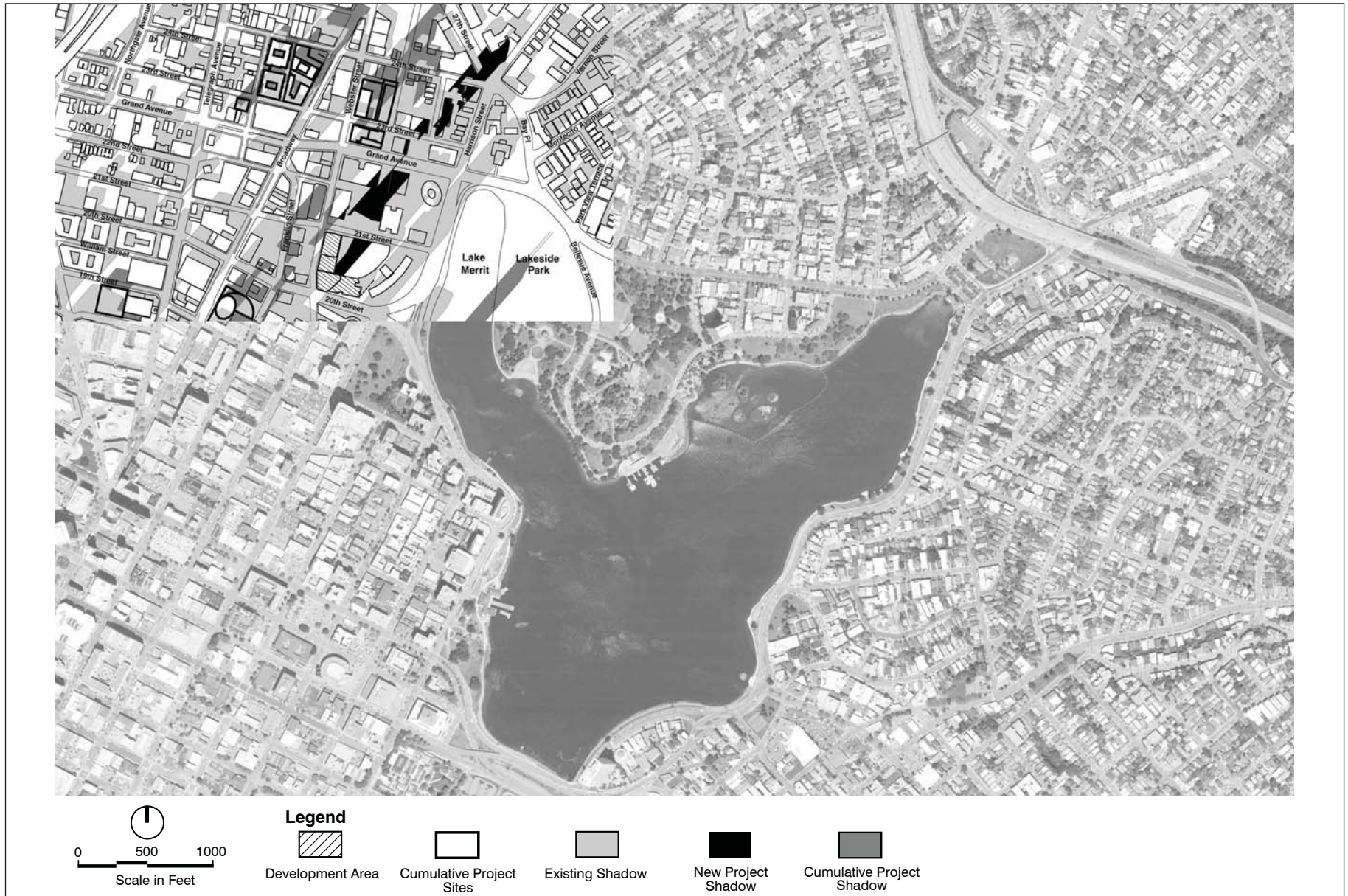
Figure IV.A-15
Project and Cumulative Shadow,
December 21, 9:00 am PST



SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-16
Project and Cumulative Shadow,
December 21, 12:00 pm PST



SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-17
Project and Cumulative Shadow,
December 21, 3:00 pm PST

Wind data from airport meteorological stations show that the predominant wind flow for the higher speed components of the wind is generally from the west; winds from the west-southwest, west and west-northwest account for nearly 40 percent of winds, each with mean wind speeds between 10.0 and 10.5 miles per hour (mph). Average wind speeds vary from season to season with the strongest average winds occurring during summer and the lightest average winds during winter. In addition to the predominant westerly winds, higher velocity winds from the north-northwest and south-southeast are often associated with storms. Together, the west, north-northwest and south-southeast winds are the most frequent winds that exceed 25 mph.

Wind conditions within the city result from the interaction of the approaching wind with the physical features of the environment – buildings, topography and landscape. In cities, groups of structures tend to slow the winds near ground level, due to the friction and drag of the structures themselves, but this leaves the air mass that flows well overhead to continue with little slowing. However, a building that is much taller than surrounding buildings will intercept and redirect winds that might otherwise flow overhead, and bring those winds down the vertical face of the building to ground level, where they create ground-level wind and turbulence. These redirected winds can be relatively strong and also relatively turbulent, and can be incompatible with the intended uses of nearby ground-level spaces such as plazas and sidewalks. Moreover, structures that present very large surfaces square to strong winds can create ground-level winds that can be hazardous to pedestrians.

The Project Site includes the existing 3-story Mall structure that is built to the edge of the property lines along the northern and western boundaries, but with set backs from the boundary property line that range from about 5 to 50 feet. The 386-foot tall, 29-story curved Kaiser Center office tower stands at the east/southeast corner of the Project Site. Several high-rise buildings exist immediately to the north and to the south of the Project Site, and the bulk of the high-rise buildings of the Oakland downtown core exist further southwest of the Project Site. Other than these high-rise buildings, only low- and mid-rise buildings located primarily to the west of the Project Site exist to slow the strongest winds. Together, these are the only buildings that provide some sheltering from the approaching strong winds for the two new high-rise towers proposed by the Project. Thus, although approaching winds in Oakland are slowed by topography, the Project Site is almost fully exposed to the strongest of the approaching winds there, winds from the west, north-northwest, and south-southeast.

Regulatory Framework

Local Plans and Policies

City of Oakland General Plan

City of Oakland General Plan policies that pertain to aesthetics, shadow and wind relevant to the Proposed Project are contained within the General Plan Open Space, Conservation and Recreation (OSCAR) Element, and the Land Use and Transportation Element (LUTE) of the General Plan. Applicable policies include the following:

OSCAR Element

- Policy OS-101: Particular attention should be paid to (a) views of the Oakland Hills from the flatlands; (b) views of downtown and Lake Merritt; (c) views of the shoreline; and (d) panoramic views from Skyline Boulevard.
- Policy OS-10.2: New development should minimize adverse visual impacts and take advantage of opportunities for new vistas and scenic enhancement.
- Policy OS-10.3: Oakland's underutilized visual resources, including the waterfront, creeks, San Leandro Bay, architecturally significant buildings or landmarks, and major thoroughfares should be enhanced.
- Policy OS-11: To maintain and develop plazas, pocket parks, pedestrian walkways, and rooftop gardens in Oakland's major activity centers and enhance the appearance of these and other public spaces with landscaping and art.

LUTE Element

- Policy T6.2: The city should make major efforts to improve the visual quality of streetscapes. Design of the streetscape, particularly in neighborhoods and commercial centers, should be pedestrian-oriented and include lighting, directional signs, trees, benches, and other support facilities.

Scenic Highways Element

The City's Scenic Highways Element of the General Plan (adopted 1974) includes a number of policies that pertain to visual resources identified as part of the Caltrans Scenic Highway Program. Policies within the City's Highways Element aim to limit signage and visual intrusions and protect panoramic vistas along scenic corridors, and to ensure that new construction within scenic corridors demonstrate "architectural merit" and are "harmonious" with the surrounding landscape. The entire length of MacArthur Freeway (I-580) within Alameda County is identified as part of the Caltrans Scenic Highways Program. I-580, an Officially Designated State Scenic Highway, is about three quarters of a mile to the east of the Project Site.

Oakland Planning Code

The design of new projects in Oakland are subject to the following performance criteria that are utilized as part of the City's design review process:

Non Residential Facilities and Signs

- That the proposal will help achieve or maintain a group of facilities which are well related to one another and which, when taken together, will result in a well-composed design, with consideration given to site, landscape, bulk, height, arrangement, texture, materials, colors, and appurtenances; the relation of these factors to other facilities in the vicinity, and the relation of the proposal to the total setting as seen from key points in the surrounding area. Only elements of design which have some significant relationship to outside appearance shall be considered, except as otherwise provided in Section 17.136.060.
- That the proposed design will be of a quality and character which harmonizes with, and serves to protect the value of, private and public investments in the area;
- That the proposed design conforms in all significant respects with the Oakland General Plan and with any applicable design review guidelines or criteria, district plan, or

development control map which have been adopted by the Planning Commission or City Council.

City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards

The City's SCAs relevant to reducing visual, light and glare, wind, and shade/shadow impacts due to the Proposed Project are listed below. If the project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to aesthetic resources. The SCAs are incorporated and required as part of the project, so they are not listed as mitigation measures.

- **SCA AES-1 Lighting Plan:** *(Prior to the issuance of an electrical or building permit)* - The proposed lighting fixtures shall be adequately shielded to a point below the light bulb and reflector and that prevent unnecessary glare onto adjacent properties. Plans shall be submitted to the Planning and Zoning Division and the Electrical Services Division of the Public Works Agency for review and approval. All lighting shall be architecturally integrated into the site.

Other standard conditions would also serve to reduce impacts to visual, light and glare, wind, and shade/shadow, including:

- SCA BIO-5 Bird Collision Reduction (Section IV.C, *Biological Resources*)

Impacts and Mitigation Measures

Significance Criteria

The project would have a significant aesthetics impact if it would:

1. Have a substantial adverse effect on a scenic vista;
2. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state or locally designated scenic highway;
3. Substantially degrade the existing visual character or quality of the site and its surroundings;
4. Create a new source of substantial light or glare which would substantially and adversely affect day or nighttime views in the area;
5. Introduce landscape that would now or in the future cast substantial shadows on existing solar collectors (in conflict with California Public Resource Code Section 25980-25986);
6. Cast shadow that substantially impairs the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors;
7. Cast shadow that substantially impairs the beneficial use of any public or quasi-public park, lawn, garden, or open space;
8. Cast shadow on an historic resource, as defined by CEQA Section 15064.5(a), such that the shadow would materially impair the resource's historic significance by materially altering those physical characteristics of the resource that convey its historical significance and that justify its inclusion on or eligibility for listing in the National Register of Historic Places,

California Register of Historical Resources, Local register of historical resources, or a historical resource survey form (DPR Form 523) with a rating of 1-5;

9. Require an exception (variance) to the policies and regulations in the General Plan, Planning Code, or Uniform Building Code, and the exception causes a fundamental conflict with policies and regulations in the General Plan, Planning Code, and Uniform Building Code addressing the provision of adequate light related to appropriate uses; or
10. Create winds that exceed the wind hazard criterion during daytime hours during the year. [The wind analysis applies if the project's height is 100 feet or greater (measured to the roof) and one of the following conditions exist: (a) the project is located adjacent to a substantial water body (i.e., Oakland Estuary, Lake Merritt or San Francisco Bay); or (b) the project is located in Downtown Oakland (as defined by the General Plan)]

The hazard criterion is a full-hour average wind speed in excess of 26 mph. When the hazard criterion is converted to the one-minute time-scale that applies to the meteorological data and pedestrian comfort criteria, it is restated as 36 mph.

Project Impacts and Mitigation Measures

Scenic Vistas or Resources

Impact AES-1: The Proposed Project would not adversely affect a scenic vista or substantially damage scenic resources. (Less than Significant)

The analysis of the Proposed Project's effect on scenic vistas and whether the Project would substantially damage scenic resources, focuses on changes to existing major public viewsheds that would result from the implementation of the Project. Urban development with high-rise towers surround the Project Site therefore, scenic resources and views at and through the site and vicinity are generally limited to short-range views of Lake Merritt to the east and long-range views of the Oakland hills to the north. However, due to intervening development in the Project area and patches of landscaping surrounding the Lake, views of Lake Merritt are restricted to portions of Harrison Street and Lakeside Drive and glimpses from several segments of 20th and 21st Streets. Existing development in the area likewise precludes most long range views of the Oakland-Berkeley hills, which are only available when looking between buildings or across Lake Merritt.

By constructing a 42-story tower at the northwest corner of the site and a 34-story tower at the southwest corner of the site, the Project would further limit certain short-range views of Lake Merritt and certain long-range views of the Oakland-Berkeley Hills from areas at and surrounding the site. However, because such views are already limited, this impact would not be considered substantial as views of these resources would continue to be available.

Views

Four locations were selected to analyze the public views to the site. These viewpoints are shown in Figure IV.A-1 and include the following locations:

- Viewpoint 1 – View from West Grand Avenue near Bay Place looking southwest.
- Viewpoint 2 – View from Broadway at 20th Street looking east.
- Viewpoint 3 – View from Webster Street at 17th Street looking northeast.
- Viewpoint 4 – View from Lakeside Drive near Madison Street looking northwest.

These four viewpoints are shown in Figures IV.A-2 through IV.A-5, respectively. In each of the figures above, the top photo shows the existing setting and the bottom figure is the same view with a simulation of the Proposed Project placed within the view. Although some views show the height of the Proposed Project structures as being much taller than some of the adjacent buildings, the new development would occur within an urban downtown setting and the structures appear to be within the context of the site's surroundings. Existing public views of Lake Merritt and of the San Francisco Bay and City skyline would not be affected by the Proposed Project.

Scenic Highways Program

The Caltrans Scenic Route Program identifies the Oakland segment of I-580 as an Officially Designated State Scenic Highway. Closest to the Project Site, I-580 is about three quarters of a mile to the east. The Scenic Highways Element of the Oakland General Plan defines the I-580 scenic corridor, which is intended to protect "the area most critical to the scenic quality of the route in question." Although the Project Site is not within the area designated as a scenic corridor, it is only about one quarter mile to areas that are within the corridor boundary, and is visible from the segment of I-580 closest to the site. However, as noted above, the Project Site is within an existing developed urban environment with other high-rise towers nearby. Therefore, while the Project would be noticeable from I-580 and may minimally obscure some long-range views from this freeway, its impacts would be considered limited because it would not disrupt or alter these views substantially.

In addition, the Proposed Project would be required to undergo design review and comply with development standards consistent with its Planned Unit Development (PUD) status and its location within an S-4 Zone. This process would ensure that the Proposed Project design is consistent with the goals and objectives identified for the Kaiser Center Complex. The City's design review criteria assess how multiple buildings "relate to one another" and result in "a well-composed design, with consideration given to site, landscape, bulk, height, arrangement, texture, materials, colors, and appurtenances," as well as how these factors relate "to other facilities in the vicinity...and the total setting as seen from key points in the surrounding area" (Oakland Planning Code Section 17.136.050). Further, the criteria address whether "the proposed design will be of a quality and character which harmonizes with, and serves to protect the value of, private and public investments in the area" and that "that the proposed design conforms in all significant respects with the Oakland General Plan and with any applicable design review guidelines or criteria, district plan, or development control map which have been adopted by the Planning Commission or City Council." The City will review compliance with these criteria based thorough review of all Proposed Project plans and field study. Therefore, the Proposed Project is not expected to substantially degrade any views from any scenic resources in the area and would result in less than significant effects with regard to scenic vistas and resources.

In summary, because the Proposed Project would only minimally affect short-range views of Lake Merritt and long-range views of the East Bay Hills in the immediate vicinity of the Project Site, and because the Proposed Project would not substantially damage views from a designated scenic highway, the Proposed Project would have a less than significant impact on scenic resources or scenic vistas.

Mitigation: None required.

Visual Character

Impact AES-2: The Proposed Project would alter the existing visual conditions on the Project Site, but would not substantially degrade the existing visual character or quality of the site and its surroundings. (Less than Significant)

The Project site is located within the Central Business District between Downtown Oakland and Lake Merritt, which is surrounded by similar land uses including high rise office towers and street level retail. The Proposed Project would replace the existing low rise retail and office structures with 36- and 42- story office towers. The towers would be the tallest buildings in the immediate vicinity but would not be out of character for the area. It is likely that occupants of the towers in the upper floors (generally above the 19th story) would be afforded unobstructed views of the city, including downtown landmarks such as City Hall and the Oakland Tribune building toward the south-southwest, San Francisco Bay and the Bay Bridge toward the south, and the residential areas along the Oakland Hills toward the east. The Proposed Project would be visible to motorists traveling on I-580, located approximately 0.75 mile east. However, as stated above under Scenic Highways Program, while the Project would be noticeable from I-580 and may minimally obscure some long-range views from this freeway, its impacts would be considered limited because it would not disrupt or alter these views substantially.

While the construction of the buildings proposed under the Project would remove the northwesternmost portion of the existing Kaiser Center roof garden, the Project would provide a net gain in roof garden area of approximately 4,500 square feet as a new garden area would be constructed to the south of the existing garden (see Figure III-4).

The Proposed Project would result in a substantial change to the visual character of the Project Site by the proposed demolition of existing on-site structures and the new construction of two high-rise office towers. Project construction is anticipated to occur over two phases. The first phase would construct the south tower (replacing the 20th Street Mall building), while the second phase would construct the north tower (replacing the Webster Street Mall building).

The proposed towers would be constructed in a contemporary style and would be similar in cladding and architectural elements, although the south tower would be trapezoidal in plan while the north tower would be rectangular in plan. Both towers would have a façade consisting of steel and non-reflective glass, with vertical and horizontal bands. The vertical bands would emphasize the towers' vertical form while the horizontal bands would define each floor. The floor plate of each tower would be uniform along the length of the towers, with the lowest five stories serving as a base for both towers.

The new South Tower would span 34 stories or 469 feet in height while the North Tower would span 42 stories or 573.5 feet in height. The proposed structures would be built along the lot lines to the north and west and would continue to be set back from southern lot lines by sidewalks and landscaping. In general, new structures would be much more visually prominent within their context

that the current buildings on the site, although the character of the pedestrian environment at the ground level would remain virtually unaltered, since the site already contains retail uses on the ground level.

The proposed office towers would not noticeably contrast with the existing visual environment in the Project Site and the surrounding vicinity, where several other high-rise buildings have similar height and massing. As noted in the setting, the Central Business District neighborhood is interspersed with high-density uses, including the Kaiser Center, which includes a 29-story high-rise office tower, and additional high-rise buildings on surrounding blocks, with the tallest one being the Ordway Building (at 404 feet tall). Therefore, in terms of size and massing, the proposed towers, at 34 and 42 stories, would continue and complement the current development trends that exists in the Project area and would not result in a noticeable change in character as compared to existing conditions.

The Proposed Project would relocate the approximately 18,369 square feet of the existing historic roof garden to the southern portion of the new roof, which would result in a net gain of public open space of approximately 4,500 square feet. The Project would also increase public access to the roof garden by installing a grand staircase to the roof garden from 20th Street, and would add new access to the roof garden through the proposed new office towers. The existing roof garden is a visually engaging element of the existing site and adds to the site's uniqueness. With the implementation of Mitigation Measure CR-2 (Historically-Sensitive Roof Garden Design), described in Section IV.D, *Cultural Resources*, the Project Applicant would be required to preserve the cultural integrity of the garden by ensuring that its character-defining features, such as its axial plan, geometrically shaped lawns, and curvilinear pathways, are either retained or recreated as part of the Proposed Project. With the implementation of this mitigation measure, the garden, in its new form, would continue to add value to the visual character of the Project Site as a whole, and the Project would not have an adverse impact on the visual character of the site.

As a standard requirement, because the Project is a PUD, prior to the issuance of any building permits, at both phases, the Project Applicant would submit the final project design – as a Final Development Plan (FPD) - including all exterior design details, proposed signs, and the final selection of exterior materials, colors and textures to the Planning and Zoning Division. The final design, or FDP, would be subject to the approval by the Planning Commission.

As a result of the design review required by both staff and the Planning Commission (as part of the proposed PUD as well as the proposed S-4 Zone), as discussed above under Impact AES-1, the Proposed Project would not degrade the visual quality of the site or the vicinity and would be consistent with the high-density development within Oakland's Business District.

Mitigation: None required.

Light and Glare

Impact AES-3: The Proposed Project would create a new source of light or glare, but would not adversely affect day or nighttime views in the area. (Less than Significant)

As discussed in the *Environmental Setting*, the Project Site contains street and building lighting associated with both the existing uses on the site and with the surrounding structures in the Project vicinity. Existing lighting sources currently provide a source of illumination typical of an urban area and noticeable in the site vicinity, particularly at night.

Although no detailed architectural plans have been prepared for the Proposed Project, the Project would likely increase the amount of night lighting from decorative and functional lighting associated with the proposed two high-rise office towers, and may increase the incidence of glare from window glazing, minimized by measures required by applicable SCA's discussed below. However, the type and intensity of lighting resulting from the Proposed Project would be consistent with the type and intensity of lighting already established in the area, and is not expected to result in a substantial increase in lighting over existing conditions. While the Proposed Project's height and mass would make light from the Project noticeable from off-site locations, it would be absorbed fairly well into the overall lighting patterns that already exist in the area. The street lighting surrounding the Project block is not anticipated to change substantially from the existing conditions.

The Project Applicant would be required to comply with SCA AES-1 that would minimize potential impacts resulting from Project related lighting and ensure that lighting and glare effects associated with the Project remain less than significant. Moreover, the Applicant would be required to implement mandatory measures and best management practices (BMPs) identified in SCA BIO-5, Bird Collision Reduction, that work to minimize mirrored and reflective glass effects on exterior building facades, as well as operational and design strategies to minimize internal and external lighting associated with the Project.

Mitigation: None required.

Shadow

Impact AES-4: The Proposed Project would result in additional shadow on adjacent areas. However, it would not cast shadow that would substantially impair the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors; would not cast shadow that would substantially impair the beneficial use of any public or quasi-public park, lawn, garden, or open space; and would not cast shadow on a historic resource. (Less than Significant)

The Project's shadow effects were analyzed for representative times of day (9:00 a.m., 12:00 noon, and 3:00 p.m.) during the following four times of year:

- March 21st at the spring equinox, when shadows are midway through a period of shortening;

- June 21st on the summer solstice, when the sun is at its highest and shadows are at their shortest;
- September 21st at the autumn equinox, when shadows are midway through a period of lengthening; and
- December 21st on the winter solstice, when the sun is at its lowest and shadows are at their longest.

Shadows on any other day of the year would be within the range of shadows presented during the seasons and times of day described above. Figures IV.A-6 through IV.A-17 illustrate the shading effects associated with the Proposed Project for the aforementioned times of day and seasons.

These diagrams are generalized, though accurate, and convey the relative shadow effects for Project area. The Project's greatest shadow effects would occur during late fall and early winter, when the sun is lowest on the horizon. As discussed in more detail, below, the proposed 28 and 36-story towers on the Project Site would generate additional shadow relative to the existing conditions. New shadow is described by season.

In March and September, morning shadow would fall in a westerly direction, newly shading the sidewalks along 20th and 21st Streets.¹ At noon, Project shadow would extend in a northwesterly direction, shading portions of the surface parking lots located on blocks east of Webster Street. New shading would also extend on the Kaiser Center roof garden. By 3:00 p.m., Project shadow would extend in a northeasterly direction and result in new shade along large portions of the roof garden as well as the surface parking lot north of 21st Street.

In June, when shadows are shortest, shadows would be cast in a westerly and southwesterly direction at 9:00 a.m. At this time, off-site shadow would extend just beyond Broadway Street, shading some low-rise buildings, sidewalks and surface parking lots west of Webster Street. By noon, Project shadow would cast a very minimal shadow that would extend only slightly onto the adjacent block to the west and onto sidewalks along Webster and 21st Streets. At 3:00 p.m., the Project would cast a shadow in a northeasterly direction, shading portion of the Kaiser Center roof garden, 21st Street, and the surface parking lot directly across 21st Street from the Project Site.

In December, when shadows are longest, at 9:00 a.m. Project shadow would fall in a northwesterly direction, extending as far as Northgate Street and shading portions of sidewalks on Franklin, Broadway, Northgate, 21st, 22nd, and 23rd Streets and Telegraph and Grand Avenues. The area shaded contains mostly low-rise office buildings and surface parking lots. By noon, Project shadow would extend in a northwesterly direction, resulting in shade along portions of the Kaiser Center roof garden as well as sidewalks along Webster Street. Shadow at this time would extend just beyond 23rd Street. At 3:00 p.m., the Project shadow would reach in a northeasterly directly toward 27th Street, stretching just beyond the intersection of 27th and Harrison Streets. During this time, shadow generated by the proposed towers would cast the greatest amount of shadow, and new shading would affect the Kaiser Center roof garden and few low-rise commercial buildings, surface parking lots and negligible portions of sidewalks northeast of the site. Most sidewalks, however, are already in

¹ March and September shadows are similar in length and direction, although they are offset by one hour from one another because March is during standard time, while September is during daylight saving time.

shadow from existing development and would not be affected by the Project. The Cathedral of Christ the Light, located at the southwestern corner of the intersection between Grand Avenue and Harrison Street, would not receive any additional shading from the Project, during this or any other time (see Figures IV.A-6 through IV.A-17).

Overall, new shadows cast by the Proposed Project would affect parcels to the north of the Project Site along Webster and 21 Streets. Existing development in the Project area currently casts shadows onto these areas, although the Project would generate shadow on areas that are currently not shaded by existing development, particularly some low-rise buildings, sidewalks and surface parking lots immediately west and north of the site. The newly cast shadows generated by the Project would be extended during the mid-day hours (noon to 3:00 p.m.) in the late fall and winter.

As previously indicated in the *Environmental Setting* discussion, site reconnaissance and staff review of the City's inventory of solar facilities (as of August 6, 2010) conducted for this analysis did not observe any passive solar heat collectors, solar collectors for hot water heating, or photovoltaic solar collectors in the areas adjacent to the Project Site or that might be affected by Project shadow. A solar facility at 555 19th Street, located mid-way between Telegraph Avenue and San Pablo Avenue east of the Project Site, approximately 1,700 feet away, is the nearest to the Project Site. No Project Shadow is cast near that location at any time of year. However, the potential exists for any of these systems to be installed on one of more of the surrounding buildings in the future.

Although there are no solar systems in the Project Site vicinity that would be affected by Project building or landscaping shadow, there is a potential for buildings to install such systems in the future. However, due to the existing shading in the Project area, any additional shadow generated by the proposed towers would be incremental and would not substantially impair the function of a building that may use a solar heating in the future.

Shadow patterns cast on the roof garden in particular would change under proposed conditions, primarily due to the two towers to be located at the northwestern and southwestern corners of the Project Site. Shadow effects to the roof garden are discussed herein, as well as under Impact CUL-3 in Section IV.D, *Cultural Resources*, which includes Figure IV.D-1, a close-up view of shadow effects on the roof garden in worst case shadow conditions. The total amount of shading would increase over existing conditions, particularly in the late fall and winter. Approximately one-quarter to one-half of the entire roof garden would be newly shaded throughout late fall and winter days. However, no new shadow would be cast on the northeastern portion of the garden, closest to the existing Kaiser Center office tower, as under existing conditions. The shadow effects would not substantially detract from the use or enjoyment of the garden since on most days of the year and times of the day, at least a portion of the garden would remain free of shade. Furthermore, the Project would result in a net increase of roof garden area by approximately 4,500 square feet, which would also provide some shade-free opportunities for use in the southern portion of the roof garden. Therefore, the Proposed Project would have a less-than-significant shadow impact on the Kaiser Center roof garden.

With respect to the Proposed Project's affects on nearby public or quasi-public park, lawn, garden, or open space that would be affected by Project shadow, with the exception of the Kaiser Center

roof garden, no other public open space, including the nearby Snow Park and Lakeside Park, and Lake Merritt, would be shaded by the Proposed Project. Both of these parks and the lake are located south and east of the areas that would be affected by the shadows generated by the Project. There are no other nearby public or quasi-public park, lawn, garden, or open space that would be affected by Project shadow. Based on the above, the Project's impact with respect to shadow would be less than significant.

Mitigation: None required.

Provision of Adequate Light

Impact AES-5: The Proposed Project would be consistent with the policies and regulations addressing the provision of adequate light related to appropriate uses. (Less than Significant)

The Proposed Project would require a number of discretionary approvals pursuant to the Oakland Planning Code, however it would not require a General Plan Amendment or Rezoning as the Project would be consistent with the current zoning designations on the Project Site. As discussed in Section III, *Project Description*, the Proposed Project would be built as a PUD within the C-55/S-17/S-4 Design Review Combining Zone (which was changed to CBD-C on July 21, 2009). Both of these factors would necessitate Design Review of the proposed new structures by the City of Oakland Planning Department. Through the Design Review process and final building plan approval and permitting process for the Project, (discussed under AES-1) the City will ensure project consistency with the light and ventilation section (Section 1203) of the Uniform Building Code and the City's Outdoor Lighting Standards (City of Oakland, 2002). Additionally, the Proposed Project is consistent with the General Plan policies regarding the provision of useable open space (*OSCAR OS 11-1 Civic Open Spaces*).

Moreover, the existing maximum development intensity allowed by the existing General Plan classifications would accommodate that proposed by the Project. Actual development would be restricted by the limits, standards, and guidelines (building height, setbacks, etc.) prescribed by the current applicable zoning designation and at the discretion of the City through the discretionary review of the Project.

Although the Proposed Project would cast shadow on nearby buildings, particularly during the winter and fall seasons at certain times of the day, indirect sunlight would still be available to windows of nearby buildings. Furthermore, the intensity of commercial development proposed is consistent with the surrounding context in which the site is located and with level of sunlight, noise, and privacy is consistent with that typically found and anticipated for commercial developments within Oakland's CBD.

The Project would result in a net increase of usable outdoor open space by expanding the existing roof garden, which would continue to receive sunlight during most days of the year and times of the day, as analyzed in Impact AES-5, above. Thus, the Proposed Project is consistent with relevant

policies and regulations regarding the provision of light and usable open spaces and therefore would not have a significant impact.

Mitigation: None required.

Wind

Impact: AES-6: The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. (Potentially Significant)

To determine the existing and potential future wind conditions on the Project Site, an Atmospheric Boundary Layer Wind Tunnel was used to test large-area scale models of the Oakland vicinity, the Project Site, the proposed Project and other potential cumulative development. Wind speeds were measured at 28 selected locations for existing conditions, with the Project and for cumulative conditions. The test results were scaled using long-term wind speed and direction data from meteorological stations in order to develop reliable estimates of the winds at the Project Site under the Existing, Project and Cumulative development scenarios.

Scaling the wind test results to the meteorological data yields an “equivalent wind speed” vs. frequency-of-occurrence distribution for each wind test point that is partially described by two related numbers: the first is the wind speed that is exceeded only 10% of the time² and is used to evaluate general wind conditions for pedestrians; and, the second is a wind speed that may be exceeded only one hour per year and is used to assess the level of wind hazard³ to pedestrians.

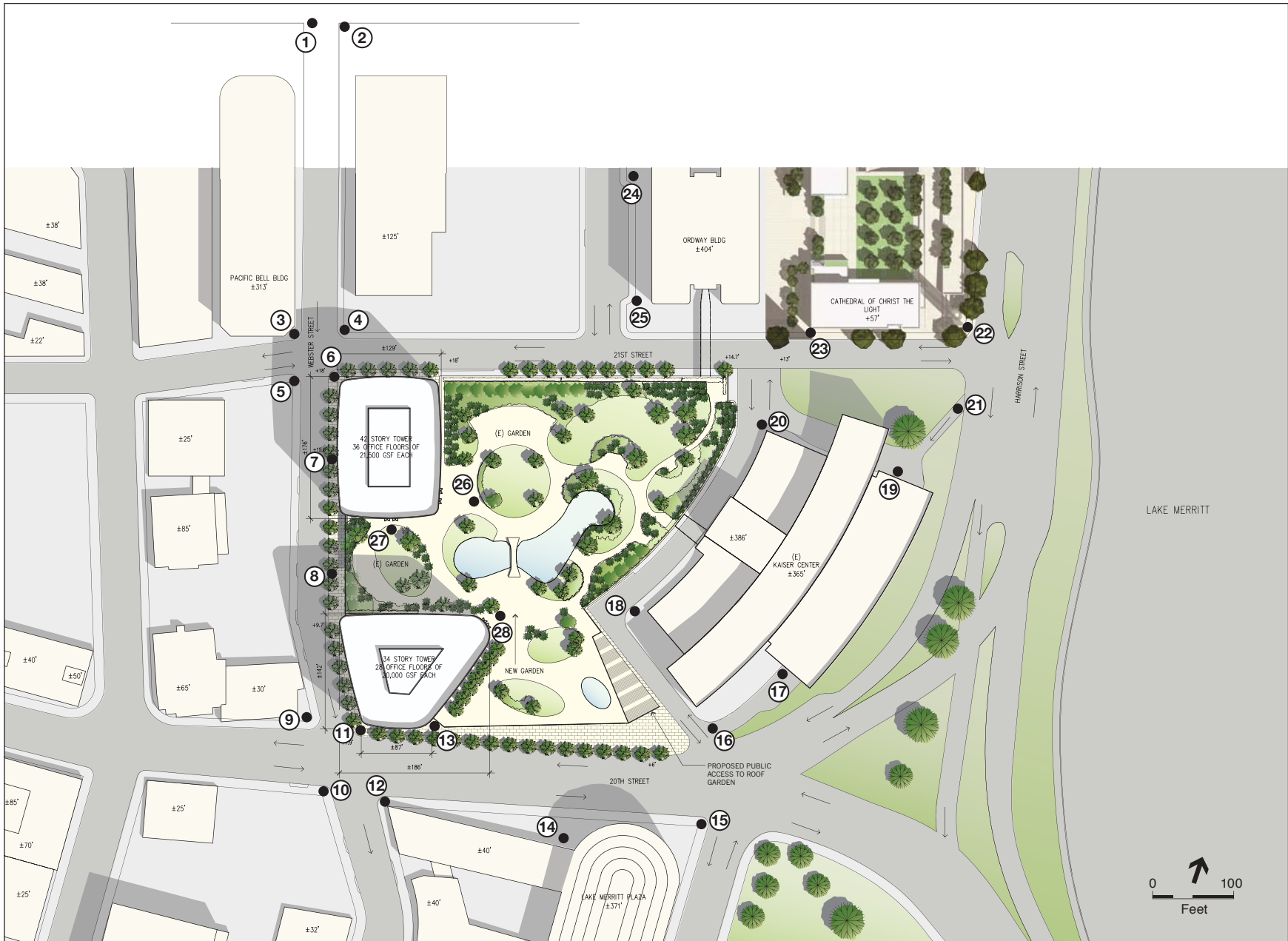
Figure IV.A-18 shows the locations of the 28 wind test measurement points. **Tables IV.A-1 and IV.A-2** summarize the findings of the wind tunnel test for all three scenarios – Existing, Project and Cumulative. The computer output tables and printout listings from the tests are contained in **EIR Appendix B**.

² As a corollary, wind speeds would be less than this speed 90% of the time.

³ The speed of the wind normally varies substantially over time. Gusts add to the average speed and lulls reduce it. The measured wind speed depends upon the averaging time over which the measurement is made. In general, the longer the averaging time, the lower the speed measured. The wind hazard criterion is based on research that identified a 3-second gust of wind at 44 mph as being strong enough to destabilize pedestrians. Starting with this value and using an appropriate wind speed distribution, the following wind speeds characterize the “same” hazardous wind, for each of three averaging times. Each interval could contain the hazardous wind event:

<u>Averaging time</u>	<u>Speed</u>	<u>Note</u>
1 hour	26 mph	Full-hour average wind speed
1 minute	36 mph	Weather Bureau one-minute average wind data
3 seconds	44 mph	Mean velocity of highest 3-second gust

Exceeding the City wind hazard criterion requires more than a full hour of wind averaging 26 mph. However, for convenience and consistency in reporting and comparing tested wind speeds, the 1-minute average speeds are used here: 1) to compare with the 36 mph value for the hazard criterion; and, 2) to report winds exceeded 10% of the time (because they are more appropriate for discussions of general wind conditions for pedestrians).



SOURCE: SOM: ESA

Kaiser Oakland . 206213
Figure IV.A-18
 Wind Study Test Point Locations

**TABLE IV.A-1
GENERAL WIND CONDITIONS SUMMARY**

References		Existing			Project				Cumulative			
Test Location Number	Wind Comfort Criterion Speed, miles/hour	Equivalent Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Speed Exceeds Criterion	S O U R C E	Equivalent Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Speed Exceeds Criterion	Speed Change Relative to Existing, miles/hour	S O U R C E	Equivalent Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Speed Exceeds Criterion	Speed Change Relative to Project, miles/hour	S O U R C E
1	11	14	20	e	14	21		e	14	21		e
2	11	10	8		11	11	1		11	10		
3	11	10	8		12	12	1	p	11	11		-
4	11	11	10		11	11	1		11	11		
5	11	12	14	e	11	11	-1	-	11	11		
6	11	9	6		11	12	2		11	11		
7	11	9	3		11	12	3		12	13		s
8	11	11	11		9	4	-2		8	4	-1	
9	11	17	31	e	19	35	2	e	18	33	-1	e
10	11	13	18	e	14	23	1	e	14	22		e
11	11	19	33	e	20	38	1	e	18	34	-1	e
12	11	16	26	e	15	25	-1	e	15	24		e
13	11	15	23	e	14	24	-1	e	14	21	-1	e
14	11	12	16	e	12	13	-1	e	11	11		-
15	11	14	20	e	14	18	-1	e	14	19		e
16	11	14	17	e	12	14	-1	e	12	15		e
17	11	10	7		10	8			9	6	-1	
18	11	16	24	e	8	3	-7	-	8	2	-1	
19	11	13	20	e	11	10	-2	-	13	18	2	s
20	11	16	26	e	13	16	-3	e	11	10	-2	-
21	11	17	33	e	15	28	-2	e	14	24	-1	e
22	11	15	26	e	13	19	-2	e	13	18		e
23	11	19	33	e	18	33		e	18	32		e
24	11	11	11		11	11			11	11		
25	11	15	28	e	19	36	4	e	18	34	-1	e
26	11	11	9		17	27	6	p	16	28	-1	p
27	11	14	23	e	17	31	3	e	13	17	-4	e
28	11	20	32	e	23	46	3	e	23	46		e
Ave. of 10% Percent:		13.8 mph	19%		13.9 mph	20%	0.1 mph		13.5 mph	18%	-0.3 mph	
Total Exceedances:		Total	19		Total	18			Total	17		
Subtotals by type:		Existing	19	e	Existing	16	e		Existing or Project	15	e/p	
					New, due to Project	2	p		New, due to Cumulative	2	s	
					New, at new location	0	n		New, at new location	0	n	
					Eliminated by Project	3	-		Eliminated by Cumulative	3	-	

SOURCE: Environmental Science Associates

NOTE: Equivalent wind speeds and percentages are rounded to integer values.

Any apparent discrepancies in column sums and speed changes in rows are due to rounding.

Bold e, s or p denotes wind speed in excess of 11 mph.

Locations 26, 27 and 28 are on Kaiser Center roof garden

SOURCE: ESA, 2009

**TABLE IV.A-2
WIND HAZARD SUMMARY**

References		Existing			Project				Cumulative			
Test Location Number	Wind Hazard Criterion Speed, miles/hour	1-hour/year Equivalent Wind Speed, miles/hour	Wind Hazard Criterion Exceeded, hours/year	S O U R C E	1-hour/year Equivalent Wind Speed, miles/hour	Wind Hazard Criterion Exceeded, hours/year	Hazard Hours Change Relative to Existing	S O U R C E	1-hour/year Equivalent Wind Speed, miles/hour	Wind Hazard Criterion Exceeded, hours/year	Hazard Hours Change Relative to Project	S O U R C E
1	36	35			36	1	1	p	35		-1	-
2	36	32			34				36			
3	36	36			36	1	1	p	36	1		p
4	36	34			33				35			
5	36	36			35				36			
6	36	27			43	15	15	p	43	15		p
7	36	23			26				27			
8	36	25			22				23			
9	36	39	3	e	42	8	5	p	41	7	-1	p
10	36	30			36				39	2	2	s
11	36	44	13	e	44	12	-1	e	42	6	-6	p
12	36	38	2	e	35		-2	-	34			
13	36	34			32				31			
14	36	28			25				24			
15	36	37	1	e	34		-1	-	32			
16	36	38	4	e	32		-4	-	30			
17	36	28			29				21			
18	36	37	1	e	20		-1	-	17			
19	36	31			26				30			
20	36	37	2	e	27		-2	-	23			
21	36	39	4	e	36		-4	-	35			
22	36	38	4	e	28		-4	-	28			
23	36	42	8	e	42	8		e	42	9	1	s
24	36	28			26				25			
25	36	33			42	9	9	p	40	5	-4	p
26	36	23			39	3	3	p	36		-3	-
27	36	31			44	18	18	p	50	47	29	s
28	36	48	26	e	52	60	34	p	52	59	-1	p
Ave. 1-hr:		34 mph			34 mph				34 mph			
Total hrs:		68 hr			135 hr	67 hr			151 hr	16 hr		
Total Exceedances:		Total	11		Total	10			Total	9		
Subtotals by type:		Existing	11	e	Existing	2	e		Existing or Project	6	e/p	
					New or increased time	8	p		New or increased time	3	s	
					New, at new location	0	n		New, at new location	0	n	
					Eliminated by Project	7	-		Eliminated by Cumulative	2	-	

SOURCE: Environmental Science Associates

NOTE: Equivalent wind speeds and percentages are rounded to integer values.

Any apparent discrepancies in column sums and speed changes in rows are due to rounding.

Bold e, s or p denotes wind speed exceedence over hazard threshold. Hazard hours durations and changes are in adjoining columns. Locations 26, 27 and 28 are on Kaiser Center roof garden.

SOURCE: ESA, 2009

Existing General Wind Conditions at the Project Site

Wind tunnel testing shows that existing general wind speeds⁴ at sidewalk locations in the Project area now range from 9 mph to 20 mph, where those speeds are the equivalent wind speeds that are exceeded only 10 percent of the time.

- On 20th Street, existing conditions are windy to very windy. Only two of the eight test locations recorded a wind speed of less than 14 mph; the highest wind speeds, 17 and 19 mph, occur on the north side of 20th Street at its intersection with Webster.
- On Webster Street north of 20th Street, existing conditions range from moderate to windy. Only one of eight locations recorded a wind speed as high as 14 mph, which occurs at the intersection of 22nd and Webster, while the lowest speeds occur at the middle and north end of the block.
- On 21st Street, existing conditions vary widely from moderate to very windy. Wind speeds generally are higher closer to Harrison Street; the highest, 19 mph, occurs on the north side of 21st Street. Conditions are windy all along the Harrison Street frontage of the Project block, around the tower, and on the interior driveways to the garage, as well.
- On the roof garden, existing conditions vary from moderate to very windy, with wind speeds ranging from 11 mph to 20 mph, depending upon the wind sheltering available.

Existing Wind Hazard Conditions at the Project Site

Wind tunnel testing also shows that existing winds exceed the City's wind hazard criterion during daytime hours during the year at ten sidewalk locations in the Project area. These locations, and the individual durations of each hazard, are as follows:

- Three locations at the intersection of 20th and Webster streets – on the northwest corner (3 hours), on the northeast corner (13 hours), and on the southeast corner. (2 hours)
- Two locations on 20th Street at Harrison Street – one on the north side (4 hours) and one on the south side (1 hour).
- Three locations at the intersection of 21st and Harrison streets – on the northwest corner (4 hours), on the southwest corner (4 hours), and on the north side of 21st Street, west of the intersection (8 hours).
- Two locations on the interior driveways to the garage – one north (2 hours) and one south (1 hour).

In addition to these ten existing sidewalk hazards, at least one existing wind hazard occurs atop the roof garden (26 hours).

⁴ Unless otherwise noted, throughout this discussion, "wind speed" refers to an "equivalent wind speed" that is exceeded 10% of the time. An "equivalent wind speed" is a metric defined as the mean wind speed multiplied by the quantity $(1 + 3 \times \text{Turbulence Intensity})$ and divided by 1.45. Because high values of turbulence generally make winds much more unpleasant for people, this definition includes a factor that amplifies the calculated velocity whenever the turbulence is greater than 0.15 or 15%, a low value.

Thus, nearly 40% of the 28 individual wind test locations⁵ have wind speeds that exceed the wind hazard criterion for 1 hour or more during daylight hours during the year. The duration of each is typically less than 10 hours per year, but at two locations near buildings and where wind speed and turbulence are increased the duration of the hazard is also longer.

In summary, wind hazards occur on-site and in the immediate vicinity under existing conditions. Based on wind testing, the total duration of the wind hazard is currently estimated at 68 hours per year. The highest wind speed that now occurs for 1 hour per year is 48 mph; this occurs at a location where the winds exceed the wind hazard criterion for a total of 26 hours during the course of the year.

Wind tunnel test measurements were made for the Project in the existing vicinity setting. The locations of the 28 wind test measurement points are shown in Figure IV.A-18, while the columns headed "Project" in Tables IV.A-1 and IV.A-2 summarize the results of the test.

General Wind Conditions at the Project Site with the Project

The Project would result in wind speeds at sidewalk locations in the Project area that would range from 8 mph to 23 mph, where those are equivalent wind speeds that are exceeded only 10% of the time. The average of the 10% exceeded wind speeds at the 28 locations would increase 0.2 mph. Wind speed changes greater than 1 mph, compared to existing winds, would occur as follows:

- Of the eight locations on 20th Street, only the one, at the northwest corner of 20th and Webster would increase as much as 2 mph; the highest wind speeds, 19 and 20 mph, would occur on the north side of the intersection of 20th and Webster Streets.
- Of the eight locations on Webster Street north of 20th Street, one would increase by 2 mph and one by 3 mph, while one would decrease by 2 mph. As now exists, only one location would have a wind speed as high as 14 mph, still at the intersection of 22nd and Webster. The lowest wind speed would occur at the middle of the Project block.
- On 21st Street, wind speeds would be higher mid-block and lower closer to Harrison Street, due to speed decreases of 2 mph and 3 mph at four locations at the north end of the high-rise tower and an increase of 4 mph to a new value, 19 mph, at one location on the north side of 21st Street. Speed decreases of 3 mph and 7 mph would occur at the north and south ends of the interior driveway, respectively.
- On the open space of the roof garden, wind speeds at the three locations would increase by 3 mph to 6 mph, to reach speeds of 17 mph to 23 mph.

Wind Hazard Conditions with the Project

The Project would result in wind speeds that exceed the wind hazard criterion during daytime hours during the year at seven sidewalk locations in the Project area. Those changes – in hazard locations and their individual durations – are as follows:

⁵ Although a large number (and percentage) of hazard criterion exceedances were found in each scenario of wind testing, it cannot be assured that every individual existing hazard location has been identified. However, the testing is sufficient to characterize the wind environment and disclose potential adverse wind impacts.

- One of three existing hazards at the intersection of 20th and Webster Streets would be eliminated by the Project. The duration of one remaining on the northwest corner (3 hours) would increase to 8 hours, while the duration of the other on the northeast corner (13 hours) would decrease to 12 hours. The net would be a 2-hour increase.
- Three new hazards would be added on Webster Street between 21st and 22nd Streets – two 1-hour hazards would result on the west side of Webster at the intersections, and one 15-hour hazard would result at the southeast corner of Webster and 21st Streets. The increase in duration due to these three new hazards would be 17 hours.
- Both existing hazards on 20th Street at Harrison Street would be eliminated. The net change would be a 5-hour decrease in duration.
- Two of the three existing hazards at the intersection of 21st and Harrison Street – one on the northwest corner (4 hours) and one on the southwest corner (4 hours) – would be eliminated. The existing 8-hour hazard on the north side of 21st Street and west of the intersection would remain unchanged. The net would be an 8-hour decrease in duration.
- Both existing hazards on the interior driveways to the garage would be eliminated. The net change would be a 3-hour decrease in duration.
- A new 9-hour hazard would occur on the north side of 21st Street, at the northeast corner of the intersection with Kaiser Plaza, as a result of the Project.

Thus, seven existing wind hazards on public sidewalks and streets with 18 hours of duration would be eliminated, one existing hazard would be reduced by 1-hour duration, and four new hazards with a total duration of 26 hours would be created by the Project. The net result would be an overall increase of 7 hours in the duration of the wind hazard.

In addition, at least two new wind hazards (3 hours and 18 hours) would occur atop the roof garden, in addition to the one existing hazard that would also increase in duration to 60 hours. These would increase the total wind hazard duration on the roof garden by 55 hours.

Thus, with the Project nearly 36% of the 28 individual wind test locations have wind speeds that exceed the wind hazard criterion for 1 hour or more during daytime hours during the year. As is the case for the existing winds, the duration of each hazard identified is typically less than 10 hours per year, but in a four locations near buildings and where wind speed and turbulence are increased the duration of the wind hazard is also longer.

Based on wind testing, the total duration of wind hazards for the Project is currently estimated at 135 hours per year, including 81 hours of wind hazard on the roof garden. The highest wind speed that would occur for 1 hour per year is 52 mph; at this location, winds would exceed the hazard criterion for 60 hours during the year.

Building large new high-rise structures amidst surrounding high-rise buildings usually results in general reductions in wind speed and so decreases the number and durations of occurrence of wind hazard in the vicinity. The fact that the Project Site is currently quite open and is exposed to the three strongest of the prevailing winds means that the anticipated reductions in ground-level wind speed due to infilling will not be fully realized until other infill high-rise buildings, such as indicated under the Cumulative Development scenario, are also constructed upwind.

Excluding effects on the roof garden, the total duration of the Project wind hazard (54 hours) and the existing wind hazard (55 hours) on public sidewalks are essentially equal, although as should be expected there are differences in the locations at which these hazards would occur.

For the Project, the largest adverse effect is on the Project's own roof garden, which is exposed to downwash winds from the new towers. Since the designs of the towers and the roof garden are not complete, wind testing included no wind-protective structures or measures to redirect downwash winds away from the roof garden open space. However, there are many opportunities to develop, as a part of final Project and landscaping design, simple and effective design or structural measures to control, reduce or eliminate the manageable wind hazard conditions identified on the roof garden. Such measures are usually practical, straightforward and reliable in controlling adverse wind conditions.

Because wind speeds would exceed the wind speed hazard threshold on the roof garden, a significant impact would result. There are structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. However, until such protective design features are tested and proved using the wind model, results cannot be quantified to determine if wind speeds would actually be reduced below the City wind threshold. Therefore, impacts resulting from wind would remain significant and unavoidable until such time that the design features can be tested.

Mitigation Measure

Measure AES-1: At the time of submittal of the Final Development Plan, the Applicant shall develop and, at the time of construction pursuant to the Final Development Plan, the Applicant shall implement a wind reduction plan that reduces wind hazards at the street level and roof garden to the maximum feasible extent, subject to review and approval by the City. The wind reduction plan shall include the results of wind tunnel testing for hazardous wind speeds of the Project conducted on the Project consistent with the Final Development Plan. The wind reduction plan shall include, but not be limited to, structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. Examples of these measures include tree plantings, dense bamboo planting, arbors, canopies and lattice fencing. The Applicant shall develop the wind reduction plan in coordination with the required landscape plan for the roof garden and be submitted to the City's Landmarks Preservation Advisory Board (LPAB) for review and recommendation to the Planning Commission, consistent with Mitigation Measure CUL -2.1 Historically-Sensitive Roof Garden Design. The LPAB will make advisory recommendations to the Planning Commission for its approval as part of its approval of the Final Development Plan, and the Applicant shall implement the approved wind reduction plan. However, implementation of the measures cannot determine if these design features will be effective in reducing this impact to a less than significant impact until they are in place.

Significance after Mitigation: Conservatively Deemed Significant and Unavoidable.

Cumulative Impacts

Impact AES-7: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in cumulative impacts related to visual character, views, aesthetics, shadow, or light and glare. (Potentially Significant)

Geographic Context

The geographic context used for the cumulative aesthetics assessment (views, visual character, light and glare, and shadow) of the Proposed Project includes areas surrounding the Project Site, which are depicted in existing setting photographs in Figures IV.A-2 through IV.A-5 and **Figure IV.A-19**, with the map of the areas shown in Figure IV.A-1, and in the shadow diagrams in Figures IV.A-6 through IV.A-17. In addition, a more detailed list of specific projects used for the cumulative shadow analysis is presented in **Table IV.A-3**, below; these cumulative projects include several from the City's Major Project's List (as shown in Table IV-1), as well as other projects in the vicinity that contribute to the aesthetics assessment of the Project but that are not considered "major projects." The cumulative projects considered for cumulative wind effects are those listed in Table IV.-1.

Impacts

Aesthetics

Figure IV.A-19 presents the cumulative visual simulation along with an annotated view, looking west toward the Kaiser Center site from across Lake Merritt, and Figures IV.A-6 through IV.A-17 present cumulative shadow simulations three different times of day (9:00 a.m.; 12:00 p.m.; 3:00 p.m.) in March, June, September and December.

As shown in these analyses, implementation of the Proposed Project in combination with combined with cumulative development in the defined geographic area, including past, present, existing, pending and other reasonably foreseeable development in the Project vicinity, would not result in significant adverse changes to the visual environment, including visual character and views, light and glare, and shadow. New multifamily residential and commercial redevelopment may occur within the Project Site vicinity, generally in the Downtown and Uptown Oakland areas and along the Broadway Corridor. New development would, in general, occur as redevelopment projects, by replacing existing development with more intense development as the Project Site vicinity is largely built out. In addition, all development that could occur in the Project Site vicinity has and would continue to be required to adhere to established restrictions, guidelines, policies, and criteria that address building appearance, height, bulk, and configuration, and the type of land use.



Existing view from Lakeshore Avenue near Athol Plaza looking northwest



Visual simulation of proposed project with cumulative development

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.

**TABLE IV.A-3
PROPERTIES INCLUDED IN CUMULATIVE SHADOW ANALYSIS
KAISER CENTER EIR**

City of Oakland Site Identification	Project Name/Location
Proposed Projects (Reasonably Foreseeable)	
14	Uptown Parcel 4 (Telegraph/19th Street)
15	1443 Alice Street
17	1309 Madison Street
18	226 13th Street
21	Emerald Views (formerly 19th Street Residential Condominiums)
31	1938 Broadway
33	459 23rd Street
42	460 Grand Avenue
48	Valdez & 23rd Street Project
59	1331 Harrison Project
61	100 Grand
67	Uptown Project
74	Jackson Courtyard Condominiums
75	1930 Broadway
76	Kaiser Center
81	Fox Courts
85	1640 Broadway Mixed Use Project
86	Broadway West Grand (formerly Negherbon Mixed Use Project)
Completed Projects	
6	Madison Lofts
9	Uptown Project
29	Telegraph Gateway Project
35	The Essex-Lake Merritt
39	Cathedral of Christ the Light
40	Center 21
43	17th Street Parking Garage
44	Thomas Berkeley Square
48	Broadway West Grand (formerly Negherbon Mixed Use Project)
54	Fox Theater
60	1111 Jackson Street – Phase 1
SOURCE: City of Oakland, CEDA Major Projects List, June 2009	

Therefore, it is reasonable to assume that the Proposed Project and cumulative development would not necessarily constitute an adverse effect on views, the visual character of the area, or generate substantial amounts of new light and glare, and shadow. Thus, there would be no significant cumulative aesthetic impacts resulting from the Proposed Project in combination with other past, present, pending and reasonably foreseeable projects.

Mitigation: None required.

Wind

The columns headed “Cumulative” in Tables IV.A-1 and IV.A-2 summarize the results of the wind tunnel test for the Cumulative Scenario.

General Cumulative Wind Conditions

Compared to Project wind conditions, the Cumulative Scenario would result in few material changes in wind speeds at sidewalk locations in the Project area. The average of the 10% exceeded wind speeds at all locations would decrease by 0.4 mph. Wind speed changes greater than 1 mph, compared to Project conditions, would occur only at two locations at the north end of the existing Kaiser tower, where winds would increase by 2 mph at one location and decrease by 2 mph at the other.

Wind Hazard Cumulative Conditions

The Cumulative scenario would result in wind speeds at seven sidewalk locations in the Project area that exceed the City’s wind hazard criterion for 1 hour or more during daylight hours during the year (City’s wind hazard criterion). The changes in these hazards – in locations and their individual durations – in comparison to the Project hazards are as follows:

- The two Project hazards at the intersection of 20th and Webster Streets would be reduced in duration by the Cumulative scenario, and one new 2-hour hazard would be created on the southwest corner. The duration of the one on the northwest corner (8 hours) would be decreased to 7 hours, while the duration of the other on the northeast corner (12 hours) would decrease to 6 hours. The net change would be a 5-hour decrease in duration.
- One of the three new Project hazards on Webster Street between 21st and 22nd Streets would be eliminated. The decrease in duration would be 1 hour.
- The Project hazard on the north side of 21st Street and west of the intersection would remain, but its duration would increase to 9 hours. The net would be a 1-hour increase in duration.
- The duration of the 9-hour Project hazard on the north side of 21st Street, at the northeast corner of the intersection with Kaiser Plaza, would be reduced to 5 hours. The net would be a 4-hour decrease.

Thus, one 1-hour Project wind hazard would be eliminated; the duration of three Project hazards would be reduced by 11 hours; the duration of one Project hazard would be increased by 1 hour; and, one new 2-hour hazard would be created by the Cumulative scenario. The overall result would be a net decrease of 9 hours in the duration of the wind hazard on the sidewalks.

In addition, the lesser of the two Project wind hazards (3 hours and 18 hours) atop the roof garden would be eliminated, while the duration of another would be increased by 29 hours and the duration of the Existing wind hazard would be reduced by 1 hour. The net effect would be an increase in the total wind hazard duration on the roof garden by 25 hours.

Thus, with the Cumulative scenario nearly 29% of the 28 individual wind test locations would have wind speeds that exceed the wind hazard for 1 hour or more during daytime hours during the year (City’s wind hazard criterion). As is the case for the existing winds, the duration of each

hazard identified is typically less than 10 hours per year, but in four locations, both near buildings and where wind speed and turbulence are increased, the duration of the hazard would also increase.

Based on wind testing, the total duration of wind hazard for the Cumulative Development scenario is currently estimated at 151 hours per year, including 106 hours of hazard on the roof garden. The highest wind speed that would occur for 1 hour per year is 52 mph; winds at this location would exceed 36 mph for 59 hours a year.

Excluding the roof garden, the total duration of the Cumulative scenario wind hazard (45 hours) is less than the existing wind hazard (55 hours) and less than the Project wind hazard (54 hours). Again as expected, there are differences between the Existing, Project and Cumulative scenarios in the locations at which these hazards would occur.

The results showing the effects of Cumulative Development reinforces the point made previously that the anticipated general reductions in ground-level wind speed (from Project high-rise development) will not be fully realized until other infill high-rise buildings, such as indicated under the Cumulative Development scenario, are also constructed.

For the Project under Cumulative Development, the largest adverse effect would be on the Project's own roof garden, which would continue to be exposed to downwash winds from the new towers. Because wind speeds will exceed the hazard threshold on the roof garden, this would result in a significant impact. As discussed under Impact AES-6, there exist structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. It is anticipated that wind speeds would be reduced below the hazard threshold by implementing such design features. However, this impact would remain significant and unavoidable until it can be shown that those design elements would mitigate the adverse effect.

Mitigation Measure

Measure AES-2: Implement Mitigation Measure AES-1.

Significance after Mitigation: Conservatively Deemed Significant and Unavoidable.

References – Aesthetics, Shadows and Wind

California Department of Transportation, The California Scenic Highway System, <http://www.dot.ca.gov/hq/LandArch/scenic/cahisys.htm>, accessed December 2, 2008.

City of Oakland, Community and Economic Development Agency (CEDA) Major Projects List, March-April 2009 (www.oaklandnet.com)

City of Oakland, *Envision Oakland: City of Oakland General Plan, Land Use and Transportation Element (LUTE)*, March 24, 1998, as amended.

City of Oakland, *Open Space, Conservation and Recreation (OSCAR), An Element of the Oakland General Plan*, June 1996.

City of Oakland, *Scenic Highways: An Element of the Oakland Comprehensive (General) Plan*, adopted September 1974.

ESA, Wind Study Model and Testing, 2009.

B. Air Quality and Greenhouse Gases

This section presents an overview of region-specific information related to air quality, including a description of current air quality conditions in the Project vicinity and sensitive land uses that could be affected by air pollution. The impact analysis discusses the expected emissions associated with the Proposed Project, evaluates potential effects on sensitive receptors in the vicinity, and includes appropriate City SCAs. Mitigation measures are identified for significant effects, followed by identification of the residual impact significance after mitigation measures are implemented. An analysis of the Project's contribution to global climate change and greenhouse gases (GHG) emissions is also included at the end of this section.

Air Quality Setting

Regulatory Context for Air Quality

Federal

The Federal Clean Air Act (FCAA) requires the U.S. Environmental Protection Agency (USEPA) to identify National Ambient Air Quality Standards (NAAQS or “national standards”) to protect public health and welfare. National standards have been established for ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide, respirable particulate matter (PM₁₀ and PM_{2.5}), and lead (Pb). **Table IV.B-1** shows current national and state ambient air quality standards and provides a brief discussion of the related health effects and principal sources for each pollutant.

Pursuant to the 1990 FCAA amendments, the USEPA classifies air basins (or portions thereof) as “attainment” or “nonattainment” for each criteria air pollutants, based on whether or not the NAAQS had been achieved. **Table IV.B-2** shows the current attainment status of the Project vicinity.

The FCAA requires each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The FCAA amendments added requirements for states containing areas that violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. The USEPA has responsibility to review all state SIPs to determine if they conform to the mandates of the FCAA amendments and will achieve air quality goals when implemented. If the USEPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan (FIP) for the nonattainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated timeframes can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

**TABLE IV.B-1
STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS, EFFECTS, AND SOURCES**

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 hour	0.09 ppm	---	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when reactive organic gases (ROG) and nitrogen oxides (NOx) react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial / industrial mobile equipment.
	8 hours	0.07 ppm ¹	0.075 ppm		
Carbon Monoxide	1 hour	20 ppm	35 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm		
Nitrogen Dioxide	1 hour	0.18 ppm	---	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
	Annual Avg.	0.030	0.053 ppm		
Sulfur Dioxide	1 hour	0.25 ppm	---	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	3 hours	---	0.5 ppm		
	24 hours	0.04 ppm	0.14 ppm		
	Annual Avg.	---	0.03 ppm		
Respirable Particulate Matter (PM-10)	24 hours	50 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	Annual Avg.	20 $\mu\text{g}/\text{m}^3$	---		
Fine Particulate Matter (PM-2.5)	24 hours	---	35 $\mu\text{g}/\text{m}^3$	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; Also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.
	Annual Avg.	12 $\mu\text{g}/\text{m}^3$	15 $\mu\text{g}/\text{m}^3$		
Lead	Monthly Avg.	1.5 $\mu\text{g}/\text{m}^3$	---	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	Quarterly	---	1.5 $\mu\text{g}/\text{m}^3$		
Hydrogen Sulfide	1 hour	0.03 ppm	No National Standard	Geothermal Power Plants, Petroleum Production and refining	Nuisance odor (rotten egg smell), headache and breathing difficulties (higher concentrations)
Sulfates	24 hour	25 $\mu\text{g}/\text{m}^3$	No National Standard	Produced by the reaction in the air of SO ₂ .	Breathing difficulties, aggravates asthma, reduced visibility
Visibility Reducing Particles	8 hour	Extinction of 0.23/km; visibility of 10 miles or more	No National Standard	Reduces visibility, reduced airport safety, lower real estate value, discourages tourism.	See PM2.5.

ppm = parts per million; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

1. This concentration was approved by the Air Resources Board on April 28, 2005 and became effective May 17, 2006.

SOURCE: California Air Resources Board, 2008a, California Air Resources Board, 2005a.

**TABLE IV.B-2
BAY AREA ATTAINMENT STATUS**

Pollutant	Designation/Classification	
	Federal Standards	State Standards
Ozone – one hour	No Federal Standard ¹	Nonattainment
Ozone – eight hour	Nonattainment	Nonattainment
PM10	Unclassified	Nonattainment
PM2.5	Unclassified/Attainment	Nonattainment
CO	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead	No Designation	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility Reducing Particles	No Federal Standard	Unclassified

1. Federal One Hour Ozone National Ambient Air Quality Standard was revoked on June 15, 2005
2. The State 8-hour ozone standard was approved by the CARB on April 28, 2005, and became effective May 17, 2006.
SOURCE: BAAQMD, 2008a.

Regulation of Toxic Air Contaminants (TACs), termed Hazardous Air Pollutants (HAPs) under federal regulations, is achieved through federal, State and local controls on individual sources. The 1977 FCAA amendments required the USEPA to identify National Emission Standards for Hazardous Air Pollutants (NESHAPs) to protect public health and welfare. These substances include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals. There is uncertainty in the precise degree of hazard.

State

The California Air Resources Board (CARB) manages air quality, regulates mobile emissions sources, and oversees the activities of county Air Pollution Control Districts and regional Air Quality Management Districts. CARB establishes state ambient air quality standards and vehicle emissions standards.

California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants and include air quality standards for some pollutants for which there is no corresponding national standard. These are shown in Table IV.B-1. Under the California Clean Air Act (CCAA) patterned after the FCAA, areas have been designated as attainment or nonattainment with respect to the state standards. Table IV.B-2 summarizes the attainment status with California standards in the Project vicinity.

Toxic Air Contaminants

The Health and Safety Code defines TACs as air pollutants which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health. The State Air Toxics Program was established in 1983 under Assembly Bill (AB) 1807

(Tanner). A total of 243 substances have been designated TACs under California law; they include the 189 (federal) HAPs adopted in accordance with AB 2728. The Air Toxics “Hot Spots” Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; however, AB 2588 does not regulate air toxics emissions. Toxic air contaminant emissions from individual facilities are quantified and prioritized. “High-priority” facilities are required to perform a health risk assessment and, if specific thresholds are violated, are required to communicate the results to the public in the form of notices and public meetings.

In August of 1998, ARB identified particulate emissions from diesel-fueled engines (diesel particulate matter, or DPM) as TACs. CARB subsequently developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (CARB, 2000). The document represents proposals to reduce diesel particulate emissions, with the goal of reducing emissions and associated health risks by 75 percent in 2010 and by 85 percent in 2020. The program aims to require the use of state-of-the-art catalyzed diesel particulate filters and ultra low sulfur diesel fuel on diesel-fueled engines.

In April 2005, CARB published *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB, 2005b). This handbook is intended to give guidance to local governments in the siting of sensitive land uses, such as residences, schools, daycare centers, playgrounds, or medical facilities, near sources of air pollution.

Regional

The regional agency primarily responsible for developing air quality plans for the Bay Area is the Bay Area Air Quality Management District (BAAQMD), the agency with permit authority over most types of stationary emission sources of air pollutants in the Bay Area.

Air Quality Plans

The 1977 FCAA amendments require that regional planning and air pollution control agencies prepare a regional *Air Quality Plan* to outline the measures by which both stationary and mobile sources of pollutants can be controlled in order to achieve all standards specified in the Clean Air Act. The 1988 CCAA also requires development of air quality plans and strategies to meet state air quality standards in areas designated as non-attainment (with the exception of areas designated as non-attainment for the state PM standards). Maintenance plans are required for attainment areas that had previously been designated non-attainment in order to ensure continued attainment of the standards. Air quality plans developed to meet federal requirements are referred to as *State Implementation Plans*.

Bay Area plans are prepared by the BAAQMD with the cooperation of the Metropolitan Transportation Commission (“MTC”) and the Association of Bay Area Governments (“ABAG”). Currently, there are three plans for the Bay Area. These are:

- The *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard* (ABAG, 2001) developed to meet federal ozone air quality planning requirements

- The *Bay Area 2005 Ozone Strategy* (BAAQMD, 2006) developed to meet planning requirements related to the state ozone standard; and
- The *1996 Carbon Monoxide Redesignation Request and Maintenance Plan for Ten Federal Planning Areas*, developed by the air districts with jurisdiction over the ten planning areas including the BAAQMD to ensure continued attainment of the federal carbon monoxide standard. In June 1998, the USEPA approved this plan and designated the ten areas as attainment. The maintenance plan was revised most recently in 2004 (CARB, 2004).

The Bay Area 2001 *Ozone Attainment Plan* was prepared as a proposed revision to the Bay Area part of California's plan to achieve the national ozone standard. The plan was prepared in response to USEPA's partial approval and partial disapproval of the Bay Area's 1999 *Ozone Attainment Plan* and finding of failure to attain the national ambient air quality standard for ozone. The revised plan was adopted by the Boards of the co-lead agencies at a public meeting and approved by the CARB in 2001. In July 2003, the USEPA approved the plan. The USEPA also made an interim final determination that the plan corrects deficiencies identified in the 1999 plan. Following three years of low ozone levels (2001, 2002 and 2003), in October 2003, USEPA proposed a finding that the Bay Area had attained the national one-hour standard and that certain elements of the 2001 plan (attainment demonstration, contingency measures and reasonable further progress) were no longer required. In April 2004, USEPA made final the finding that the Bay Area had attained the one-hour standard and approved the remaining applicable elements of the 2001 plan: emissions inventory; control measure commitments; motor vehicle emission budgets; reasonably available control measures; and commitments to further study measures.

The USEPA recently transitioned from the national one-hour standard to a more health protective 8-hour standard. Defined as "concentration-based," the new national ozone standard is set at 85 parts per billion averaged over eight hours. The new national 8-hour standard is considered to be more health protective because it protects against health effects that occur with longer exposure to lower ozone concentrations. In April 2004, USEPA designated regions as attainment and non-attainment areas for the 8-hour standard. These designations took effect on June 15, 2004. USEPA formally designated the Bay Area as a non-attainment area for the national 8-hour ozone standard and classified the region as "marginal" according to five classes of non-attainment areas for ozone, which range from marginal to extreme. Marginal non-attainment areas were charged with attaining the national 8-hour ozone standard by June 15, 2007. While certain elements of Phase 1 of the 8-hour implementation rule are still undergoing legal challenge, USEPA signed Phase 2 of the 8-hour implementation rule on November 9, 2005. Although the Bay Area did not achieve attainment by the June 2007 deadline, it is not currently anticipated that marginal areas will be required to prepare attainment demonstrations for the 8-hour standard, though other planning elements may be required. The Bay Area plans to address all requirements of the national 8-hour standard in subsequent documents.

For state air quality planning purposes, the Bay Area is classified as a serious non-attainment area for ozone. The "serious" classification triggers various plan submittal requirements and transportation performance standards. One such requirement is that the Bay Area update the *Clean Air Plan* ("CAP") every three years to reflect progress in meeting the air quality standards and to incorporate new information regarding the feasibility of control measures and new emission

inventory data. The Bay Area's record of progress in implementing previous measures must also be reviewed. On January 4, 2006, the BAAQMD adopted the most recent revision to the CAP - the *Bay Area 2005 Ozone Strategy*. The control strategy for the *2005 Ozone Strategy* is to implement all feasible measures on an expeditious schedule in order to reduce emissions of ozone precursors and consequently reduce ozone levels in the Bay Area and reduce transport to downwind regions. The 2010 CAP is currently in a draft stage and has yet to be adopted as of publication of this Draft EIR.

In April 2005, CARB established a new eight-hour average ozone standard of 0.070 ppm, which became effective on May 17, 2006. CARB is currently working on designations and implementation guidance for the new standard. The one-hour state standard of 0.090 ppm has been retained. The San Francisco Bay Area has not attained the state eight-hour standards and will be taking action as necessary to address those standards once the planning requirements have been established.

Local

City of Oakland General Plan

The Open Space, Conservation, and Recreation (OSCAR) Element of the Oakland General Plan contains the following Air Quality objective and policies that would apply to the Proposed Project (City of Oakland, 1996).

- To improve air quality in Oakland and the surrounding Bay Region. (*Objective CO-12: Air Resources*)
- Promote land use patterns and densities which help improve regional air quality conditions by: (a) minimizing dependence on single passenger autos; (b) promoting projects which minimize quick auto starts and stops, such as live-work development, mixed use development, and office development with ground floor retail space; (c) separating land uses which are sensitive to pollution from the sources of air pollution; and (d) supporting telecommuting, flexible work hours, and behavioral changes which reduce the percentage of people in Oakland who must drive to work on a daily basis. (*Policy CO-12.1*)
- Require that development projects be designed in a manner which reduces potential adverse air quality impacts. This may include: (a) the use of vegetation and landscaping to absorb carbon monoxide and to buffer sensitive receptors; (b) the use of low-polluting energy sources and energy conservation measures; and (c) designs which encourage transit use and facilitate bicycle and pedestrian travel. (*Policy CO-12.4*)
- Require construction, demolition and grading practices which minimize dust emissions (*Policy CO-12.6*)

City of Oakland Municipal Code

Per the City of Oakland Municipal Code, Title 15 Buildings and Construction, Chapter 15.36 Demolition Permits, 15.36.100 Dust Control Measures,

“Best Management Practices” shall be used throughout all phases of work, including suspension of work, to alleviate or prevent fugitive dust nuisance and the discharge of smoke or any other air contaminants into the atmosphere in such quantity as will violate any city or regional air pollution control rules, regulations, ordinances, or statutes. Water or dust palliatives or combinations of both shall be applied continuously and in sufficient

quantity during the performance of work and at other times as required. Dust nuisance shall also be abated by cleaning and sweeping or other means as necessary. A dust control plan may be required as condition of permit issuance or at other times as may be deemed necessary to assure compliance with this section. Failure to control effectively or abate fugitive dust nuisance or the discharge of smoke or any other air contaminants into the atmosphere may result in suspension or revocation of the permit, in addition to any other applicable enforcement actions or remedies. (Ord. 12152 § 1, 1999) .

City of Oakland Standard Conditions of Approval & Uniformly Applied Development Standards

The City's SCAs are incorporated into projects as conditions of approval regardless of a project's environmental determination. As applicable, the SCAs are adopted as requirements of an individual project when it is approved by the City and are designed to, and will, substantially mitigate environmental effects. For Proposed Project, the relevant SCAs regarding air quality will be incorporated as part of the Project. If an SCA would reduce a potentially significant impact to less than significant, the impact will be determined to be less than significant and no mitigation is imposed. Where there are impacts associated with a Project Site that will result in significant environmental impacts despite implementation of the SCA, additional mitigation measures are recommended.

The City's SCAs relevant to air quality impacts are shown below.

- **SCA AIR-1 Construction-Related Air Pollution Controls (Dust and Equipment Emissions)** (*Ongoing throughout demolition, grading, and/or construction*)

During construction, the project applicant shall require the construction contractor to implement all of the following applicable measures recommended by the Bay Area Air Quality Management District (BAAQMD):

- a. Water all exposed surfaces of active construction areas at least twice daily (using reclaimed water if possible). Watering should be sufficient to prevent airborne dust from leaving the site. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water should be used whenever possible.
- b. Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer).
- c. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- d. Pave all roadways, driveways, sidewalks, etc. as soon as feasible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
- e. Enclose, cover, water twice daily or apply (non-toxic) soil stabilizers to exposed stockpiles (dirt, sand, etc.).
- f. Limit vehicle speeds on unpaved roads to 15 miles per hour.
- g. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485, of the California Code of

Regulations. Clear signage to this effect shall be provided for construction workers at all access points.

- h. All construction equipment shall be maintained and properly tuned in accordance with the manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- i. Post a publicly visible sign that includes the contractor's name and telephone number to contact regarding dust complaints. When contacted, the contractor shall respond and take corrective action within 48 hours. The telephone numbers of contacts at the City and BAAQMD shall also be visible. This information may be posted on other required on-site signage.

The enhanced measures below apply to construction projects involving 1) land uses that exceed the BAAQMD construction screening criteria (e.g., 240 or more multi-family residential units); 2) a demolition permit; 3) simultaneous occurrence of more than two construction phases (e.g., grading and building construction occurring simultaneously); 4) extension site preparation (i.e., over four acres in size); or 5) extensive soil transport (i.e., 10,000 or more cubic yards of soil import/export).

- j. All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.
- k. All excavation, grading, and demolition activities shall be suspended when average wind speeds exceed 20 mph.
- l. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- m. Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for one month or more).
- n. Designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust offsite. Their duties shall include holidays and weekend periods when work may not be in progress.
- o. Install appropriate wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of the construction site to minimize wind blown dust. Wind breaks must have a maximum 50 percent air porosity.
- p. Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- q. The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.
- r. All trucks and equipment, including tires, shall be washed off prior to leaving the site.
- s. Site accesses to a distance of 100 feet from the paved road shall be treated with a 6 to 12 inch compacted layer of wood chips, mulch, or gravel.
- t. Minimize the idling time of diesel-powered construction equipment to two minutes.
- u. The project applicant shall develop a plan demonstrating that the off-road equipment (more than 50 horsepower) to be used in the construction project (i.e., owned, leased, and subcontractor vehicles) would achieve a project wide fleet-average 20 percent NOx reduction and 45 percent particulate matter (PM) reduction compared to the

most recent California Air Resources Board (CARB) fleet average. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as they become available.

- v. Use low VOC (i.e., ROG) coatings beyond the local requirements (i.e., BAAQMD Regulation 8, Rule 3: Architectural Coatings).
- w. All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of NO_x and PM.
- x. Off-road heavy diesel engines shall meet the CARB's most recent certification standard.
- **SCA AIR-2 Construction Emissions** (*Prior to issuance of a demolition, grading or building permit.*)

To minimize construction equipment emissions during construction, the Project Applicant shall require the construction contractor to:

- a. Demonstrate compliance with BAAQMD Regulation 2, Rule 1 (General Requirements) for all portable construction equipment subject to that rule. BAAQMD Regulation 2, Rule 1 provides the issuance of authorities to construct and permits to operate certain types of portable equipment used for construction purposes (e.g., gasoline or diesel-powered engines used in conjunction with power generation, pumps, compressors, and cranes) unless such equipment complies with all applicable requirements of the "California Air Pollution Control Officers Association (CAPCOA)" Portable Equipment Registration Rule" or with all applicable requirements of the Statewide Portable Equipment Registration Program. This exemption is provided in BAAQMD Rule 2-1-105.
- b. Perform low- NO_x tune-ups on all diesel-powered construction equipment greater than 50 horsepower (no more than 30 days prior to the start of use of that equipment). Periodic tune-ups (every 90 days) should be performed for such equipment used continuously during the construction period.
- **SCA AIR-3 Asbestos Removal in Structures** (*Prior to issuance of a demolition permit.*)

If asbestos-containing materials (ACM) are found to be present in building materials to be removed, demolished and disposed, the Project Applicant shall submit specifications signed by a certified asbestos consultant for the removal, encapsulation, or enclosure of the identified ACM in accordance with all applicable laws and regulations, including but not necessarily limited to: California Code of Regulations, Title 8; Business and Professions Code; Division 3; California Health & Safety Code 25915-25919.7; and Bay Area Air Quality Management District, Regulation 11, Rule 2, as may be amended.

In addition, the following SCAs located in other sections of this EIR would also serve to reduce VMT, thus reducing pollutant emissions:

- TRANS-1: Transportation Demand Management Plan (Section IV.L, *Traffic and Circulation*)
- UTIL-1: Waste Reduction and Recycling (Section IV.M, *Utilities and Service Systems*)

Physical Setting for Air Quality

Climate and Meteorology

Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. The Project Site is located in the City of Oakland and is within the boundaries of the San Francisco Bay Area Air Basin (Bay Area). The Bay Area Air Basin encompasses the nine-county region including all of Alameda, Contra Costa, Santa Clara, San Francisco, San Mateo, Marin and Napa counties, and the southern portions of Solano and Sonoma counties. The climate of the Bay Area is determined largely by a high-pressure system that is almost always present over the eastern Pacific Ocean off the West Coast of North America. During winter, the Pacific high-pressure system shifts southward, allowing more storms to pass through the region. During summer and early fall, when few storms pass through the region, emissions generated within the Bay Area can combine with abundant sunshine under the restraining influences of topography and subsidence inversions to create conditions that are conducive to the formation of photochemical pollutants, such as ozone and secondary particulates, such as nitrates and sulfates.

More specifically, the site lies approximately 3 miles east of San Francisco Bay in the Northern Alameda and Western Contra Costa Counties climatological subregion. This subregion stretches from Richmond to San Leandro with San Francisco Bay as its western boundary and its eastern boundary defined by the Oakland-Berkeley Hills. In this area, marine air traveling through the Golden Gate, as well as across San Francisco and the San Bruno Gap, is a dominant weather factor. The Oakland-Berkeley Hills cause the westerly flow of air to split off to the north and south of Oakland, which causes diminished wind speeds. The air pollution potential in this subregion is relatively low for portions close to the Bay, due to the largely good ventilation and less influx of pollutants from upwind sources (BAAQMD, 1999).

Wind measurements taken at Oakland International Airport indicate that the predominant wind flow is out of the west-northwest. Northwest winds occur approximately 46 percent of the time. Average wind speeds vary from season to season with the strongest average winds occurring during summer and the lightest average winds during winter. Average wind speeds are 9.7 miles per hour (mph) during summer and 7.4 mph during winter. Temperatures in Oakland average 58 °F annually, ranging from an average of 40°F on winter mornings to an average of mid-70s in the late summer afternoons. Daily and seasonal oscillations of temperature are small because of the moderating effects of the nearby ocean. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the “rainy” period from early November to mid-April. Oakland averages 18 inches of precipitation annually, but because much of the area’s rainfall is derived from the fringes of mid-latitude storms, a shift in the annual storm track of a few hundred miles can mean the difference between a very wet year and near drought conditions.

Existing Air Quality

The BAAQMD operates a regional monitoring network that measures the ambient concentrations of the six criteria air pollutants. Existing and probable future levels of air quality in Oakland can generally be inferred from ambient air quality measurements conducted by the BAAQMD at its nearby monitoring stations. The monitoring stations closest to the Project area are the Alice Street

and International Boulevard stations in Oakland, 0.8 mile southwest and 6.5 mile southeast from the Project Site, respectively. The Alice Street station monitored ozone (1-hour and 8-hour) and carbon monoxide for year 2005, and the International Boulevard station monitored ozone (1-hour and 8-hour), particulate matter (PM_{2.5}), carbon monoxide, and nitrogen dioxide for year 2007 through 2009. Data for 2006 was not available near the Project Site. Since the major pollutants of concern in the San Francisco Bay Area are ozone, and particulate matter, **Table IV.B-3** shows a four-year summary of monitoring data (2005 and 2007 through 2009) for these pollutants from the Alice Street and International Boulevard stations. Due to the proximity of the Project to the stations in Oakland, air quality measurements gathered in Oakland are felt to be generally representative of conditions in the Project area. Table IV.B-3 also compares measured pollutant concentrations with state and national ambient air quality standards.

TABLE IV.B-3
AIR QUALITY DATA SUMMARY (2005-2009) FOR THE PROJECT AREA^a

Pollutant	State Standard ^b	National Standard ^b	Monitoring Data by Year			
			2005	2007	2008	2009
Ozone hourly						
Highest 1-hour average, ppm ^c	0.09	NA	0.068	0.040	0.086	0.092
Days over State Standard			0	0	0	0 ^f
Ozone 8-hour						
Highest 8-hour average, ppm ^c	0.07	0.075	0.045	0.036	0.064	0.062
Days over National Standard			0	0	0	0
Days over State Standard			0	0	0	0
PM2.5						
Highest 24-hour average, µg/m3 ^c	NA	35	NA	22.8	30.1	36.3
Estimated days over National Standard ^d			NA	0 ^e	0	3

a Data for 2004 and 2005 are from the BAAQMD's Alice Street station in Oakland, approximately 0.8 mile southwest of the Project Site; data for 2007 and 2008 are from the BAAQMD's International Boulevard station in Oakland, approximately 6.5 mile southeast from the Project Site; data for 2006 was not available near the Project Site. PM₁₀ data was not available near the Project Site.

b Generally, state standards and national standards are not to be exceeded more than once per year.

c ppm = parts per million; µg/m³ = micrograms per cubic meter.

d Exceedance based on the previous National Standard of 65µg/m³.

e The CARB states that an exceedance is not necessarily a violation.

f A violation occurs only if the standard is exceeded. Because 0.092 rounds to 0.09, it is not considered a violation. A recorded concentration of 0.095 or greater would constitute a violation of the state standard.

NA = Not Available or Not Applicable.

SOURCE: California Air Resources Board (CARB), 2008b.

Criteria Air Pollutants

Ozone (O₃)

Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NO_x). ROG and NO_x are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NO_x under the influence of wind and sunlight. Ozone concentrations tend to be higher in the

late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone.

Carbon Monoxide (CO)

Ambient carbon monoxide concentrations normally are considered a local effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic. Wind speed and atmospheric mixing also influence carbon monoxide concentrations. Under inversion conditions, carbon monoxide concentrations may be distributed more uniformly over an area that may extend some distance from vehicular sources. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia, as well as for fetuses.

Carbon monoxide concentrations have declined dramatically in California due to existing controls and programs and most areas of the state including the Project region have no problem meeting the carbon monoxide state and federal standards. CO measurements and modeling were important in the early 1980s when CO levels were regularly exceeded throughout California. In more recent years, CO measurements and modeling have not been a priority in most California air districts due to the retirement of older polluting vehicles, fewer emissions from new vehicles, and improvements in fuels. The clear success in reducing CO levels is evident in the first paragraph of the executive summary of the California Air Resources Board *2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for Ten Federal Planning Areas* (CARB, 2004), which states:

The dramatic reduction in carbon monoxide (CO) levels across California is one of the biggest success stories in air pollution control. Air Resources Board (ARB or Board) requirements for cleaner vehicles, equipment and fuels have cut peak CO levels in half since 1980, despite growth. All areas of the State designated as non-attainment for the federal 8-hour CO standard in 1991 now attain the standard, including the Los Angeles urbanized area. Even the Calexico area of Imperial County on the congested Mexican border had no violations of the federal CO standard in 2003. Only the South Coast and Calexico continue to violate the more protective State 8-hour CO standard, with declining levels beginning to approach that standard.

Nitrogen Dioxide (NO₂)

NO₂ is a reddish brown gas that is a by-product of combustion processes. Automobiles and industrial operations are the main sources of NO₂. NO₂ may be visible as a coloring component of a brown cloud on high pollution days, especially in conjunction with high ozone levels.

Nitrogen dioxide is an air quality concern because it acts as a respiratory irritant and is a precursor of ozone. Nitrogen dioxide is a major component of the group of gaseous nitrogen compounds commonly referred to as nitrogen oxides (NO_x). Nitrogen oxides are produced by fuel combustion in motor vehicles, industrial stationary sources (such as industrial activities), ships, aircraft, and rail

transit. Typically, nitrogen oxides emitted from fuel combustion are in the form of nitric oxide (NO) and nitrogen dioxide (NO₂). NO is often converted to NO₂ when it reacts with ozone or undergoes photochemical reactions in the atmosphere. Therefore, emissions of NO₂ from combustion sources are typically evaluated based on the amount of NO_x emitted from the source.

Sulfur Dioxide (SO₂)

SO₂ is a combustion product of sulfur or sulfur-containing fuels such as coal and diesel. SO₂ is also a precursor to the formation of atmospheric sulfate, particulate matter and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain.

Particulate Matter (PM)

PM₁₀ and PM_{2.5} consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. (A micron is one-millionth of a meter). PM₁₀ and PM_{2.5} represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Some sources of particulate matter, such as wood burning in fireplaces, demolition, and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility. Large dust particles (diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This large dust is of more concern as a soiling nuisance rather than a health hazard. The remaining fraction, PM₁₀ and PM_{2.5}, are a health concern particularly at levels above the federal and state ambient air quality standards. PM_{2.5} (including diesel exhaust particles) is thought to have greater effects on health, because these particles are so small and thus, are able to penetrate to the deepest parts of the lungs. Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Recent studies have shown an association between morbidity and mortality and daily concentrations of particulate matter in the air. Children are more susceptible to the health risks of PM₁₀ and PM_{2.5} because their immune and respiratory systems are still developing.

Mortality studies since the 1990s have shown a statistically significant direct association between mortality (premature deaths) and daily concentrations of particulate matter in the air. Despite important gaps in scientific knowledge and continued reasons for some skepticism, a comprehensive evaluation of the research findings provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health (Dockery and Pope 2006).

Lead (Pb)

Ambient lead concentrations meet both the federal and state standards in the Project area. Lead has a range of adverse neurotoxin health effects, and was formerly released into the atmosphere primarily via leaded gasoline products. The phase-out of leaded gasoline in California resulted in

decreasing levels of atmospheric lead. The Proposed Project would not introduce any new sources of lead emissions; consequently, lead emissions are not required to be quantified and are not further evaluated in this analysis.

Toxic Air Contaminants (TACs)

Non-criteria air pollutants or TACs are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including particulate emissions from diesel-fueled engines.

In 2001, the CARB assessed the statewide health risks from exposure to diesel exhaust and to other toxic air contaminants. It is difficult to distinguish the health risks of diesel emissions from the other air toxics, since diesel exhaust contains about 40 different TACs. The CARB study (CARB, 2000) detected diesel exhaust by using ambient air carbon soot measurements as a surrogate for diesel emissions. The Study reported that in 2000, the statewide cancer risk from exposure to diesel exhaust was about 540 per million (i.e., 540 cancers per million people) as compared to a total risk for exposure to all ambient air toxics of 760 per million. This estimate of risk from diesel exhaust, which accounts for about 70 percent of the total risk from TACs, included both urban and rural areas in the state. It can be considered as an average worst-case for the state, since it assumes constant exposure to outdoor concentrations of diesel exhaust and does not account for expected lower concentrations indoors, where people spend most of their time.

Odorous Emissions

Though offensive odors from stationary sources rarely cause any physical harm, they still remain unpleasant and can lead to public distress generating citizen complaints to local governments. The occurrence and severity of odor impacts depend on the nature, frequency and intensity of the source; wind speed and direction; and the sensitivity of receptors. The *CEQA Guidelines* recommends that odor impacts be considered for any proposed new odor sources located near existing receptors, as well as any new sensitive receptors located near existing odor sources. Generally, increasing the distance between the receptor and the source will mitigate odor impacts.

Sensitive Land Uses

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Land uses such as schools, children's day care centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress and other air quality-related health problems. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and

industrial areas, because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Recreational uses are also considered sensitive, due to the greater exposure to ambient air quality conditions, and because the presence of pollution detracts from the recreational experience. The Project consists of retail and office space. As stated within the *Significance Criteria for Air Quality*, below, residential uses, schools, parks, daycare centers, nursing homes, and medical centers are considered sensitive receptors for the evaluation of TACs; each of these uses, except parks, is considered a sensitive receptor for the evaluation of odor impacts. The City also considers the roof garden on the 6th level of the Kaiser Center to also be a sensitive land use as it is an outdoor area accessible by occupants and visitors to the Project.

A residential senior community facility is located approximately 700 feet southeast of the Project Site, and high-density apartments are located approximately 600 feet north, at Grand Avenue. Lake Merritt Lakeside Park is located approximately 500 feet east of the Project Site, and Children's Fairyland at Lake Merritt is located approximately 1,200 feet northeast of the Project Site. Snow Park is approximately 250 feet east of Phase 1 and approximately 500 feet southeast of Phase 2, and the Kaiser Center outdoor roof garden is located within the Project Site (6th Floor) and accessible by occupants and visitors to the Project. (All distances measured perpendicular from edge of Project Site.)

Air Quality Impacts and Mitigation Measures

Significance Criteria for Air Quality

The Proposed Project would result in a significant impact to air quality if it would:

Project-level Impacts

1. During project construction result in average daily emissions of 54 pounds per day of ROG, NO_x, or PM_{2.5} or 82 pounds per day of PM₁₀;
2. During project operation result in average daily emissions of 54 pounds per day of ROG, NO_x, or PM_{2.5} or 82 pounds per day of PM₁₀; or result in maximum annual emissions of 10 tons per year of ROG, NO_x, or PM_{2.5} or 15 tons per year of PM₁₀;
3. Contribute to carbon monoxide (CO) concentrations exceeding the California Ambient Air Quality Standards (CAAQS) of nine parts per million (ppm) averaged over eight hours and 20 ppm for one hour [**NOTE:** Pursuant to BAAQMD Guidelines, localized CO concentrations should be estimated for projects in which (1) project-generated traffic would conflict with an applicable congestion management program established by the county congestion management agency or (2) project-generated traffic would increase traffic volumes at affected intersections to more than 44,000 vehicles per hour (or 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited, such as tunnels, parking garages, bridge underpasses, natural or urban street canyons, and below-grade roadways).];

4. During either project operation or project construction expose persons by siting a new source or a new receptor to substantial levels of Toxic Air Contaminants (TACs) resulting in (a) a cancer risk level greater than 10 in one million, (b) a non-cancer risk (chronic or acute) hazard index greater than 1.0, or (c) an increase of greater than 0.3 micrograms per cubic meter of annual average $PM_{2.5}$ [NOTE: Pursuant to BAAQMD Guidelines, when siting new TAC sources consider receptors located within 1,000 feet, and when siting new receptors consider TAC sources located within 1,000 feet including, but not limited to, stationary sources, freeways, major roadways (10,000 or greater vehicles per day), truck distribution centers, ports, and rail lines. The cumulative analysis should consider the combined risk from all existing and reasonably foreseeable future sources. For this threshold receptors include residential uses, schools, parks, daycare centers, nursing homes, and medical centers] or;
5. Frequently and for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial number of people [NOTE: For this threshold sensitive receptors include residential uses, schools, daycare centers, nursing homes, and medical centers.].

Project-Level Cumulative Impacts

1. During either project operation or project construction expose persons by siting a new source or a new receptor to substantial levels of TACs resulting in (a) a cancer risk level greater than 100 in a million, (b) a non-cancer risk (chronic or acute) hazard index greater than 10.0, or (c) an increase of greater than 0.8 micrograms per cubic meter of annual average $PM_{2.5}$.

Thresholds regarding impacts to climate change are presented in the GHG Emissions and Climate Change analysis part of this Section, following the Cumulative Air Quality Analysis.

Construction Dust

Impact AIR-1: Construction and demolition activities associated with new development under the Proposed Project would generate short-term emissions of fugitive dust. (Less than Significant)

The BAAQMD's approach to analyses of fugitive dust emissions from construction is to emphasize implementation of effective and comprehensive dust control measures rather than detailed quantification of emissions. The BAAQMD considers any project's construction-related impacts to be less than significant if the required dust-control measures are implemented. Without these measures, the impact is generally considered to be significant, particularly if sensitive land uses are located in the project vicinity. In addition, through its Municipal Code, the City of Oakland requires demolition projects to use best management practices for dust control.

Construction activities would occur intermittently at the Project Site throughout the phases of construction. Although the related impacts would be temporary, construction related activities could cause adverse effects on the local air quality, primarily from dust emissions.

Construction activities would include site preparation, earthmoving and general construction. Site preparation includes activities such as demolition, general land clearing, and grubbing. Earthmoving activities would include cut-and-fill operations, trenching, soil compaction and grading. General construction includes adding improvements such as roadway surfaces, structures and facilities. These activities would result in dust emissions (including PM₁₀ and PM_{2.5}) primarily from “fugitive” sources (i.e., emissions released through means other than through a stack or tailpipe) such as soil disturbance.

Construction-related fugitive dust emissions at the Project Site would vary from day to day, depending on the level and type of activity, silt content of the soil and the weather. Without mitigation, construction activities would result in significant quantities of dust and as a result, local visibility and PM₁₀ and PM_{2.5} concentrations would be adversely affected.

The Project would be subject to dust control measures recommended by BAAQMD, which are included in SCA AIR-1, listed above, and to City of Oakland Municipal Code 15.36.100 Dust Control Measures. Implementation of the measures would reduce impacts from fugitive dust to on- and off-site receptors to a less-than-significant level.

Mitigation: None Required.

Construction Emissions

Impact AIR-2: Activities associated with demolition, site preparation, and construction throughout development of the Proposed Project would generate emissions of criteria pollutants, including equipment exhaust emissions. (Potentially Significant Phase 2 ROG emissions.)

Construction activities would result in the emission of ROG, NO_x, CO, SO_x and particulates (PM₁₀ and PM_{2.5}) from equipment exhaust, construction-related vehicular activity and construction worker automobile trips. Emission levels for construction activities would vary depending on the number and type of equipment use, duration of use, operation schedules (the time and frequency) and the number of construction workers traveling to the worksite by motorized vehicle. Criteria pollutant emissions of ROG and NO_x from these emissions sources would incrementally add to the regional atmospheric loading of ozone precursors during construction. The Project would be subject to SCA AIR-2, listed above, which would further reduce impacts from construction equipment emissions.

Construction would also increase DPM, but the toxic effects of the DPM would be minimal, and less than significant, because the construction would be temporary and would not last over the long-term timeframes used in DPM Health Risk Analyses (e.g., continuous exposure over a 70-year period).

The significance criterion considers the potential effect of sensitive land uses located within 1,000 feet of TAC sources.¹ As previously described under *Sensitive Land Uses*, nearby sensitive receptors considered by BAAQMD include a residential senior community facility located approximately 700 feet southeast and high-density apartments located approximately 600 feet north of the Project Site (a potential TAC source during certain construction activities). The City also considers parks a sensitive receptor, which includes Lake Merritt Lakeside Park (approx. 500 feet east of the overall Project Site) and Children's Fairyland (approx. 1,200 feet northeast of the overall Project Site), Snow Park (approx. 250 feet east of Phase 1 and approx. 500 feet southeast of Phase 2 of the Project Site), and the Kaiser Center outdoor roof garden located within the Project Site (6th Floor) and accessible by occupants and visitors to the Project.

Each of these sensitive receptors is located within 1,000 feet of the Project Site, except Children's Fairyland, which is approximately 1,200 feet away. Screening tables published by BAAQMD for evaluation of air toxic risks from construction activities indicate that for a 2.2 acre commercial land use construction site, a distance of at least 328 feet from sensitive receptors would result in less than significant localized cancer risks, TAC exposure hazard risks and PM_{2.5} concentration risks (BAAQMD, May 2010).

Of the sensitive receptors in the Project area, only Snow Park, a 4.1-acre neighborhood park located approximately 250 feet from the Project Site (measured between property lines) would be located within the 328-foot offset distance of significance. It is reasonable to assume, however, that receptor (park user) in a park would have a substantially reduced exposure frequency than those of a residential receptor for which the risk values and distances in the screening tables were derived. This would likely be true for both the number of days of exposure per year (given seasonal use of the Park) as well as the number of hours of exposure in a given day (given that the duration of park use is relatively short-term and would be substantially less than the duration of time one spends in a residence). The park is located in an urban location and bound by roadways with high traffic volumes (Harrison and 19th Streets and Lakeside Drive). There are no children's play facilities or areas located within the park. A putting green exists in the southwest area of the park, and neither it nor any other user facilities exist within the 78-foot (328 minus 250 feet) offset distance of significance from the Project Site that would cause a park user to be repetitively present in this area. Therefore, construction-related TAC exposure hazard risks and PM_{2.5} concentration risks at Snow Park are considered to be less than significant.

Access and use of the roof garden during demolition and construction activities would be restricted and prohibited for safety reasons during earthwork and building erection when the majority of diesel powered equipment would be operating and PM_{2.5} emissions generated. Therefore construction risk and hazard air quality impacts would be considered to be less than significant.

¹ BAAQMD defines sensitive receptors as facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples include schools, hospitals and residential areas, and the City also specifies parks, daycare centers, nursing homes.

The URBEMIS2007 model of the California Air Resources Board was used to quantify construction emissions. Construction-related exhaust emissions are presented in **Table IV.B-4**. These emissions estimated consider the following construction phases: demolition, excavation/grading, building construction, asphalt paving and application of architectural coatings. The estimation of construction emissions of Phase 1 assumed demolition of the existing 3-story retail/office building. Phase 1 grading emissions also considered the excavation and removal of 31,000 cubic yards of material for the South Tower. Generally construction emissions associated for Phase 2 are projected to be less than Phase 1 because no cut and fill activities are proposed with Phase 2 development. While there would potentially be a few months of concurrent overlap of construction activities of the two phases, peak average daily emissions are not projected to occur during this period.

TABLE IV.B-4
AVERAGE DAILY CONSTRUCTION-RELATED POLLUTANT EMISSIONS (POUNDS PER DAY)

Year	ROG	NO _x	CO	SO ₂	PM-10	PM-2.5	CO ₂
Phase 1							
2012	1.65	16.5	8.66	<0.1	0.9	0.78	2,469
2013	2.95	21.9	37.2	<0.1	1.0	0.95	6,184
2014	30.8	17.1	43.4	<0.1	1.04	0.95	6,336
2015	50.8	19.3	44.1	<0.1	1.26	1.15	6,841
BAAQMD Construction Threshold	54	54	None	None	82	54	None
Significant Impact?	No	No	No	No	No	No	No
Phase 2 / Buildout							
2015	0.90	6.84	5.48	<0.1	0.4	0.37	1,124
2016	2.79	15.7	47.0	<0.1	0.80	0.72	8,083
2017	40.3	14.2	45.3	<0.1	0.85	0.77	8,038
2018	80.0	16.0	45.8	<0.1	0.99	0.90	8,552
BAAQMD Construction Threshold	54	54	None	None	82	54	None
Significant Impact?	Yes	No	No	No	No	No	No

SOURCE: URBEMIS2007

BAAQMD has adopted new daily mass significance thresholds for construction-related activities in its *Air Quality Guidelines*. These thresholds are 54 pounds per day of either ROG, NO_x or PM_{2.5} and 82 pounds per day for PM₁₀. BAAQMD has indicated that these standards are to be compared to average daily emissions, not peak daily emissions (Tholen, 2010). Therefore daily emissions in Table IV.B-4 are an average over the entire year. As can be seen from the data in Table IV.B-4, construction-related exhaust emissions from Phase 1 would not exceed any of the BAAQMD thresholds. Construction-related emissions from Phase 2 would exceed the ROG threshold. Table IV.B-4 also shows that construction-related exhaust emissions from Phase 2 would exceed the ROG threshold in year 2018, which could be reduced to a less-than-significant level (from 80.0 pounds per day to a mitigated 37.8 pounds per day) by use of low volatile organic compounds (VOC) architectural coatings.

Project construction would require the demolition of existing buildings at the Project Site. Buildings constructed prior to 1980 often include building materials containing asbestos.

Airborne asbestos fibers pose a serious health threat. The CARB Enforcement Division is responsible for enforcing the NESHAP regulation under Title 40 Code of Federal Regulations (CFR) Part 61, Subpart M. The Asbestos NESHAP requires a thorough inspection of the facility, by an accredited inspector, be conducted for all renovations and all demolitions. According to the BAAQMD CEQA Guidelines, the demolition, renovation or removal of asbestos-containing building materials is subject to the limitations of District Regulation 11, Rule 2: Hazardous Materials; Asbestos Demolition, Renovation and Manufacturing. The District's Enforcement Division should be consulted prior to commencing demolition of a building containing asbestos building materials. Any demolition activity subject to but not complying with the requirements of District Regulation 11, Rule 2 would be considered to have a significant impact.

The Project would be subject to SCA AIR-2, listed above which would reduce impacts from airborne asbestos fibers to a less than significant level under existing BAAQMD thresholds. Under the thresholds, Phase 2 ROG emissions would be significant.

Mitigation Measure AIR-1: To reduce the significant Phase 2 ROG emissions, the Project applicant shall use low VOC architectural coatings. Use of low VOC coatings will reduce ROG emissions to below significance thresholds (37.8 pounds per day).

Significance after Mitigation and Standard Condition: Less than Significant.

Operational Criteria Pollutant Emissions

Impact AIR-3: The Proposed Project would result in increased emissions of criteria pollutants. (Significant PM₁₀ emissions at Buildout)

The Proposed Project would result in an increase in criteria air pollutant emissions from a variety of emissions sources, including on-site area sources (e.g., natural gas combustion for space and water heating, landscape maintenance, use of consumer products such as hairsprays, deodorants, cleaning products, etc.) and mobile on-road sources (automobile and truck trips). Exhaust emissions from passenger vehicle travel associated with the Project were calculated by using the URBEMIS2007 program, which uses EMFAC2007 (CARB's vehicle emissions model for cars and trucks). URBEMIS2007 calculates area source emissions based on the size of the project.

Table IV.B-5 summarizes mobile and area emissions for the Project area, with and without implementation of the Project and the resulting net emissions as a result of the Project. The existing land uses (without the Project) and Project emissions are compared using year 2015 emissions factors, while the Project, which includes construction of both towers to be completed in 2018, uses year 2020 emission factors. As indicated in Table IV.B-5, no impact would occur in Phase 1.

BAAQMD has adopted new daily mass significance thresholds for operational-related activities in its *Air Quality Thresholds*. These thresholds are 54 pounds per day of either ROG, NO_x or PM_{2.5} and 82 pounds per day for PM₁₀. As can be seen from the data in Table IV.B-5, operation-related exhaust emissions from the Project would exceed the PM₁₀ threshold.

TABLE IV.B-5
ESTIMATED DAILY EMISSIONS FOR THE PROPOSED PROJECT (POUNDS PER DAY)^a

Air Pollutant	Existing Uses	Project Uses	Net New Emissions	Significance Threshold	Threshold Comparison	Significant (Yes or No)?
Phase 1						
NO_x	36	61	25	54	-26	No
PM₁₀	61	110	49	82	-33	No
PM_{2.5}	12	21	9	54	-45	No
ROG	22	45	23	54	-31	No
CO^c	260	474	214	None	None	No
Phase 2						
NO_x	36	77	41	54	-15	No
PM₁₀	61	172	111 ^b	82	+29^b	Yes^b
PM_{2.5}	12	33	21	54	-33	No
ROG	22	64	42	54	-12	No
CO^c	260	609	349	None	None	No

a Emission factors were generated by the Air Board's URBEMIS2007 model for Alameda County and assume a default vehicle mix (see Appendix C). All daily estimates are for wintertime conditions (most conservative). Both Existing Uses and Project Uses emissions are based on Year 2014 emission factors. Emission include both vehicular and area sources.

b Net PM₁₀ emission would be reduced to 86 pounds per day with implementation of a 10 percent vehicle reduction through TDM and Clean Car Standards regulations, pursuant to AB 1493, which would exceed the significance threshold by 4.0 pounds per day.

c Projects for which mobile source CO emissions exceed 550 pounds per day do not necessarily have a significant air quality impact, but are required to estimate localized CO concentrations.

NOTE: The addition of the subtotals may not equal the total due to rounding.

SOURCE: ESA, 2009

The Proposed Project would also be subject to the transportation-related SCAs (e.g., TRANS-1 Transportation Demand Management Plan), listed in Section IV.L of this EIR, which would serve to reduce air pollutant emissions. Transportation-related SCAs are anticipated to reduce vehicle trips 10 to 20 percent (and preliminarily and conservatively assumed to achieve a 10 percent reduction in the GHG analysis in this Draft EIR, pending completion of a TDM Plan for the Project) equating to a reduction of about 100 pounds per day. Implementation of Pavley Standards (pursuant to AB 1493 and also referred to as "Clean Car Regulations") standards for automobiles will reduce emissions by approximately 14 percent by 2020 (CARB, 2008d) to 86 pounds per day. Therefore, with application of TRANS-1 and AB1493, Project emissions of PM₁₀ with the Proposed Project would remain significant as they would exceed the BAAQMD significance threshold of 82 pounds per day by 4.0 pounds per day.

Mitigation: Not feasible because none available. PM₁₀ emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduce vehicle GHG emissions, including PM₁₀, but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project's Applicant's control are known to reduce vehicle trips and related emissions

Significance after Standard Conditions: Significant and Unavoidable PM₁₀ emissions.

As discussed above, implementation of a TDM (required as SCA TRANS-1) to reduced SOV trips by up to 10 percent and incorporation of Clean Car Standards could reduce the

significant impact, but not to less than significant. A TDM Plan to effect a greater reduction in SOV trips could effectively reduce the impact to less than significant reducing PM₁₀ by at least 5.0 pounds per day. However, until a final TDM Plan is prepared and implemented, the effectiveness of the TDM can not be known. Therefore, the impact determination remains significant and unavoidable.

Parking Garage

Impact AIR-4: The Proposed Project would not result in increased emissions of criteria pollutants due to poor ventilation in the Parking Garage. (Less than Significant)

The parking garage areas associated with the Proposed Project would be located below grade as well as at and above grade, the latter of which would be partially open. Partially open parking structures generally do not need mechanical ventilation to prevent accumulation of potentially hazardous air emissions. Section 406.4.2 of the California Building Code (Title 24, Part 2) requires that enclosed parking garages have proper ventilation and air circulation. This would ensure the Project does not result in a significant impact related to ventilation of the parking garage and prevent accumulation of pollutants.

Mitigation: None required.

CO Concentrations

Impact AIR-5: The Proposed Project would not contribute to CO concentrations exceeding the State AAQS of 9 ppm averaged over 8 hours and 20 ppm for 1 hour (Less than Significant)

City of Oakland CEQA significance thresholds state that localized carbon monoxide concentrations should be estimated for projects in which project traffic would impact intersections or roadway links operating at Level of Service (LOS) D, E or F or would cause LOS to decline at intersections that operate at LOS E or F and that a project contributing to CO concentrations exceeding the State Ambient Air Quality Standard of 9 parts per million (ppm) averaged over 8 hours and 20 ppm for 1 hour would be considered to have a significant impact. BAAQMD *Guidelines* also recommend using the California Department of Transportation CALINE4 model to estimate local CO concentrations resulting from motor vehicle emissions for any projects that will generate 10,000 or more motor vehicle trips per day. While the net increase in vehicle trips per day are 7,966, the Project would generate a total of 12,968 vehicle trips per day and thus a conservative approach was taken and CALINE4 was used to estimate local CO concentrations.

Seven (7) road segments with a substantial increase in traffic volumes and projected by the traffic analysis to operate at LOS F with the Project were modeled for CO concentrations (see Appendix C for Air Quality Data). **Table IV.B-6** presents the results of the model.

TABLE IV.B-6
PROJECTED CARBON MONOXIDE CONCENTRATIONS^a

Intersection	State Standard ^b	Existing 2007	Near Term 2015	Near Term + Project 2015	Future 2030	Future + Project 2030
Oakland Avenue/Perry Place						
1-hour	20.0	7.0	6.1	6.2	5.6	5.6
8-hour	9.0	4.7	4.1	4.2	3.7	3.7
Harrison Street/27th and 24th Streets						
1-hour	20.0	6.6	5.8	5.9	5.4	5.5
8-hour	9.0	4.4	3.9	4.0	3.6	3.7
Harrison Street/Grand Avenue						
1-hour	20.0	6.8	5.9	6.0	5.5	5.5
8-hour	9.0	4.6	4.0	4.0	3.7	3.7
Broadway Avenue/Grand Avenue						
1-hour	20.0	6.2	5.6	5.7	5.4	5.4
8-hour	9.0	4.2	3.7	3.8	3.6	3.6
Kaiser Center Access Road/21st Street						
1-hour	20.0	5.9	5.5	5.6	5.3	5.4
8-hour	9.0	4.0	3.7	3.7	3.5	3.6
Kaiser Center Garage NE/21st Street						
1-hour	20.0	5.8	5.4	5.6	5.3	5.4
8-hour	9.0	3.9	3.6	3.7	3.5	3.6
Kaiser Center Garage NW/21st Street						
1-hour	20.0	5.8	5.4	5.5	5.3	5.3
8-hour	9.0	3.9	3.6	3.7	3.5	3.5

a All values are parts per million (ppm) of carbon monoxide (CO).

b The state 1-hour CO standard (20 ppm) is more stringent than the Federal standard (the Federal 1-hour CO standard is 35 ppm). The 8-hour Federal CO standard (9 ppm) is the same as the state standard.

SOURCE: ESA, 2009

As indicated from the modeling results, concentrations of CO would remain below state and federal standards for all scenarios analyzed. Thus, the Proposed Project would not have a significant air quality impact on localized CO concentrations. Even though traffic volumes will increase over the years, future years show a decline in CO levels due to improvements in vehicle engine and retirement of older vehicles.

Mitigation: None required.

Odor

Impact AIR-6: The Proposed Project would not frequently and, for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial

number of people, specifically in residential uses, schools, daycare centers, nursing homes, or medical centers. (Less than Significant).

In general, the types of land uses that pose potential odor problems include refineries, chemical plants, wastewater treatment plants, landfills, composting facilities, and transfer stations. No such uses are proposed with the Project or located within the Project vicinity, according to review of the City's inventory of odor sources in June 2010.

Certain engines, including diesel-powered engines used for construction, can also generate objectionable odors. Diesel engines would be used for some construction equipment. Odors generated by construction equipment would be variable, depending on the location and duration of use. Diesel odors may be noticeable to some individuals at certain times, but would not affect a substantial number of people. As previously indicated within the Significance Criteria, sensitive receptors for odor impacts include residential uses, schools, daycare centers, nursing homes, and medical centers. Since the Project would not include any substantial objectionable odors, and no such odor-sensitive uses exist within approximately 700 feet of the Project Site (a residential senior community facility to the southeast), this is a less-than-significant impact.

Commercial uses at the Project Site could include a restaurant, which could generate temporary odors from cooking. However, these odors are generally not considered objectionable. Per City of Oakland Municipal Code, Chapter 8.28 Solid Waste Collection and Disposal and Recycling, every owner of any premises in the city from which solid waste is produced shall dispose of the solid waste through the City's regular solid waste collection service, made at least once a week or more often as may be required to adequately serve the premises. Therefore, odor-related impacts from the Project would be less than significant.

Mitigation: None required.

Toxic Air Contaminants and PM_{2.5} Concentrations

Impact AIR-7: The Proposed Project would not generate or expose persons to substantial levels of toxic air contaminants (TACs) or PM_{2.5} concentrations (Less than Significant)

A project may have an impact related to TAC emissions by either introducing a sensitive receptor population to a location where substantial TAC are already emitted or by generating TAC emission affecting a sensitive receptor population. As discussed in Impact AIR-2 (Construction Emissions), the significance criterion considers the potential effect of sensitive land uses located within 1,000 feet of TAC sources should be considered. Emissions of TAC and PM_{2.5} during construction are addressed in Impact AIR-2.

There are no stationary sources of TAC or PM_{2.5} emissions proposed by the Project. Thus, none of these sensitive receptors in the nearby vicinity would be affected by the Proposed Project as an "emitter" or "source." The proposed project would not introduce a new sensitive receptor to the

area. The Project proposes to reconfigure the existing roof garden for continued use by Project occupants and visitors to Kaiser Center which would not be considered a new land use. A net increase of approximately 4,500 square feet would be added to the roof garden as a result its reconfiguration to accommodate the new Project towers. Thus, the Project's impact would be less than significant when considering the Project as a potential TAC source or a receptor.

Mitigation: None required.

Cumulative Air Quality Impacts (Criteria Pollutants and Precursors)

The following discussion addresses the potential air quality effects under cumulative condition.

Impact AIR-8: Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. (Significant Operational PM₁₀ Emissions)

The geographic area considered for the air quality cumulative is generally the San Francisco Bay Area air basin. According to City of Oakland significance criteria, any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact. Impact AIR-3 identifies that operational emissions of PM₁₀ due to Project-related traffic increases would be significant.

These significant Project impacts are also considered significant cumulative impacts. For the construction impacts, SCA AIR-1 and SCA AIR-2 combined with Mitigation Measure AIR-1 will reduce the potential ROG effects identified in Impact AIR-2 to less-than-significant. For operations impacts, SCA TRANS-1 (TDM Plan, as described in Section IV.L of this EIR), would also apply to the Proposed Project to reduce potential cumulative impacts from PM₁₀ emissions identified in Impact AIR-3), but not to less than significant.

Mitigation Measure AIR-2: *Construction:* Implement Mitigation Measure AIR-1. *Operations:* Not feasible because none available. PM₁₀ emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduce vehicle GHG emissions, including PM₁₀, but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project's Applicant's control are known to reduce vehicle trips and related emissions

Significance after Mitigation and Standard Conditions: *Construction:* Less than Significant. *Operations:* Significant and Unavoidable PM₁₀ emissions.

Physical Setting for GHG Emissions and Climate Change

There is a general scientific consensus that global climate change is occurring, caused in whole or in part, by increased emissions of greenhouse gases (GHGs) that keep the Earth's surface warm by trapping heat in the Earth's atmosphere (US EPA, 2000), in much the same way as glass in a greenhouse. While many studies show evidence of warming over the last century and predict future global warming, the precise causes of such warming and its potential effects are far less certain.² While the greenhouse effect is responsible for maintaining a habitable climate on Earth, human activity has caused increased concentrations of these gases in the atmosphere, contributing to an increase in global temperatures and alterations of climactic conditions.

The US EPA has recently concluded that scientists have a good understanding of the following relationship and data supporting :

- “Human activities are changing the composition of Earth’s atmosphere. Increasing levels of greenhouse gases like carbon dioxide (CO₂) in the atmosphere since pre-industrial times are well-documented.”
- The atmospheric buildup of CO₂ and other greenhouse gases is largely the result of human activities such as the burning of fossil fuels.
- A warming trend of approximately 0.7 to 1.5°F occurred during the 20th century. Warming occurred in both the northern and southern hemispheres, and over the oceans.
- “The key greenhouse gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries.” It is therefore virtually certain that atmospheric concentrations of greenhouse gases will continue to rise over the next few decades. Increasing greenhouse gas concentrations tend to warm the planet. (US EPA, 2000)

At the same time, there is much uncertainty concerning the magnitude and rate of the warming. Specifically, the US EPA notes that “important scientific questions remain about how much warming will occur; how fast it will occur; and how the warming will affect the rest of the climate system, including precipitation patterns and storms. Answering these questions will require advances in scientific knowledge in a number of areas:

- Improving understanding of natural climatic variations, changes in the sun’s energy, land-use changes, the warming or cooling effects of pollutant aerosols, and the impacts of changing humidity and cloud cover.
- Determining the relative contribution to climate change of human activities and natural causes.
- Projecting future greenhouse emissions and how the climate system will respond within a narrow range.
- Improving understanding of the potential for rapid or abrupt climate change.” (US EPA, 2000)

² “Global climate change” is a broad term used to describe any worldwide, long-term change in the earth’s climate. “Global warming” is more specific and refers to a general increase in temperatures across the earth, although it can cause other climatic changes, such as a shift in the frequency and intensity of weather events and even cooler temperatures in certain areas, even though the world, on average, is warmer.

Greenhouse Gases (GHGs)

Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) are the principal GHGs, and when concentrations of these gases exceed natural concentrations in the atmosphere, the greenhouse effect may be enhanced. CO₂, CH₄ and N₂O occur naturally, but are also generated through human activity. CO₂ Emissions of CO₂ are largely by-products of fossil fuel combustion, whereas CH₄ results from off-gassing associated with agricultural practices and landfills. Other human generated GHGs, which have much higher heat-absorption potential than CO₂, include fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFC), and sulfur hexafluoride (SF₆) which are byproducts of certain industrial processes.

Potential Effects of Human Activity on GHG Emissions

Fossil fuel combustion, especially for the generation of electricity and powering of motor vehicles, has led to substantial increases in CO₂ emissions (and thus substantial increases in atmospheric concentrations). In 1994, atmospheric CO₂ concentrations were found to have increased by nearly 30 percent above pre-industrial (c.1860) concentrations.

The effect each GHG has on climate change is measured as a combination of the volume of its emissions, and its global warming potential (GWP),³ and is expressed as a function of how much warming would be caused by the same mass of CO₂. Thus, GHG emissions are typically measured in terms of pounds or tons of CO₂e.

Global Emissions

Worldwide emissions of GHGs in 2004 were 30 billion tons of CO₂e per year (UNFCCC, 2007) (including both ongoing emissions from industrial and agricultural sources, but excluding emissions from land-use changes).

U.S. Emissions

In 2004, the United States emitted about 8 billion tons of CO₂e or about 25 tons/year/person. Of the four major sectors nationwide — residential, commercial, industrial and transportation — transportation accounts for the highest fraction of GHG emissions (approximately 35 to 40 percent); these emissions are entirely generated from direct fossil fuel combustion.(US EPA, 2000)

State of California Emissions

In 2004, California emitted approximately 550 million tons of CO₂e, or about 6 percent of the U.S. emissions. This large number is due primarily to the sheer size of California compared to other states. By contrast, California has one of the fourth lowest per capita GHG emission rates in the country, due to the success of its energy-efficiency and renewable energy programs and commitments that have lowered the State's GHG emissions rate of growth by more than half of

³ The potential of a gas or aerosol to trap heat in the atmosphere.

what it would have been otherwise (CEC, 2007). Another factor that has reduced California's fuel use and GHG emissions is its mild climate compared to that of many other states.

The California EPA Climate Action Team stated in its March 2006 report that the composition of gross climate change pollutant emissions in California in 2002 (expressed in terms of CO₂ equivalence) were as follows:

- Carbon dioxide (CO₂) accounted for 83.3 percent;
- Methane (CH₄) accounted for 6.4 percent;
- Nitrous oxide (N₂O) accounted for 6.8 percent; and
- Fluorinated gases (HFCs, PFC, and SF₆) accounted for 3.5 percent (CalEPA, 2006).

The California Energy Commission found that transportation is the source of approximately 41 percent of the State's GHG emissions, followed by electricity generation (both in-state and out-of-state) at 23 percent, and industrial sources at 20 percent. Agriculture and forestry is the source of approximately 8.3 percent, as is the source categorized as "other," which includes residential and commercial activities (CEC, 2007).

Bay Area Emissions

In the Bay Area, fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) is the single largest source of the Bay Area's GHG emissions, accounting for just over half of the Bay Area's 85 million tons of GHG emissions in 2002. Industrial and commercial sources were the second largest contributors of GHG emissions with about 25 percent of total emissions. Domestic sources (e.g., home water heaters, furnaces, etc.) account for about 11 percent of the Bay Area's GHG emissions, followed by power plants at 7 percent. Oil refining currently accounts for approximately 6 percent of the total Bay Area GHG emissions (BAAQMD, 2008b).

Oakland Emissions

The City of Oakland, in partnership with ICLEI – Local Governments for Sustainability (ICLEI), has developed a greenhouse gas emissions inventory estimating citywide GHG emissions for the year 2005 at approximately 3 million metric tons of CO₂e (City of Oakland, 2009).⁴ This citywide GHG emissions inventory reflects all the energy used and waste produced within the Oakland city limits. When emissions from highway transportation are considered in this total, approximately 58 percent of Oakland's annual GHG emissions are associated with the transportation sector. Natural gas consumption represents approximately 22 percent of Oakland's GHG emissions, while electricity use and waste decomposition represent 16 percent and 4 percent of Oakland's total GHG emissions, respectively. As shown in **Table IV.B-7**, Oakland emitted approximately 3 million metric tons of CO₂e in 2005 from all major sources, more than half of which were from transportation.

TABLE IV.B-7
OAKLAND COMMUNITY-WIDE GHG EMISSIONS SUMMARY – 2005 (TONS/YEAR) ⁵

GHG Emissions Source	Metric Tons of Carbon Dioxide Equivalent (CO₂e)	Percent of Total
Non-Highway Transportation	759,884	25%
Highway Transportation	1,006,911	33%
Commercial/Industrial Electricity	320,151	11%
Commercial/Industrial Natural Gas	288,514	10%
Residential Electricity	150,077	5%
Residential Natural Gas	350,162	12%
Landfilled Solid Waste	126,361	4%
Total	3,002,060	100%

SOURCE: City of Oakland, 2009.

Construction and Development Emissions

The construction and operation of developments, such as the Proposed Project, cause GHG emissions. Operational phase GHG emissions result from energy use associated with heating, lighting and powering buildings (typically through natural gas and electricity consumption in Oakland), pumping and processing water, as well as fuel used for transportation and decomposition of waste associated with building occupants.

New development can also create GHG emissions in its construction and demolition phases including the use of fuels in construction equipment, creation and decomposition of building materials, vegetation clearing, natural gas usage, electrical usage (since electricity generation by convention means is a major contributor of GHG emissions, discussed below), and transportation.

However, it is important to acknowledge that new development does not necessarily create entirely new GHG emissions, since most of the persons who will visit or occupy new development will come from other locations where they were already causing such GHG emissions. Further, as discussed above, it has not been demonstrated that new GHG emissions caused by a local development project can affect global climate change, or that a project's net increase in GHG emissions, if any, when coupled with other activities in the region, would be cumulatively considerable.

Potential Effects of Human Activity on Global Climate Change

Globally, climate change has the potential to impact numerous environmental resources through anticipated, though uncertain, impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. A

warming of about 0.2°C (0.36°F) per decade is projected, and there are identifiable signs that global warming is taking place, including substantial loss of ice in the Arctic (IPCC, 2000).⁶

However, the understanding of GHG emissions, particulate matter, and aerosols on global climate trends remains uncertain. In addition to uncertainties about the extent to which human activity rather than solar or volcanic activity is responsible for increasing warming, there is also evidence that some human activity has cooling, rather than warming, effects, as discussed in detail in numerous publications by the International Panel on Climate Change (IPCC), namely “Climate Change 2001, The Scientific Basis”(2001).⁷

Acknowledging uncertainties regarding the rate at which anthropogenic greenhouse gas emissions would continue to increase (based upon various factors under human control, such as future population growth and the locations of that growth; the amount, type, and locations of economic development; the amount, type, and locations of technological advancement; adoption of alternative energy sources; legislative and public initiatives to curb emissions; and public awareness and acceptance of methods for reducing emissions), and the impact of such emissions on climate change, the IPCC devised a set of six “emission scenarios” which utilize various assumptions about the rates of economic development, population growth, and technological advancement over the course of the next century (IPCC, 2000).⁸ These emission scenarios are paired with various climate sensitivity models to attempt to account for the range of uncertainties which affect climate change projections. The wide range of temperature, precipitation, and similar projections yielded by these scenarios and models reveal the magnitude of uncertainty presently limiting climate scientists’ ability to project long-range climate change (as previously discussed).

The projected effects of global warming on weather and climate are likely to vary regionally, but are expected to include the following direct effects, according to the IPCC (IPCC, 2000)⁹:

- Snow cover is projected to contract, with permafrost areas sustaining thawing;
- Sea ice is projected to shrink in both the Arctic and Antarctic;
- Hot extremes, heat waves, and heavy precipitation events are likely to increase in frequency;
- Future tropical cyclones (typhoons and hurricanes) will likely become more intense;
- Non-tropical storm tracks are projected to move poleward, with consequent changes in wind, precipitation, and temperature patterns. Increases in the amount of precipitation are very likely in high-latitudes, while decreases are likely in most subtropical regions; and
- Warming is expected to be greatest over land and at most high northern latitudes, and least over the Southern Ocean and parts of the North Atlantic Ocean.

⁷ The IPCC was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation.

Potential secondary effects from global warming include global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.

Potential Effects of Climate Change on State of California

According to the California Air Resources Board (CARB), some of the potential impacts in California of global warming may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years.¹⁰ Several recent studies have attempted to explore the possible negative consequences that climate change, left unchecked, could have in California. These reports acknowledge that climate scientists' understanding of the complex global climate system, and the interplay of the various internal and external factors that affect climate change, remains too limited to yield scientifically valid conclusions on such a localized scale. Substantial work has been done at the international and national level to evaluate climatic impacts, but far less information is available on regional and local impacts. In addition, projecting regional impacts of climate change and variability relies on large-scale scenarios of changing climate parameters, using information that is typically at too general a scale to make accurate regional assessments.¹¹

Below is a summary of some of the potential effects reported in an array of studies that could be experienced in California as a result of global warming and climate change:

- Air Quality – Higher temperatures, conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and therefore its indirect effects, are uncertain. For other pollutants, the effects of climate change and/or weather are less well studied, and even less well understood.¹² If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thus ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the State (CCCC, 2006).¹³
- Water Supply – Uncertainty remains with respect to the overall impact of global climate change on future water supplies in California. For example, models that predict drier conditions (i.e., parallel climate model (PCM)) suggest decreased reservoir inflows and storage and decreased river flows, relative to current conditions. By comparison, models that predict wetter conditions (i.e., HadCM2) project increased reservoir inflows and storage, and increased river flows (Brekke, et al., 2004).

A July 2006 technical report prepared by the California Department of Water Resources (DWR) addresses the State Water Project (SWP), the Central Valley Project, and the Sacramento-San

¹⁰ California Air Resources Board (CARB), 2006c. *Public Workshop to Discuss Establishing the 1990 Emissions Level and the California 2020 Limit and Developing Regulations to Require Reporting of Greenhouse Gas Emissions*, Sacramento, CA. December 1.

¹¹ Kiparsky, M. and P.H. Gleick, 2003. *Climate Change and California Water Resources: A Survey and Summary of the Literature*. Oakland, CA: Pacific Institute for Studies in Development. July.

¹² US EPA, 2007, op. cit.

¹³

Joaquin Delta. Although the report projects that “[c]limate change will likely have a significant effect on California’s future water resources . . . [and] future water demand,” it also reports that “much uncertainty about future water demand [remains], especially [for] those aspects of future demand that will be directly affected by climate change and warming. While climate change is expected to continue through at least the end of this century, the magnitude and, in some cases, the nature of future changes is uncertain. This uncertainty serves to complicate the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood (DWR, 2006).” DWR adds that “[i]t is unlikely that this level of uncertainty will diminish significantly in the foreseeable future (DWR, 2006).” Still, changes in water supply are expected to occur, and many regional studies have shown that large changes in the reliability of water yields from reservoirs could result from only small changes in inflows (Kiparsky, 2003; DWR, 2005; Cayan et al., 2006). Water purveyors, such as the East Bay Municipal Utilities District (EBMUD), are required by state law to prepare Urban Water Management Plans (UWMPs) (discussed below, under Regulatory Context for Greenhouse Gas Emissions and Climate Change) that consider climatic variations and corresponding impacts on long-term water supplies (California Water Code, Section 10631[c]). DWR has published a 2005 SWP Delivery Reliability Report, which presents information from computer simulations of the SWP operations based on historical data over a 73-year period (1922–1994). The DWR notes that the results of those model studies “represent the best available assessment of the delivery capability of the SWP.” In addition, the DWR is continuing to update its studies and analysis of water supplies. EBMUD would incorporate this information from DWR in its update of its current UWMP 2005 (required every five years per the California Water Code), and information from the UWMP can be incorporated into Water Supply Assessments (WSAs) and Water Verifications prepared for certain development projects in accordance with Cal. Water Code Section 10910, et. seq. and Cal. Government Code Section 66473.7, et. seq. (See Section IV.M, *Utilities and Service Systems*, in this EIR for discussion of the WSA and verifications for the Proposed Project.)

- Hydrology – As discussed above, climate change could potentially affect the following: the amount of snowfall, rainfall and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. Sea level rise can be a product of global warming through two main processes -- expansion of sea water as the oceans warm and melting of ice over land. A rise in sea levels could result in coastal flooding and erosion and could also jeopardize California’s water supply. In particular, saltwater intrusion would threaten the quality and reliability of the state’s major fresh water supply that is pumped from the southern portion of the Sacramento/San Joaquin River Delta. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.
- Agriculture – California has a \$30 billion agricultural industry that produces half the country’s fruits and vegetables. The California Climate Change Center (CCCC) notes that higher CO₂ levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase, crop-yield could be threatened by a less reliable water supply, and greater ozone pollution could render plants more susceptible to pest and disease outbreaks. In addition,

temperature increases could change the time of year that certain crops, such as wine grapes, bloom or ripen, and thus affect their quality (CCCC, 2006).

- *Ecosystems and Wildlife* – Increases in global temperatures and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. In 2004, the Pew Center on Global Climate Change released a report examining the possible impacts of climate change on ecosystems and wildlife (Parmesan and Galbraith, 2004). The report outlines four major ways in which it is thought that climate change could affect plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes such as carbon cycling and storage.

Regulatory Context for GHG Emissions and Climate Change

Global climate change is addressed through the efforts of various federal, State, regional, and local government agencies as well as national and international scientific and governmental conventions and programs. These agencies work jointly, as well as individually, to understand and regulate the effects of greenhouse gas emissions and resulting climate change through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies, conventions and programs focused on global climate change are discussed below.

International and Federal

Kyoto Protocol

The United States participates in the United Nations Framework Convention on Climate Change (UNFCCC) (signed on March 21, 1994). The Kyoto Protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. It has been estimated that if the commitments outlined in the Kyoto Protocol are met, global GHG emissions could be reduced by an estimated 5 percent from 1990 levels during the first commitment period of 2008–2012. It should be noted that although the United States is a signatory to the Kyoto Protocol, Congress has not ratified the Protocol and the United States is not bound by the Protocol's commitments.

Copenhagen Summit

The 2009 United Nations Climate Change Conference, i.e., Copenhagen Summit, was held in Denmark in December 2009. The conference included the 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change and the 5th Meeting of the Parties (COP/MOP 5) to the Kyoto Protocol. A framework for climate change mitigation beyond 2012 was to be agreed there. The Copenhagen Accord was drafted by the US, China, India, Brazil and South Africa on December 18, and judged a "meaningful agreement" by the United States government. It was "taken note of", but not "adopted", in a debate of all the participating countries the next day, and it was not passed unanimously. The document recognized that climate change is one of the greatest challenges of the present day and that actions should be taken to keep any temperature increases to below 2°C. The document is not legally binding and does not contain any legally binding commitments for reducing CO₂ emissions.

Climate Change Technology Program

The United States has opted for a voluntary and incentive-based approach toward emissions reductions in lieu of the Kyoto Protocol's mandatory framework. The Climate Change Technology Program (CTTP) is a multi-agency research and development coordination effort (which is led by the Secretaries of Energy and Commerce) that is charged with carrying out the President's National Climate Change Technology Initiative (CTTP, 2006).

U.S. Environmental Protection Agency (US EPA)

To date, the US EPA has not regulated GHGs under the Clean Air Act (discussed above) based on its assertion in *Massachusetts et. al. v. Environmental Protection Agency (EPA) et al.* (U.S. Supreme Court, 2007) that the "Clean Air Act does not authorize it to issue mandatory regulations to address global climate change and that it would be unwise to regulate GHG emissions because a causal link between GHGs and the increase in global surface air temperatures has not been unequivocally established." However, in the same case, (*Massachusetts v. EPA*) the U.S. Supreme Court held that the US EPA can, and should, consider regulating motor-vehicle GHG emissions.

State of California

Assembly Bill (AB) 1493 and Amended "Pavley" Regulations

On July 1, 2002, the California Assembly passed Assembly Bill (AB) 1493 (signed into law on July 22, 2002), requiring the CARB to "adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." The regulations were to be adopted by January 1, 2005, and apply to 2009 and later model-year vehicles. In September 2004, CARB responded by adopting "CO₂-equivalent fleet average emission" standards. The standards will be phased in from 2009 to 2016, reducing emissions by 22 percent in the "near term" (2009–2012) and 30 percent in the "mid term" (2013–2016), as compared to 2002 fleets.

Executive Order (EO) S-3-05

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05, establishing statewide GHG emission reduction targets. This EO provides that by 2010, emissions shall be reduced to 2000 levels; by 2020, emissions shall be reduced to 1990 levels; and by 2050, emissions shall be reduced to 80 percent below 1990 levels. The Secretary of the California Environmental Protection Agency (CalEPA) is charged with coordinating oversight of efforts to meet these targets and formed the Climate Action Team (CAT) to carry out the EO. Several of the programs developed by the CAT to meet the emission targets are relevant to residential construction and are outlined in a March 2006 report (Cal EPA, 2006). These include prohibition of idling of certain classes of construction vehicles, provision of recycling facilities within residential buildings and communities, compliance with the Energy Commission's building and appliance energy efficiency standards, compliance with California's Green Buildings and Solar initiatives, and implementation of water-saving technologies and features.

California Assembly Bill 32 (AB 32)

On August 31, 2006, the California Assembly passed Bill 32 (AB 32) (signed into law on September 27, 2006), the California Global Warming Solutions Act of 2006. AB 32 commits California to reduce GHG emissions to 1990 levels by 2020 and establishes a multi-year regulatory process

under the jurisdiction of the CARB to establish regulations to achieve these goals. The regulations shall require monitoring and annual reporting of GHG emissions from selected sectors or categories of emitters of GHGs. By January 1, 2008, CARB was required to adopt a statewide GHG emissions limit equivalent to the statewide GHG emissions levels in 1990, which must be achieved by 2020. By January 1, 2011, CARB is required to adopt rules and regulations, which shall become operative January 1, 2012, to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

On April 20, 2007, CARB published *Proposed Early Actions to Mitigate Climate Change in California* (Cal EPA, 2007). There are no early action measures specific to residential development included in the list of 36 measures identified for CARB to pursue during calendar years 2007, 2008, and 2009. Also, this publication indicated that the issue of GHG emissions in CEQA and General Plans was being deferred for later action, so the publication did not discuss any early action measures generally related to CEQA or to land use decisions. As noted in that report, “AB 32 requires that all GHG reduction measures adopted and implemented by the Air Resources Board be technologically feasible and cost effective (Cal EPA, 2007).” The law permits the use of market-based compliance mechanisms to achieve those reductions and also requires that GHG measures have neither negative impacts on conventional pollutant controls nor any disproportionate socioeconomic effects (among other criteria).

On December 11, 2008, CARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of CARB’s plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce CO₂e emissions by 174 million metric tons (MMT), or approximately 30 percent, from the state’s projected 2020 emissions level of 596 MMT of CO₂e under a business-as-usual scenario. The Scoping Plan also breaks down the amount of GHG emissions reductions CARB recommends for each emissions sector of the state’s GHG inventory. While CARB has identified a GHG reduction target of 15 percent for local governments themselves, it has not yet determined what amount of GHG emissions reductions it recommends from local government land use decisions. However, the Scoping Plan does state that successful implementation of the plan relies on local governments’ land use planning and urban growth decisions because local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. CARB further acknowledges that decisions on how land is used will have large effects on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The measures approved by CARB will be developed over the next two years and be in place by 2012.

The Scoping Plan also includes recommended measures that were developed to reduce greenhouse gas emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving our natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately impact low-income and minority communities. These measures, shown below in **Table IV.B-8** by sector, also put the state on a path to meet the long-term 2050 goal of reducing California’s greenhouse gas emissions to 80 percent below 1990 levels.

**TABLE IV.B-8
LIST OF RECOMMENDED ACTIONS BY SECTOR**

Measure No.	Measure Description	GHG Reductions (Annual Million Metric Tons CO₂e)
Transportation		
T-1	Pavley I and II – Light Duty Vehicle Greenhouse Gas Standards	31.7
T-2	Low Carbon Fuel Standard (Discrete Early Action)	15
T-3 ^a	Regional Transportation-Related Greenhouse Gas Targets	5
T-4	Vehicle Efficiency Measures	4.5
T-5	Ship Electrification at Ports (Discrete Early Action)	0.2
T-6	Goods Movement Efficiency Measures. <ul style="list-style-type: none"> • Ship Electrification at Ports • System-Wide Efficiency Improvements 	3.5
T-7	Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure – Aerodynamic Efficiency (Discrete Early Action)	0.93
T-8	Medium- and Heavy-Duty Vehicle Hybridization	0.5
T-9	High Speed Rail	1
Electricity and Natural Gas		
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) <ul style="list-style-type: none"> • Increased Utility Energy Efficiency Programs • More Stringent Building & Appliance Standards Additional Efficiency and Conservation Programs	15.2
E-2	Increase Combined Heat and Power Use by 30,000 GWh (Net reductions include avoided transmission line loss)	6.7
E-3	Renewables Portfolio Standard (33% by 2020)	21.3
E-4	Million Solar Roofs (including California Solar Initiative, New Solar Homes Partnership and solar programs of publicly owned utilities) <ul style="list-style-type: none"> • Target of 3000 MW Total Installation by 2020 	2.1
CR-1	Energy Efficiency (800 Million Therms Reduced Consumptions) <ul style="list-style-type: none"> • Utility Energy Efficiency Programs • Building and Appliance Standards • Additional Efficiency and Conservation Programs 	4.3
CR-2	Solar Water Heating (AB 1470 goal)	0.1
Green Buildings		
GB-1	Green Buildings	26
Water		
W-1	Water Use Efficiency	1.4†
W-2	Water Recycling	0.3†
W-3	Water System Energy Efficiency	2.0†
W-4	Reuse Urban Runoff	0.2†
W-5	Increase Renewable Energy Production	0.9†
W-6	Public Goods Charge (Water)	TBD†
Industry		
I-1	Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	TBD
I-2	Oil and Gas Extraction GHG Emission Reduction	0.2
I-3	GHG Leak Reduction from Oil and Gas Transmission	0.9
I-4	Refinery Flare Recovery Process Improvements	0.3
I-5	Removal of Methane Exemption from Existing Refinery Regulations	0.01

^a This is not the SB 375 regional target. CARB will establish regional targets for each MPO region following the input of the regional targets advisory committee and a consultation process with MPO's and other stakeholders per SB 375

† GHG emission reduction estimates are not included in calculating the total reductions needed to meet the 2020 target

California Senate Bill 1368 (SB 1368)

On August 31, 2006, the California Senate passed SB 1368 (signed into law on September 29, 2006), which required the Public Utilities Commission (PUC) to develop and adopt a “greenhouse gases emission performance standard” by February 1, 2007, for the private electric utilities under its regulation. The PUC adopted an interim standard on January 25, 2007, but formally requested a delay until September 30, 2007, for the local publicly-owned electric utilities under its regulation. These standards apply to all long-term financial commitments entered into by electric utilities. The California Energy Commission (CEC) adopted a consistent standard in August, 2007. (NRDC, 2007)

California Senate Bill 97 (SB 97)

Governor Schwarzenegger signed SB 97 (Chapter 185, Statutes 2007) into law on August 24, 2007. The legislation provides partial guidance on how greenhouse gases should be addressed in certain CEQA documents.

SB 97 requires the Governor’s Office of Planning and Research (OPR) to prepare CEQA Guidelines for the mitigation of GHG emissions, including, but not limited to, effects associated with transportation or energy consumption. The Resources Agency was required to certify and adopt the guidelines by January 1, 2010, and the relevant amendments became effective June, 2010, as discussed below. OPR and the Resources Agency are required to periodically review the guidelines to incorporate new information or criteria adopted by CARB pursuant to the Global Warming Solutions Act, scheduled for 2012. On June 19, 2008, OPR published a technical advisory on CEQA and climate change. The advisory provides OPR’s perspective on the emerging role of CEQA in addressing climate change and greenhouse gas emissions, while recognizing that approaches and methodologies for calculating greenhouse gas emissions and addressing environmental impacts through CEQA review are rapidly evolving. The advisory recognizes that OPR will develop, and the Resources Agency will adopt, amendments to the CEQA Guidelines pursuant to SB 97. In the interim, the technical advisory “offers informal guidance regarding the steps lead agencies should take to address climate change in their CEQA documents.”

The technical advisory points out that neither CEQA nor the CEQA Guidelines prescribe thresholds of significance or particular methodologies for performing an impact analysis. The advisory states, “This is left to lead agency judgment and discretion, based upon factual data and guidance from regulatory agencies and other sources where available and applicable.” OPR recommends that “the global nature of climate change warrants investigation of a statewide threshold of significance for GHG emissions.” Until such a standard is established, OPR advises that each lead agency should develop its own approach to performing an analysis for projects that generate greenhouse gas emissions.

OPR sets out the following process for evaluating greenhouse gas emissions. First, agencies should determine whether greenhouse gas emissions may be generated by a proposed project, and if so, quantify or estimate the emissions by type or source. Calculation, modeling, or estimation

of greenhouse gas emissions should include the emissions associated with vehicular traffic, energy consumption, water usage, and construction activities.

Lead agencies should then assess whether the emissions are “cumulatively considerable” even though a project’s greenhouse gas emissions may be individually limited. OPR states, “Although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment.” Individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice.

Finally, if the lead agency determines emissions are a cumulatively considerable contribution to a significant cumulative impact, the lead agency must investigate and implement ways to mitigate the emissions. OPR states, “Mitigation measures will vary with the type of project being contemplated, but may include alternative project designs or locations that conserve energy and water, measures that reduce vehicle miles traveled (VMT) by fossil-fueled vehicles, measures that contribute to established regional or programmatic mitigation strategies, and measures that sequester carbon to offset the emissions from the project.” OPR concludes that, “A lead agency is not responsible for wholly eliminating all GHG emissions from a project; the CEQA standard is to mitigate to a level that is “less than significant.” The technical advisory includes a list of mitigation measures that can be applied on a project-by-project basis.

In January 2008, the California Air Pollution Control Officers Association (CAPCOA) issued a “white paper” on evaluating and addressing GHGs under CEQA. This resource guide was prepared to support local governments as they develop their programs and policies around climate change issues. The paper is not a guidance document. It is not intended to dictate or direct how any agency chooses to address GHG emissions. Rather, it is intended to provide a common platform of information about key elements of CEQA as they pertain to GHG, including an analysis of different approaches to setting significance thresholds.

The paper notes that for a variety of reasons local agencies may decide not to have a CEQA threshold. Local agencies may also decide to assess projects on a case-by-case basis when the projects come forward. The paper also discusses a range of GHG emission thresholds that could be used. The range of thresholds discussed includes a GHG threshold of zero and several non-zero thresholds. Non-zero thresholds include percentage reductions for new projects that would allow the state to meet its goals for GHG emissions reductions by 2020 and perhaps 2050. These would be determined by a comparison of new emissions versus business as usual emissions and the reductions required would be approximately 30 percent to achieve 2020 goals and 90 percent (effectively immediately) to achieve the more aggressive 2050 goals. These goals could be varied to apply differently to new projects, by economic sector, or by region in the state.

Other non-zero thresholds discussed in the paper include:

- 900 metric tons/year CO₂e (a market capture approach);
- 10,000 metric tons/year CO₂e (potential CARB mandatory reporting level with Cap and Trade);

- 25,000 metric tons/year CO₂e (the CARB mandatory reporting level for the statewide emissions inventory);
- 40,000 to 50,000 metric tons/year CO₂e (regulated emissions inventory capture – using percentages equivalent to those used in air districts for criteria air pollutants),
- Projects of statewide importance (9,000 metric tons/year CO₂e for residential, 13,000 metric tons/year CO₂e for office project, and 41,000 metric tons/year CO₂e for retail projects); and
- Unit-based thresholds and efficiency-based thresholds that were not quantified in the report.

In January 2009, OPR released preliminary proposed amendments to the CEQA Guidelines regarding GHG emissions. No significance threshold is included in the draft and the guidelines afford the customary deference provided to lead agencies in their analysis and methodologies. The introductory preface to the amendments recommends that CARB set state-wide thresholds of significance. OPR emphasized the necessity of having a consistent threshold available to analyze projects, and the analyses should be performed based on the best available information. The revisions would include a new section specifically addressing the significance of GHG emissions that would build upon OPR's 2008 technical advisory. Like the advisory, the proposed Guidelines section calls for quantification of GHG emissions. The proposed section states that the significance of GHG impacts should include consideration of the extent to which the project would result in the following: help or hinder compliance with AB 32 goals; increase energy use, especially energy use generated by fossil fuel combustion; improve energy efficiency; and result in emissions that would exceed any applicable significance threshold. In April 2009, OPR forwarded the draft revisions to the California Natural Resources Agency for review and proposed adoption. On July 3, 2009, the California Natural Resources Agency began the formal rulemaking process for adopting the CEQA Guidelines. The Secretary for Natural Resources adopted Amendments to the CEQA Guidelines addressing greenhouse gas emissions on December 30, 2009. The Amendments became effective on March 18, 2010, with a 120-day grace period.

The second part of SB 97 codifies safe harbor for highways and flood control projects. It provides that the failure of a CEQA document for a project funded by Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or the Disaster Preparedness and Flood Prevention Bond Act of 2006 to adequately analyze the effects of GHG emission otherwise required to be reduced pursuant to the regulations adopted under the Global Warming Solutions Act (which are not slated for adoption until January 1, 2012), does not create a cause of action for a violation of CEQA. This portion of SB 97 had a sunset date of January 1, 2010.

The bill does not address the obligation to analyze GHGs in projects not protected by the safe harbor provision. One possible interpretation is that there is no duty until the guidelines are adopted, because CEQA Guidelines Section 15007, Subdivision (b), provides that guideline amendments apply prospectively only.

California Senate Bill 375 (SB 375)

Governor Schwarzenegger signed SB 375 into law in September 2008 (Chapter 728, Statutes of 2008). The legislation aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires metropolitan planning organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS) that will prescribe land use allocation in the MPO's regional transportation plan. CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects will not be eligible for funding programmed after January 1, 2012.

California Urban Water Management Act

The California Urban Water Management Planning Act requires various water purveyors throughout the State of California (such as EBMUD) to prepare UWMPs, which assess the purveyor's water supplies and demands over a 20-year horizon (California Water Code, Section 10631 *et seq.*). As required by that statute, UWMPs are updated by the purveyors every five years. As discussed above, this is relevant to global climate change which may affect future water supplies in California, as conditions may become drier or wetter, affecting reservoir inflows and storage and increased river flows.¹⁴

Bay Area Air Quality Management District (BAAQMD)

BAAQMD is responsible for improving air quality within the San Francisco Bay Area Basin. BAAQMD adopted new thresholds of significance (BAAQMD Thresholds) on June 2, 2010, to assist lead agencies in determining when potential air quality impacts would be considered significant under CEQA. BAAQMD also released new CEQA Guidelines (CEQA Guidelines) in June 2010 which advise lead agencies on how to evaluate potential air quality impacts with the adopted new thresholds of significance. The analysis herein uses the thresholds from the BAAQMD Thresholds and the CEQA Guidelines to determine the Proposed Project's significance with respect to GHG emissions.

City of Oakland

City of Oakland General Plan

Oakland Energy and Climate Action Plan. An Oakland Energy and Climate Action Plan (ECAP) is being developed to identify, evaluate and recommend prioritized actions to reduce energy consumption and GHG emissions in Oakland. The ECAP will identify energy and climate goals, clarify policy direction, and identify priority actions for reducing energy use and GHG emissions. On July 7, 2009, the Oakland City Council directed staff to develop the draft Oakland ECAP using a GHG reduction target equivalent to 36 percent below 2005 GHG emissions by

¹⁴ Brekke, 2004, op. cit.

2020 (City of Oakland, Resolution No. 82129 C.M.S., 2009). Since the City issued a draft ECAP for public review in April 2010, but it has not established this ECAP at this time, it is unknown if the Project would conflict with policies and actions that may be included. However, the Project does not appear to conflict with the current City Sustainability Programs or General Plan policies regarding GHG reductions.

Land Use and Transportation Element (LUTE). The LUTE (which includes the Pedestrian Master Plan and Bicycle Master Plan) of the Oakland General Plan contains the following policies that address issues related to GHG emissions and climate change:

- Transit-oriented development should be encouraged at existing or proposed transit nodes, defined by the convergence of two or more modes of public transit such as BART, bus, shuttle service, light rail or electric trolley, ferry, and inter-city or commuter rail. *(Policy T.2.1)*
- Transit-oriented developments should be pedestrian-oriented, encourage night and day time use, provide the neighborhood with needed goods and services, contain a mix of land uses, and be designed to be compatible with the character of surrounding neighborhoods. *(Policy T.2.2)*
- The City should include bikeways and pedestrian ways in the planning of new, reconstructed, or realigned streets, wherever possible. *(Policy T3.5)*
- The City should encourage and promote use of public transit in Oakland by expediting the movement of and access to transit vehicles on designated “transit streets” as shown on the Transportation Plan. *(Policy T3.6)*
- Through cooperation with other agencies, the City should create incentives to encourage travelers to use alternative transportation options. *(Policy T4.2)*
- In order to facilitate the construction of needed housing units, infill development that is consistent with the General Plan should take place throughout the City of Oakland. *(Policy N3.2)*
- The City should prepare, adopt, and implement a Bicycle and Pedestrian Master Plan as a part of the Transportation Element of [the] General Plan. *(Policy T4.5)*

Open Space, Conservation and Recreation Element (OSCAR). The OSCAR Element includes policies that address GHG reduction and global climate change. Listed below are the following types of OSCAR policies: policies that encourage the provision of open space, which increases vegetation area (trees, grass, landscaping, etc.) to effect cooler climate, reduce excessive solar gain, and absorb CO₂; policies that encourage stormwater management, which relates to the maintenance of floodplains and infrastructure to accommodate potential increased storms and flooding; and policies that encourage energy efficiency and use of alternative energy sources, which directly address reducing GHG emissions.

- Conserve existing City and Regional Parks characterized by steep slopes, large groundwater recharge areas, native plant and animal communities, extreme fire hazards, or similar conditions. *(Policy OS-1.1)*

- Manage Oakland's urban parks to protect and enhance their open space character while accommodating a wide range of outdoor recreational activities. (*Policy OS-2.1*)
- Employ a broad range of strategies, compatible with the Alameda Countywide Clean Water Program. (*Policy CO-5.3*)
- See *Policy CO-12.1, above, under OSCAR policies that address general air quality.*
- Expand existing transportation systems management and transportation demand management strategies which reduce congestion, vehicle idling, and travel in single passenger autos. (*Policy CO-12.3*)
- See *Policy CO-12.4, above, under OSCAR policies that address general air quality.*
- Require new industry to use best available control technology to remove pollutants, including filtering, washing, or electrostatic treatment of emissions. (*Policy CO-12.5*)
- Support public information campaigns, energy audits, the use of energy-saving appliances and vehicles, and other efforts which help Oakland residents, businesses, and City operations become more energy efficient. (*Policy CO-13.2*)
- Encourage the use of energy-efficient construction and building materials. Encourage site plans for new development which maximize energy efficiency. (*Policy CO-13.3*)
- Accommodate the development and use of alternative energy resources, including solar energy and technologies which convert waste or industrial byproducts to energy, provided that such activities are compatible with surrounding land uses and regional air and water quality requirements. (*Policy CO-13.4*)

Historic Preservation Element (HPE). A key HPE policy relevant to climate change encourages the reuse of existing building (and building materials) resources, which could reduce landfill material (a source of methane, a GHG), avoid the incineration of materials (which produces CO₂ as a by-product), avoid the need to transport materials to disposal sites (which produces GHG emissions), and eliminate the need for materials to be replaced by new product (which often requires the use of fossil fuels to obtain raw and manufacture new material) (US EPA 2006a).

Safety Element. Safety Element policies that address wildfire hazards related to climate change in that increased temperatures could increase fire risk in areas that become drier due to climate change (US EPA, 2010b). Also, wildfire results in the loss of vegetation; carbon is stored in vegetation, and when the vegetation burns, the carbon returns to the atmosphere (NASA, 2004). The occurrence of wildfire also emits particulate matters into the atmosphere. Safety Element policies also address storm-induced flooding hazards related to the potential to accommodate potential increase in storms and flooding as a result of climate change. Pertinent safety Element policies including the following:

- Prioritize the reduction of the wildfire hazard, with an emphasis on prevention. (*Policy FI-3*)
- Enforce and update local ordinances and comply with regional orders that would reduce the risk of storm-induced flooding. (*Policy FL-1*)

- Continue or strengthen city programs that seek to minimize the storm-induced flooding hazard. (*Policy FL-2*)

Other City of Oakland Programs and Policies. The City of Oakland has supported and adopted a number of programs and policies designed to reduce GHG emissions and continue Oakland's progress toward becoming a model sustainable city. Other programs and policies of relevance to new large commercial office development include:

- *Sustainable Oakland Program* – Oakland's sustainability efforts are coordinated through the Sustainable Oakland program, a product of the Oakland Sustainability Community Development Initiative (SDI) created in 1998 (Ordinance 74678 C.M.S.).
- *Green Building* – The City of Oakland has implemented Green Building principles in City buildings through the following programs: Civic Green Building Ordinance (Ordinance No. 12658 C.M.S., 2005), requiring, for certain large civic projects, techniques that minimize the environmental and health impacts of the built environment through energy, water and material efficiencies and improved indoor air quality, while also reducing the waste associated with construction, maintenance and remodeling over the life of the building; Green Building Guidelines (Resolution No. 79871, 2006) which provides guidelines to Alameda County residents and developers regarding construction and remodeling; and Green Building Education Incentives for private developers.
- *Downtown Housing* – The 10K Downtown Housing Initiative has a goal of attracting 10,000 new residents to downtown Oakland by encouraging the development of 6,000 market-rate housing units. This effort is consistent with Smart Growth principles.
- *Waste Reduction and Recycling* – The City of Oakland has implemented a residential recycling program increasing collection of yard trimmings and food waste. This program has increased total yard trimming collections by 46 percent compared to 2004, and recycling tonnage by 37 percent. The City also adopted Construction and Demolition Recycling, for which the City passed a resolution in July 2000 (Ordinance 12253, OMC Chapter 15.34), requiring certain nonresidential or apartment house projects to recycle 100 percent of all Asphalt & Concrete (A/C) materials and 65 percent of all other materials.
- *Polystyrene Foam Ban Ordinance* - In June 2006 the Oakland City Council passed the Green Food Service Ware Ordinance (Ordinance 14727, effective as of January 1, 2007), which prohibits the use of polystyrene foam disposable food service ware and requires, when cost neutral, the use of biodegradable or compostable disposable food service ware by food vendors and City facilities.
- *Zero Waste Resolution* – In March 2006 the Oakland City Council adopted a Zero Waste Goal by 2020 Resolution (Resolution 79774 C.M.S.), and commissioned the creation of a Zero Waste Strategic Plan to achieve the goal.
- *Stormwater Management* – On February 19, 2003, the Regional Water Quality Control Board, San Francisco Bay Region, issued a municipal stormwater permit under the National Pollutant Discharge Elimination System (NPDES) permit program to the Alameda Countywide Clean Water Program (ACCWP). The purpose of the permit is to reduce the discharge of pollutants in stormwater to the maximum extent practicable and to effectively prohibit non-stormwater discharges into municipal storm drain systems and

watercourses. The City of Oakland, as a member of the ACCWP, is a co-permittee under the ACCWP's permit and is, therefore, subject to the permit requirements.

- *Provision C.3 of the NPDES permit* is the section of the permit containing stormwater pollution management requirements for new development and redevelopment projects. Among other things, Provision C.3 requires that certain new development and redevelopment projects incorporate post-construction stormwater pollution management measures, including stormwater treatment measures, stormwater site design measures, and source control measures, to reduce stormwater pollution after the construction of the project. These requirements are in addition to standard stormwater-related best management practices (BMPs) required during construction.
- *Community Gardens and Farmer's Markets* – Community Garden locations include Arroyo Viejo, Bella Vista, Bushrod, Golden Gate, Lakeside Horticultural Center, Marston Campbell, Temescal, and Verdesse Carter. Weekly Farmer's Markets locations include the Jack London Square, Old Oakland, Grand Lake, Mandela, and Temescal districts. Both efforts promote and facilitate the principal of growing and purchasing locally, which effects reductions in truck and vehicle use and GHG emissions.

Impacts and Mitigation Measures for GHG Emissions

Significance Thresholds for GHG Emissions and Climate Change

The project would have a significant impact on the environment if it would:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment, specifically:

Project-Level Impacts¹⁵

- a. For a project involving a stationary source¹⁶, produce total emissions of more than 10,000 metric tons of CO₂e annually.
 - b. For a project involving a land use development¹⁷, produce total emissions of more than 1,100 metric tons of CO₂e annually **AND** more than 4.6 metric tons of CO₂e per service population¹⁸ annually.¹⁹
2. Conflict with an applicable plan, policy, or regulation adopted for the purposes of reducing greenhouse gas emissions.

¹⁵ The project's expected greenhouse gas emissions during construction should be annualized over a period of 40 years and added to the expected emissions during operation for comparison to the threshold. A 40-year period is used because 40 years is considered the average life expectancy of a building before it is remodeled with considerations for increased energy efficiency. The thresholds are based on the BAAQMD thresholds. The BAAQMD thresholds were originally developed for project operation impacts only. Therefore, combining both the construction emissions and operation emissions for comparison to the threshold represents a conservative analysis of potential greenhouse gas impacts.

¹⁶ Stationary sources are projects that require a BAAQMD permit to operate.

¹⁷ Land use developments are projects that do not require a BAAQMD permit to operate.

¹⁸ The service population includes both the residents and the employees of a proposed project.

¹⁹ A project's impact would be considered significant if the emissions exceed BOTH the 1,100 metric tons threshold and the 4.6 metric tons threshold. Accordingly, the impact would be considered less than significant if a project's emissions are below EITHER of these thresholds.

Approach to CEQA Analysis of GHG Emissions and Climate Change Impacts in this EIR

This EIR does discuss, for consideration by decision makers, estimated GHG emissions of the Proposed Project, Project-related activities that could contribute to the generation of increased GHG emissions, the Project design features that would avoid or minimize those emissions, and the approaches to further reduce those emissions.

Quantitative and Qualitative Approach

The approach employed in this EIR is to use both a quantitative and a qualitative approach. The quantitative approach is used to answer the first threshold: Will the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. The quantifiable threshold discussed above are used to determine if this threshold is met. .

If a project does not exceed the quantifiable thresholds in the first threshold, the qualitative approach addresses the second threshold: Will the project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

Theoretically, if a project implements reduction strategies identified in AB 32, the Governor's Executive Order S-3-05, or other strategies to help toward reducing GHGs to the level proposed by the governor and targeted by the City of Oakland, it could reasonably follow that the project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs. Alternatively, a project could reduce a potential cumulative contribution to GHG emissions through energy efficiency features, density and locale (e.g., compact development near transit and activity nodes of work or shopping) and by contributing to available mitigation programs, such as reforestation, tree planting, or carbon trading.

However, the analysis in Oakland EIRs consider that, because the quantifiable thresholds established in the BAAQMD Guidelines was formulated based on AB 32 reduction strategies, a project cannot exceed the numeric threshold without also conflicting with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. Therefore, if a project does not meet the threshold #1 (numeric) and therefore results in a significant cumulative impact because it would also result in a significant cumulative impact under the threshold #2 (plan, policy or regulation consistency), even though the project may incorporate measures and have features that would reduce its contribution to cumulative GHG emissions.

Net Change in Emissions and Local/Global Context

The methodology applied here assumes that all emission sources with the Project would be new sources that would combine with existing conditions. For this assessment, it is not possible to predict whether emission sources associated with the Project would move from outside the air basin (and thus generate "new" emissions within the air basin), or whether they are sources that already exist and are merely relocated within the air basin. Because the effects of GHGs are global, if the project merely shifts the location of the GHG-emitting activities (locations of residences and businesses and where people drive), there would not be a net new increase of emissions. It also can not be determined until buildout of the project whether occupants of the

proposed development will have shorter commute distances, require fewer vehicle trips, walk, bike, or use public transit more often, instead of driving, or use overall less energy by virtue of the Project's characteristics or proximity to workers' housing. If these types of changes occur, overall vehicle miles traveled could be reduced and it could be argued that the Project would result in a potential net reduction in GHG emissions, locally and globally.

GHG Effects on Flooding and Sea-level Rise

Since the Project Site is not located in an area that would be subject to coastal or other flooding resulting from climate change, the potential effects of climate change (e.g., effects of flooding on the Project Site due to sea level rise) on the Proposed Project are not discussed in this EIR. The Project is located approximately 1.25 miles from the nearest coastal shoreline (along the Oakland Estuary) and approximately 1.0 mile from the nearest area considered vulnerable to sea level rise of approximately 55 inches at the end of this century (BCDC, 2009)

Impact AIR-9: Construction and operation of the Proposed Project would result in a cumulatively considerable increase in GHG emissions. (Potentially Significant)

Construction and operation of the Proposed Project would generate GHG emissions, with the majority of energy consumption (and associated generation of GHG emissions) occurring during operation. Typically more than 80 percent of the total energy consumption takes place during the use of buildings and less than 20 percent is consumed during construction (UNEP, 2007). Overall, the following activities associated with the Proposed Project (as well as any similar land use development) could contribute to the generation of GHG emissions:

- *Motor Vehicle Use* – Transportation associated with the Proposed Project would result in GHG emissions from the combustion of fossil fuels in daily automobile and truck trips. It is likely that these transportation emissions are comparatively lower than other development options on the site given the dense, transit-oriented nature of Downtown Oakland. Also, as discussed previously, the Project is designed to reduce auto trips.
- *Gas, Electric and Water Use* – Natural gas use results in the emissions of two GHGs: methane (the major component of natural gas) and carbon dioxide from the combustion of natural gas. Methane is released prior to initiation of combustion of the natural gas (as before a flame on a stove is sparked), and from the small amount of methane that is uncombusted in a natural gas flame. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. California's water conveyance system is energy intensive: Preliminary estimates indicate that total energy used to pump and treat this water exceeds 15,000 GWh per year, or at least 6.5 percent of the total electricity used in the State per year (CEC, 2010).
- *Removal of Vegetation* – The net removal of vegetation for construction results in a loss of the carbon sequestration in plants. However, planting of additional vegetation would result in additional carbon sequestration and lower the carbon footprint of the project. (See City Standard Conditions of Approval regarding *Landscape Requirements and Tree Replacement*, below.)

- *Construction Activities* – Construction equipment typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs such as carbon dioxide, methane and nitrous oxide. Furthermore, methane is emitted during the fueling of heavy equipment.

While the Proposed Project and all developments of similar land uses would generate GHG emissions from the activities described above, the City of Oakland's ongoing implementation of its Sustainability Community Development Initiative (which includes an array of programs and measures, discussed below, under *Regulatory Context for GHG Emissions and Climate Change*) will collectively reduce the levels of GHG emissions and contributions to global climate change attributable to activities throughout Oakland.

GHG Emission Inventory for the Proposed Project

Emissions included in the BAAQMD Guidelines, and therefore included in the baseline GHG emissions inventory for the Project, if applicable, are described below (and quantified in Tables IV.B-10 and IV.B-11):

- *Area Source Emissions*. These are direct emissions from sources that include natural gas combustion for heating, cooking, fireplaces, or boilers, as well as emissions from landscape maintenance equipment.
- *Transportation Emissions*. These are direct emissions from mobile sources including automobiles, trucks, motorcycles, and busses.
- *Operational Electricity Consumption*. These are indirect emissions emitted off-site via non-renewable, non-nuclear electricity generators as a result of increased electrical demand.
- *Solid Waste Disposal Emissions*. These are indirect emissions associated with waste generation. A large percentage of Project waste would be diverted from landfills by waste reduction, recycling, and composting. Oakland currently diverts a large portion of its waste and has goals to even further reduce the amount of waste sent to a landfill. The remainder of the waste not diverted would be disposed of at a landfill. Landfills emit anthropogenic methane from the anaerobic breakdown of material.
- *Operational Fugitive (Direct) Emissions*. These direct emissions are most commonly associated with inadvertent emissions to the atmosphere due to leakage or inherent imperfections in a gas transport or collection system. Direct fugitive GHG emissions that may reasonably be expected to be generated by a commercial building like the Project would consist of GHG refrigerants emitted from leaks or other imperfections in refrigeration or air cooling equipment.
- *Operational Water Emissions (embedded energy)*. These indirect emissions are associated with the electricity used to convey water, due to increased water demand from the Project.
- *Operational Wastewater (non-biogenic)*. These are indirect emissions from wastewater treatment associated with the electricity use in wastewater treatment (and not the biogenic CO₂ process emissions) (BAAQMD, 2010b).

Emission sources not included in the BAAQMD Guidelines or relevant to the Project are not included in the baseline GHG emissions inventory and are discussed in greater detail in Appendix I. These include emissions generated from permitted stationary source equipment, vegetation sequestration change, fugitive refrigeration emissions, life cycle emissions, agricultural emissions; and off road equipment emissions.

Project Design Features, City Standard Conditions of Approval, Regulatory Requirements, and General Plan Policies and Local Programs that Reduce GHG Emissions of the Project

There are many ways for a project to reduce its GHG emissions through its design, construction and operations. Local conditions of approval, policies, programs and regulatory requirements that apply to a project also combine to reduce project GHG emissions. Each of these components is considered part of the Proposed Project and is also included in the estimate of the Project's baseline GHG emissions inventory as follows:

Project Design Features

- *CALGreen – Energy Performance Standard.* One of the objectives of the Project (presented in Chapter 3, Project Description) is to meet contemporary energy and design objectives by ensuring that the new towers meet mandatory CALGreen performance standards. CALGreen is a newly enacted building code requirement pursuant to Title 24 of the CCR, which is effective January 2011 and will apply to construction of the Proposed Project. CALGreen will require that every new building constructed in California reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills and install low pollutant-emitting materials. It also requires separate water meters for nonresidential buildings' indoor and outdoor water use, with a requirement for moisture-sensing irrigation systems for larger landscape projects and mandatory inspections of energy systems (e.g., heat furnace, air conditioner and mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity and according to their design efficiencies. The effects of these energy and water saving features are incorporated into the baseline emission inventory for the Proposed Project. The GHG Reduction Plan for the Project also provides the opportunity for the Project to exceed mandatory CALGreen performance standards where feasible.

City Standard Conditions of Approval

The following SCAs are required as part of a Proposed Project and adopted as conditions of approval to help reduce GHG emissions of the Project:

- *SCA TRANS-1 – Parking and Transportation Demand Management Plan.* SCA TRANS-1 requires the Project applicant to submit for review and approval by the City of Oakland Planning and Zoning Division a Transportation Demand Management (TDM) Plan containing strategies to reduce on-site parking demand and single occupancy vehicle (SOV) travel. Although a TDM Plan for the Project has not yet been prepared, generally the TDM Plan could reduce SOV trips for a large office project located near transit by about 10 to 20 percent. Calculations of GHG reductions attributable to the TDM Plan preliminarily (and conservatively) assume a 10 percent reduction in Project trip generation. The GHG Reduction Plan provides emissions estimates for the project both

with and without the preliminary 10 percent projected TDM trip reduction. Once the TDM Plan is completed and approved (prior to certification of the EIR), the appropriate refinement to the Project trip generation and resulting GHG emissions will be calculated and reported in the EIR prior to certification.

- *SCA UTIL-1 – Waste Reduction and Recycling.* SCA UTIL-1 requires the Project applicant to submit a Construction & Demolition Waste Reduction and Recycling Plan (WRRP) and an Operational Diversion Plan (ODP) for review and approval by the Oakland Public Works Agency. Chapter 15.34 of the Oakland Municipal Code outlines requirements for reducing waste and optimizing construction and demolition (C&D) recycling. Affected projects include all new construction and all demolition. This SCA essentially addresses reduction in construction-related emissions, which the City combines with the Project's operational emissions to assess against the significance thresholds for operational emissions, even though construction emissions are not a component of BAAQMD's Guidelines. Therefore, this SCA will contribute to reducing total emissions of the Project.
- *Landscape Requirements and Tree Replacement.* SCAs address landscape requirements for frontages of commercial buildings and replacement of trees removed as part of a project. Projects are required to install one tree for every 25 feet of street frontage in cases sidewalks have adequate width. Additionally SCAs generally require the replacement of native trees removed as part of a project. Together, these SCAs that maintain and increase landscaping and trees effect cooler climate, reduce excessive solar gain, and absorb CO₂e emissions over the minimum 3.5 years to construct Phase 2 of the Project, for a total of, but have no impact on the emissions inventory of the Proposed Project.
- *SCA GHG-1- GHG Reduction Plan.* SCA GHG-1 applies to certain projects that produce total GHG emissions that exceed the BAAQMD CEQA Thresholds, including commercial office buildings employing 1,000 persons or containing more than 250,000 square feet of total floor area, such as the Proposed Project. SCA GHG-1 requires the Project applicant to prepare a GHG Reduction Plan to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the BAAQMD CEQA Thresholds. The GHG Reduction Plan will include a comprehensive set of quantified GHG emissions reduction measures in addition to energy efficiencies included as part of the project (including the City's Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements. SCA GHG-1 is presented in the detailed Project GHG emissions impact analysis further below and will reduced the GHG emissions of the Project.

General Plan Policies and City Programs

Each of the following policies and programs were previously presented in *Regulatory Context for GHG Emissions and Climate Change*, in this Section.

- *Oakland General Plan LUTE.* The LUTE is aimed at promoting use of public transit, bicycles and pedestrian travel. Any reduction of transportation-related GHG emissions are captured in the trip reduction associated with the TDM Plan.
- *Oakland General Plan Open Space, Conservation and Recreation (OSCAR) Element.* The OSCAR contains policies that (a) encourage the provision of open space, which increases vegetation area (trees, grass, landscaping, etc.) to effect cooler climate, reduce

excessive solar gain, and absorb CO₂; (b) encourage stormwater management, which relates to the maintenance of floodplains and infrastructure to accommodate potential increased storms and flooding; and (c) encourage energy efficiency and use of alternative energy sources. Policies that address vegetation area have no impact on the emissions inventory as vegetative sequestration is not a component of BAAQMD's Guidelines. Other policies regarding energy efficiency encourage and support energy efficiency but are not requirements under any implementation mechanism via the General Plan. They have resulted, however, in the implementation of the City of Oakland sustainability program discussed below.

- *City of Oakland Sustainability Programs.* The City has proactively adopted a number of sustainability programs in an effort to reduce the City's impact on climate change. Oakland's sustainability efforts are managed by the Oakland Sustainability Community Development Initiative and there are two main categories that relate to reducing GHG emissions from a development project: renewable energy and green building.

Renewable Energy. With regard to renewable energy, the City's Sustainability Program has set a priority of promoting renewable energy with a particular emphasis on solar generation. The Program's aggressive renewable energy goals include the following: 50 percent of city facilities entire electricity use from renewable sources by 2017; and 100 percent of the city's entire electricity use from renewable sources by 2030. The City has some control over renewable energy percentages for buildings it operates by contracting its energy needs directly with the local utility. However, private building operators generally receive a standard energy mix from PG&E, and would not be required to contract for a higher percentage of renewables under this program as it only targets City facilities. PG&E has requested a 33 percent renewable energy mix goal for 2020 from the CPUC (compared to a 12 percent mix in 2007).

Green Building. With regard to green building strategies, the City of Oakland has implemented green building principles in City buildings through the following programs: Civic Green Building Ordinance (Ordinance No. 12658 C.M.S., 2005), requiring, for certain large civic projects, techniques that minimize the environmental and health impacts of the built environment through energy, water and material efficiencies and improved indoor air quality, while also reducing the waste associated with construction, maintenance and remodeling over the life of the building; Green Building Guidelines (Resolution No. 79871, 2006) which provides guidelines to Alameda County residents and developers regarding construction and remodeling; and Green Building Education Incentives for private developers. Green building requirements for private developers are anticipated for adoption in the fall of 2010, however, the baseline emissions inventory for the Proposed Project assumes implementation of mandatory CALGreen standards as a Project design feature, as discussed above.

Regulatory Requirements

- *AB 1493 and Amended "Pavley" Regulations.* AB 1493 required the California Air Resources Board (CARB) to develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State. The CARB has adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments, approved by CARB on September 24, 2009, are part of California's commitment toward a nation-wide program to reduce new passenger vehicle GHGs from 2012 through 2016. The model used to estimate the

Proposed Project's GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of Pavley standards.

- *Low Carbon Fuel Standards (LCFS)*. On April 23, 2009 CARB approved the regulation to implement the LCFS. The LCFS will reduce GHG emissions from the transportation sector in California by about 16 million metric tons (MMT) in 2020. The model used to estimate the Proposed Project's GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of LCFS.

Other Project characteristics that reduce GHG emissions and support the Project's alignment with AB 32 GHG reduction goals include proposed pedestrian improvements. The Project proposed extensive streetscape improvements, including new and increased sidewalk, curb, and gutter; right-of-way landscaping; streetlights; street furniture; wayfinding signage; and/or art. These features, as outlined in the City's Pedestrian Master Plan adopted in November 2002, are identified as design amenities that develop a pedestrian-oriented environment that facilitate walking and transit use. These features would help reduce transportation-related GHG emissions by encouraging additional pedestrian trips. Also, the Project's combination of office and commercial/retail uses has the potential to reduce greenhouse gas emissions related to transportation for both the employees and the patrons of each of these uses. Multiple amenities and services an employee or patron might use would be located in this single development, which would reduce vehicle-miles-traveled.

Construction-generated GHG Emissions

The construction-generated GHG emissions of the Project are shown in **Table IV.B-9**, which summarizes the emissions estimates from the principal GHGs (CO₂, CH₄ and N₂O) in metric tons of CO₂e, by construction year and Project phase. An estimated total 2,081 MT CO₂e emissions from Project construction equipment and vehicles would be emitted over the minimum 3.5 years to construct Phase 1 of the Project, and an estimated total 2,461 MT CO₂e emissions over the minimum 3.5 years to construct Phase 2 of the Project, for a total of approximately 4,542 MT CO₂e emissions over the minimum total construction period of seven years through Buildout. Approximately 46 percent of the total construction GHG emissions is associated with Phase 1 construction, with approximately 54 percent associated with Phase 2 construction.

**TABLE IV.B-9
CONSTRUCTION-GENERATED GHG EMISSIONS OF THE PROPOSED PROJECT**

Construction Year	Annual CO ₂ e Emissions (metric tons per year)			
	CO ₂	CH ₄	N ₂ O	Total CO ₂ e
Phase 1				
2012	244	0.29	1.94	246
2013	733	0.88	5.82	740
2014	750	0.90	5.96	757
2015 (Phase 1)	335	0.40	2.66	338
Total Phase 1				2,081
Phase Construction Emissions per Year (annualized over 40 years)				52
Phase 2				
2015 (Phase 2)	112	0.13	0.89	113
2016	953	1.14	7.57	962
2017	948	1.14	7.53	957
2018 (426	0.51	3.39	430
Total Phase 2				2,461
Total Construction Emissions – Project Buildout				4,542
Total Construction Emissions per Year (annualized over 40 years)				114
Total Construction Emissions per Year (annualized over approximately 7 years to construct the Project)				649

SOURCE: ESA, 2010

Construction emissions are annualized because the proposed operational GHG emissions thresholds are analyzed in terms of metric tons “per year.” Assuming a 40-year development life of the Project until it is demolished or remodeled for energy efficiency (which is the common standard currently used in practice), total construction emissions represent approximately 114 MT CO₂e annually, over 40 years. Annualized over the 3.5-year construction period for Phase 1, the one-time construction–related contribution to GHG emissions is approximately 52 MT CO₂e per year, and over the seven-year construction period of the Project Buildout the one-time construction-related contribution is approximately 649 MT CO₂e per year.

As previously discussed, the BAAQMD Guidelines do not include a specific threshold or methodology for assessing construction-related GHG emissions for CEQA analysis. The City’s methodology adds the 40-year annualized construction-related GHG emissions to the Project’s total operational-related emissions, to assess construction-related GHG emissions against the BAAQMD thresholds and Project’s ability to meet AB 32 GHG reduction goals, as discussed below.

The Project includes characteristics that specifically contribute it being consistent with AB 32 GHG reduction goals during construction. The analysis of construction emissions only considers improvements in construction equipment exhaust emissions through manufacturer requirements and turnover. In addition to considering the CO₂e emission from construction activities, the Project would incorporate dust control measures recommended by BAAQMD (Oakland SCA AIR-1, Construction-Related Air Pollution Controls (Dust and Equipment Emissions [Dust Control]), and measures related to construction exhaust emissions (Oakland SCA AIR-2, Construction Emissions). Further, the SCAs that apply to the Project align with BAAQMD regulations that relate to portable equipment (e.g., concrete batch plants, and gasoline- or diesel-

powered engines used for power generation, pumps, compressors, pile drivers, and cranes), architectural coatings, and paving materials. Equipment used during project construction would be subject to the requirements of BAAQMD Regulation 2 (Permits), Rule 1 (General Requirements) with respect to portable equipment unless exempt under Rule 2-1-105 (Exemption, Registered Statewide Portable Equipment); BAAQMD Regulation 8 (Organic Compounds), Rule 3 (Architectural Coatings); and BAAQMD Regulation 8 (Organic Compounds), Rule 15 (Emulsified and Liquid Asphalts).

In summary, the annualized GHG emissions from construction of the Project would not conflict with the goals of AB 32.

Long-Term Operational GHG Emissions

As introduced above, long-term operational GHG emissions associated with the Project include indirect emissions from mobile sources (motor vehicle trips), emissions from natural gas combustion used in non-residential buildings, emissions from electricity use in non-residential buildings (grid electricity), emissions from water conveyance and waste water treatment and conveyance, and emissions from area sources. Emissions from each of these sources, in addition to the construction-related emissions discussed above, are reported in **Tables IV.B-10** and **IV.B-11**, below. Detailed descriptions and Project assumptions for each emissions source is included in the *Preliminary GHG Reduction Plan* for the Project, in Appendix I to this EIR.

TABLE IV.B-10
UNADJUSTED OPERATIONAL GHG EMISSIONS INVENTORY FROM THE PROPOSED PROJECT

Emission Source	Total Annual CO ₂ e Emissions (metric tons per year)	
	Phase 1 Total CO ₂ e	Project Buildout ^a Total CO ₂ e
Motor vehicle trips (no TDM)	4,570	9,143
Natural gas	734	1,749
Grid Electricity	2,538	3,966
Water Conveyance	11	20
Wastewater Treatment & Conveyance	12	22
Solid Waste	280	758
Area Source (landscape maintenance)	0.24	0.24
Total Unadjusted Operational Project GHG Emissions without Construction Emissions	8,145	15,658
Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9)	52	114
Total Unadjusted Operational Project GHG Emissions with Construction Emissions	8,197	15,772
Total Unadjusted Operational Project GHG Emissions by Service Population	5.7^b	4.8^b

a Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components

b Total emissions divided by service population of 1,423 net new employees for the Project at Phase 1, and 3,233 net new employees for the Project at Buildout.

SOURCE: ESA, 2010

**TABLE IV.B-11
BASELINE OPERATIONAL GHG EMISSIONS INVENTORY FROM THE PROPOSED PROJECT**

Emission Source	Annual CO ₂ e Emissions (metric tons per year)	
	Phase 1 Total CO ₂ e	Project Buildout ^a Total CO ₂ e
Motor vehicle trips without TDM / with TDM ^a	4,190 / 3,771	8,359 / 7,515
Natural gas	682	1,632
Grid Electricity	1,995	3,099
Water Conveyance	8	15
Wastewater Treatment & Conveyance	13	24
Solid Waste	170	462
Area Source (landscape maintenance)	0.24	0.24
Total Baseline Operational Project GHG Emissions without TDM / with TDM, without Construction Emissions	7,058 / 6,639	13,591 / 12,747
Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9)	52	114
Total Baseline Operational Project GHG Emissions without TDM / with TDM, with Construction Emissions	7,110 / 6,691	13,705 / 12,861
BAAQMD Threshold of Significance	1,100	1,100
<i>Exceeds Threshold?</i>	Yes	Yes
Total Operational Project GHG Emissions by Service Population without TDM / with TDM	5.0 / 4.7^c	4.2 / 3.9^d
BAAQMD Threshold of Significance	4.6	4.6
<i>Exceeds Threshold?</i>	Yes	No
Impact Determination	Significant	Less than Significant^e

a Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components

b Assumes preliminary 10 percent TDM reduction of vehicle trips.

c Total emissions divided by service population of 1,423 net new employees for Phase I of the Project.

d Total emissions divided by service population of 3,233 net new employees for the Project at Buildout.

e For projects that meet the City's definition of a "very large project," the City requires the Project applicant to prepare a GHG Reduction Plan as a Standard Condition of Approval, even though no CEQA impact is identified.

SOURCE: ESA, 2010

Unadjusted Operational GHG Emissions

"Unadjusted Operational GHG Emissions" of the Project do not factor in the Project's design features, applicable City SCAs (including TDM), and regulatory requirements that are considered part of the Project and that reduced the Project's GHG emissions; it is essentially a "business as usual" approach. Unadjusted emissions do, however, assume the same Project assumptions and inputs used to estimate the Project's baseline emissions, below. The unadjusted emissions are considered to demonstrate the emissions reductions that are attributable to measures incorporated as part of the Project. As shown in **Table IV.B-10**, the total unadjusted annual GHG emissions generated by the Project is approximately 8,197 MT CO₂e per year at Phase 1 and 15,772 MT CO₂e per year at Project Buildout.

Total Baseline Operational GHG Emissions

“Baseline Operational GHG Emissions” of the Project factor in all the emissions reduction components that are part of the Project: the Project design features, applicable City SCAs (including TDM, but excluding SCA GHG-1), and regulatory requirements. Although a TDM Plan for the Project (required by SCA TRANS-1) has not yet been prepared, generally, TDM could reduce SOV trips for a large office project near located near transit by about 10 to 20percent. Baseline emissions are reported with and without a preliminary (and conservative) 10 percent TDM trip reduction assumption.

As shown in **Table IV.B-11**, the total annual baseline GHG emissions generated by the Project at Phase 1, *not assuming the preliminary 10 percent TDM reduction*, is approximately 7,110 MT CO₂e per year, which is approximately 5.0 MT CO₂e annually, based on a total service population of 1,423 net new employees. Emissions at Phase 1, *assuming the preliminary 10 percent TDM reduction*, is approximately 6,691 MT CO₂e per year, and approximately 4.7 MT CO₂e per year per capita of service population.

As further shown in Table IV.B-11, the total annual baseline GHG emissions generated by the Project at Buildout, *not assuming the preliminary 10 percent TDM reduction* is approximately 13,705 MT CO₂e per year, which is approximately 4.2 MT CO₂e based on a total service population of 3,233 net new employees. Emissions at Buildout, *assuming the preliminary 10 percent TDM reduction*, is approximately 12,861 MT CO₂e per year, and approximately 3.9 MT CO₂e per year per capita of service population.

Comparison of Unadjusted and Baseline Emissions

The difference in the baseline and unadjusted GHG emissions of the Project generally demonstrate the extent of emissions reduction that is attributable to measures incorporated with the Project.

At Phase 1, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (7,110 MT CO₂e shown in Table IV.B-11), is approximately 1,087 MT CO₂e per year less than the Project’s estimated unadjusted Phase 1 emissions (8,197 MT CO₂e shown in IV.B-10). This is a reduction of approximately 13 percent. The most substantial reductions are associated with motor vehicle emissions (approximately 380 MT CO₂e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 543 MT CO₂e per year less than the unadjusted emissions, which do not consider the Project’s adherence to CALGreen standards, as discussed in the assumptions, above).

At Buildout, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (13,705 MT CO₂e shown in Table IV.B-11), is approximately 2,067 MT CO₂e per year less than the Project’s estimated unadjusted emissions (15,772 MT CO₂e shown in IV.B-10). This is a reduction of approximately 13 percent (as with Phase 1). Again, the most substantial reductions are associated with motor vehicle emissions (approximately 784 MT CO₂e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards

and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 867 MT CO₂e per year less than the unadjusted emissions, which do not consider the Project's adherence to CALGreen standards).

Impacts of Baseline Operational GHG Emissions

Based on the project-level significance thresholds, the Project would have a significant impact on the environment if it would produce total emissions of more than 1,100 metric tons of CO₂e annually *and* more than 4.6 metric tons of CO₂e per service population annually, or conflict with an applicable plan, policy, or regulation adopted for the purposes of reducing greenhouse gas emissions.

Impact at Phase 1

For Phase 1, as shown in Table IV. B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 7,110 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold. Also, the Project's 5.0 MT CO₂e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 6,691 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold, and the 4.7 MT CO₂e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Therefore, the Project would have a significant cumulative GHG impact in Phase 1 because its emissions would exceed both the 1,100 MT CO₂e per year threshold *and* the 4.6 MT CO₂e per year service population threshold.

Impact at Total Buildout

At Buildout, as shown in Table IV.B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 13,705 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold. However, the Project's 4.2 MT CO₂e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 12,861 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold, but the 3.9 MT CO₂e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Therefore, at Buildout, the Project would not have a significant cumulative GHG impact because it would not exceed the 4.6 MT CO₂e per year service population threshold, even though it would exceed the 1,100 MT CO₂e per year threshold.

GHG Reduction Plan Mitigation Measure and Standard Conditions of Approval (SCAs)

The City addresses significant cumulative GHG emissions CEQA impacts through a "GHG Reduction Plan Mitigation Measure" that requires the applicant to prepare and implement a project-specific GHG Reduction Plan. The GHG Plan would identify a set of emissions reduction measures targeted at reducing the Project's GHG emissions to below either of the two numeric

significant thresholds (1,100 MT CO₂e per year **OR** 4.6 MT CO₂e per year), which would thereby reduce the CEQA impact to less than significant.

The City has also identified a “GHG Reduction Plan Standard Condition of Approval,” SCA GHG-1, to identify a set of emissions reduction measures targeted at reducing the Project’s GHG emissions to below *both* of the two numeric significant thresholds (1,100 MT CO₂e per year **AND** 4.6 MT CO₂e per year), even though a CEQA impact may not exist. SCA GHG-1 is identical to the GHG Reduction Plan Mitigation Measure, as shown below (Mitigation Measure AIR-2, below. The SCA GHG-1 would apply to “very large projects” that: (a) involve a land use development (i.e., a project that does not require a permit from the Bay Area Air Quality Management District to operate); (b) produce total greenhouse gas (GHG) emissions of more than 1,100 metric tons of CO₂e annually **or** more than 4.6 metric tons of CO₂e per service population annually (with “service population” defined as the total number of employees and residents of the project); and (c) is either a:

- Residential development of more than 500 units;
- Shopping center or business establishment employing more than 1,000 persons or containing more than 500,000 square feet of total floor area;
- Commercial office building employing 1,000 persons or containing more than 250,000 square feet of total floor area;
- Hotel or motel containing more than 500 rooms;
- Industrial, manufacturing, or processing plant, or industrial park employing more than 1,000 persons, occupying more than 40 acres of land, or encompassing more than 650,000 square feet of total floor area; or
- Any combination of smaller versions of the above that when combined result in equivalent annual CO₂e emissions as the above.

Like all Oakland SCAs, the GHG Reduction Plan SCA GHG-1 would be incorporated as a condition of approval to the project.

Phase 1

The following Mitigation Measure AIR-3, GHG Reduction Plan, is identified to address the Phase 1 GHG Emissions impact, and preparation and implementation of the GHG Reduction Plan would be specifically targeted at reducing the Project’s GHG Emissions at Phase 1 to below the 4.6 MT CO₂e per year service population threshold – a reduction of at least 0.5 MT CO₂e per year (to reduced 5.0 to 4.5 MT CO₂e).

Mitigation Measure AIR-3, GHG Reduction Plan: The project applicant shall retain a qualified air quality consultant to develop a GHG Reduction Plan for City review and approval. The applicant shall implement the approved GHG Reduction Plan.

The goal of the GHG Reduction Plan shall be to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the Bay Area Quality Management District’s (BAAQMD’s) CEQA Thresholds of Significance (1,100 metric tons of CO₂e per year and 4.6 metric tons of CO₂e per year per service population) to help achieve the City’s goal of reducing GHG emissions. The GHG Reduction Plan shall include, at a minimum,

(a) a detailed GHG emissions inventory for the project under a “business-as-usual” scenario with no consideration of project design features, or other energy efficiencies; (b) an “adjusted” baseline GHG emissions inventory for the project, taking into consideration energy efficiencies included as part of the project (including the City’s Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements); and (c) a comprehensive set of quantified additional GHG reduction measures available to further reduce GHG emissions beyond the adjusted GHG emissions. If the project is to be constructed in phases, the GHG Reduction Plan shall provide GHG emission scenarios by phase.

Potential additional GHG reduction measures to be considered include, but are not be limited to, measures recommended in BAAQMD’s latest CEQA Air Quality Guidelines, the California Air Resources Board Scoping Plan (December 2008, as may be revised), the California Air Pollution Control Officers Association (CAPCOA) CEQA and Climate Change Guidance Document (January 2008, as may be revised), the California Attorney General’s website, and Reference Guides on Leadership in Energy and Environmental Design (LEED) published by the U.S. Green Building Council.

The proposed additional GHG reduction measures must be reviewed and approved by the City. The types of allowable GHG reduction measures include the following (listed in order of City preference): (1) physical design features; (2) operational features; and (3) the payment of fees to fund GHG-reducing programs (i.e., the purchase of “carbon credits”). For proposed reduction measures involving the purchase of carbon credits, the City will give preference to proposed payments to the City to offset the costs associated with implementation of GHG reduction strategies identified in the draft City’s Energy and Climate Action Plan (ECAP).

The allowable locations of the GHG reduction measures include the following (listed in order of City preference): (1) the project site; (2) off-site within the City of Oakland; (3) off-site within the San Francisco Bay Area Air Basin; and (3) off-site within the State of California.

For physical GHG reduction measures to be incorporated into the design of the project, the measures shall be included on the drawings submitted for construction-related permits. For operational GHG reduction measures to be incorporated into the project, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of project completion (or at the completion of the project phase for phased projects).

For physical GHG reduction measures to be incorporated into off-site projects, the measures shall be included on drawings and submitted to the City for review and approval and then installed prior to completion of the subject project (or prior to completion of the project phase for phased projects). For operational GHG reduction measures to be incorporated into off-site projects, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of completion of the subject project (or at the completion of the project phase for phased projects).

For GHG reduction measures involving the purchase of carbon credits (either to fund GHG-reducing activities identified in the draft ECAP or to fund non-ECAP GHG-reducing activities), evidence of the payment/purchase shall be submitted to the City for review and

approval prior to completion of the subject project (or prior to completion of the project phase for phased projects).

Because the Project meets the City's definition of "very large project" for a commercial office building²⁰ the Project would also be subject to the City's SCA GHG-1, GHG Reduction Plan, for which the target would be to further reduce the Project's Phase 1 GHG emissions to below the 1,100 MT CO₂e per year threshold (after implementation of the mitigation measure to reduce the Phase I GHG emissions to below the 4.6 MT CO₂e per year). SCA GHG-1 is identical to Mitigation Measure AIR-3.

This cumulative GHG emissions impact identified for Phase 1 would be less than significant. Although the actual emissions reduction would depend on the combination and extent of the additional measures employed, it is reasonable that potential additional measures identified in **Table IV.B-12, *Additional GHG Reduction Measures Identified for Potential Implementation by the Proposed Project***, and in the preliminary GHG Reduction Plan in Appendix I to this EIR (in addition to TDM reductions from SCA TRANS-1), could reduce the cumulative baseline GHG emissions associated with Phase 1 of the Project by at least 0.5 MT CO₂e per year to a less-than-significant level.

Significance after Implementation of Mitigation Measure: Less than Significant

Project Buildout

The Proposed Project would not result in a significant cumulative GHG impact at Buildout, therefore no mitigation measure is required. However, SCA GHG-1, GHG Reduction Plan, would apply to the Project, and would be specifically targeted at reducing the Project's GHG Emissions at Buildout to below the 1,100 MT CO₂e per year threshold – a reduction of at least 12,604 MT CO₂e per year (to reduced 13,705 to 1,099 MT CO₂e). SCA GHG-1 is identical to Mitigation Measure AIR-3. Other City SCAs that will be adopted as conditions of approval for the Project include TRANS-1, *Parking and Transportation Demand Management*; SCA UTIL-1, *Waste Reduction and Recycling*; and *Landscape Requirements and Tree Replacement* SCAs.

Mitigation: None required.

²⁰ Commercial office building employing 1,000 persons or containing more than 250,000 square feet of total floor area.

TABLE IV.B-12
ADDITIONAL GHG REDUCTION MEASURES IDENTIFIED FOR POTENTIAL IMPLEMENTATION BY
THE PROPOSED PROJECT

Mitigation Measure	Description	CO ₂ e Emissions Reduction Estimate Range
CAPCOA MM T-9	Paid Parking ^a	1 percent – 30 percent
CAPCOA MM T-18	Reduced/No Parking Fee for EVs/CNG Vehicles	Low
CAPCOA MM T-19	TMA Membership ^a	1 percent – 28 percent
CAPCOA MM D-14	Enhanced Recycling	Low
CAPCOA MM D-15	LEED Certification ^b	Moderate
CAPCOA MM D-16	Retro-Commissioning	8 percent – 10 percent
CAPCOA MM D-17	Drought-tolerant Landscaping	Low
CAPCOA MM E-1	High-Efficiency Pumps	Low
CAPCOA MM E-4	Energy Star Roof	0.5 percent – 1 percent
CAPCOA MM E-5	On-Site Renewable Energy System	1 percent – 3 percent
CAPCOA MM E-9	Low energy Cooling	1 percent – 10 percent
CAPCOA MM E-11	Charging Facilities	Low
CAPCOA MM E-15	Electric Yard Equipment Compatibility	Low
CAPCOA MM E-17	Green Building Materials	Low
CAPCOA MM E-18	Shading Mechanisms for windows, patio and walkway overhangs	Low
CAPCOA MM E-20	Programmable Thermostats	Low
CAPCOA MM S-1	Emissions Reduction Education	Low
CAPCOA MM M-2	Offset Purchase	Up to 100 percent
BAAQMD MM 6	Daily Parking Charge ^{a,c}	0 percent - 25 percent
BAAQMD MM 7	Parking Cash-out. California law requires certain employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space ^a	0 percent – 12.5 percent
BAAQMD MM 8	Free Transit Passes ^a	25 percent of transit service reduction
BAAQMD MM 16	Car sharing services provided ^a	1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together
BAAQMD MM 17	Information Provided on Transportation Alternatives ^a	1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together
BAAQMD MM 18	Dedicated Employee Transportation Coordinator ^a	
BAAQMD MM 19	Carpool Matching Program ^a	
BAAQMD MM 20	Preferential Carpool/Vanpool Parking ^a	
BAAQMD MM 24	Electrically powered landscape equipment and electrical outlets	Equivalent to URBEMIS estimated emissions
BAAQMD MM 43	Increase Roof/Ceiling Insulation	None Given
BAAQMD MM 45	Install rainwater collection systems in commercial buildings	None Given
BAAQMD MM 47	Restrict the use of water for cleaning outdoor surfaces/prohibit systems that apply water to non-vegetated surfaces	None Given
BAAQMD MM 48	Implement water-sensitive Urban Design Practices in New Construction	None Given
BAAQMD MM 51	Require the Provision of storage areas for recyclables and green waste in new construction	None Given

^a To be estimated with SCA TRANS-1, which requires preparation of a TDM incorporating a variety of measures aimed at reducing SOV trips generated by the Project.

^b While LEED certification is not being proposed for the Project, Voluntary Tier CALGreen standards may be identified.

^c Addressed In CAPCOA Measure T-9.

SOURCE: ESA, 2010

Impact AIR-10: The Proposed Project would conflict with any applicable plan, policy or regulation of an appropriate regulatory agency adopted for the purpose of reducing greenhouse gas emissions (Potentially Significant)

As discussed in Impact AIR-2, the Project incorporates several characteristics, such as its transit-oriented location and building and site design features, and will comply with several BAAQMD and other strategies and regulatory requirement that would reduce the Project's contribution to cumulative GHG emissions generated during construction and operation of the Project.

An Oakland Energy and Climate Action Plan (ECAP) is being developed to identify, evaluate and recommend prioritized actions to reduce energy consumption and GHG emissions in Oakland. The ECAP will identify energy and climate goals, clarify policy direction, and identify priority actions for reducing energy use and GHG emissions. On July 7, 2009, the Oakland City Council directed staff to develop the draft Oakland ECAP using a GHG reduction target equivalent to 36 percent below 2005 GHG emissions by 2020 (City of Oakland, Resolution No. 82129 C.M.S., 2009). Since the City issued a draft ECAP for public review in April 2010, but it has not adopted this ECAP at this time, it is unknown if the Project would conflict with policies and actions that may be included. However, the Project does not appear to conflict with the current City Sustainability Programs or General Plan policies regarding GHG reductions.

The Project's GHG emissions generated during construction and operation would be minimized by virtue of the building characteristics and site design features that the Project proposes. In addition, the Project is subject to all the regulatory requirements including the City's Standard Conditions of Approval, which would reduce GHG emissions of the Project. These include conditions to address adherence to best management construction practices and equipment use (see SCA AIR-1 and AIR-2) and to minimize post construction stormwater runoff that could affect the ability to accommodate potentially increased storms and flooding within existing floodplains and infrastructure systems. Overall, the Project would entail implementing reduction strategies identified in AB 32, the Governor's Executive Order S-3-05, and other strategies to help reduce GHGs to the level proposed by the governor and targeted by the City of Oakland.

Mitigation Measure AIR-4: Implement Mitigation Measure AIR-3.

Significance after Implementation of Mitigation Measure: Less than Significant

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- U.S. Supreme Court, *Massachusetts et. al. v. EPA et. al* (No. 05-1120, 415F 3d 50), April 2, 2007.

C. Biological Resources

This section identifies the existing biological resources at the Project Site and within the Project Study Area; identifies the federal, state, and local regulations pertaining to biological resources within the region; and describes project impacts on those biological resources as well as SCAs and/or mitigation measures to reduce project-related potentially significant impacts. Information used in the preparation of this section was obtained from existing documents pertaining to plant and wildlife species found in the Study Area, the California Natural Diversity Database (CDFG, 2010), California Native Plant Society (CNPS) Electronic Inventory (CNPS, 2010), U.S. Fish and Wildlife Service (USFWS) database (USFWS, 2010), and standard biological literature.

Setting

Regional Setting

The Project Site is located in California's Bay-Delta Bioregion¹. This bioregion consists of a variety of natural communities that range from the open waters of the Bay and Delta to salt and brackish marshes to chaparral and oak woodlands. The temperate climate is Mediterranean in nature, with relatively mild, generally wet winters and warm, dry summers. The high diversity of vegetation and wildlife found in Alameda County, which reflects that of the region as a whole, is a result of soils, topographic, and micro-climate diversity that combine to promote relatively high levels of endemism.² This, in combination with the rapid pace of development in the region, has resulted in a relatively high degree of endangerment for local flora and fauna. The Project Site is located on the western shores of Lake Merritt, approximately one-half mile inland from the Oakland Estuary and in the central portion of the San Francisco Estuary, which is designated as a Western Hemisphere Shorebird Reserve Network of international importance. More than one million shorebirds use regional wetlands each winter, between 300,000 and 900,000 shorebirds pass through San Francisco Bay during spring and fall migration periods, more than 50% of the diving ducks in the Pacific Flyway winter in the shallow wetlands of the bay, and several species breed in regional wetlands during the summer (Goals Project, 1999). More than 90% of historic wetlands in San Francisco Bay have been lost or altered and 94% of tidal marshes have been destroyed in the central San Francisco Bay Region (Goals Project, 1999). San Francisco Bay's remaining tidal wetlands are home to several special-status bird species, including the California clapper rail (*Rallus longirostris obsoletus*), black rail (*Laterallus jamaicensis*), salt-marsh common yellowthroat (*Geothlypis trichas*), and Alameda song sparrow (*Melospiza melodia pusillula*).

¹ A bioregion is an area defined by a combination of ecological, geographic and social criteria, that consists of a system of related, interconnected ecosystems. The Bay-Delta bioregion is considered the immediate watershed of the Bay Area and the Delta, not including the major rivers that flow into the Delta. Bounded on the north by northern edge of Sonoma and Napa counties and the Delta and extending east to the edge of the valley floor. Bounded on the south by the southern edge of San Joaquin County, the eastern edge of the Diablo Range, and the southern edge of Santa Clara and San Mateo counties.

² *Endemism* refers to the degree to which organisms or taxa are restricted to a geographical region or locality and are thus individually characterized as endemic to that area.

Project Setting

Project Site

The Project Site is located on the eastern edge of downtown Oakland, a city with a population of over 400,000. Land uses in the Project Study Area³ consist of a mix of commercial and office buildings, as well as urban parks. The Project Site is part of the already fully developed Kaiser Center and is currently occupied by low-rise commercial buildings and the mature landscaping of the roof garden on top of commercial space and a parking garage. The site is surrounded by high-traffic city streets, with Lakeside Park and Lake Merritt directly to the east. While the construction of the buildings proposed under the Project will result in the destruction of the westernmost portion of the existing roof garden, this area of the garden will be relocated to the south end of the existing garden and east of the Project's proposed South Tower (see Figure III-3). The Project will result in a net gain in roof garden area of approximately 4,500 square feet.

Study Area

Historically, the Study Area consisted of a mosaic of a fully tidal estuary with mudflats and salt marshes that transitioned into brackish marsh and riparian habitat along Glen Echo Creek and the other freshwater drainages (Pleasant Valley, Bushy Dell, Indian Gulch, and Park Boulevard Creeks) that emptied into a narrow arm of San Francisco Bay running between the mainland and what was then a peninsula but has since become the island of Alameda (SFEI, 1998). Uplands in the vicinity would originally have been a mosaic of coastal prairie and coastal scrub, with scattered oaks and occasional willow groves along stream courses. Sewage from the several early settlements along its shores was discharged into the estuary. Lake Merritt was created when a dam was built in 1868 and the Lake became the nation's first wildlife refuge in 1870. The wetlands surrounding the Lake were gradually reclaimed as houses were built in their place but by 1915 some of these houses were demolished as Lakeside Park was created. Between 1925 and 1956 five islands were constructed of dredged silt to provide habitat for nesting and roosting waterfowl. Fresh water is provided to the islands and a barrier protects the islands from recreational boaters. The uplands of surrounding Lakeside Park are dominated by large areas of maintained turfgrass and have been planted with numerous trees, including native coast live oak (*Quercus agrifolia*), California buckeye (*Aesculus californica*), and coast redwood (*Sequoia sempervirens*), and many non-native species including Italian stone pine (*Pinus pinea*) and deodar cedar (*Cedrus deodara*).

Habitat Types Within the Study Area

Descriptions of the various habitat types occurring within the Study Area are presented below.

³ The Project Site includes the western portion of the Kaiser Center; the larger Study Area includes the Project Site as well as Lakeside Park and Lake Merritt to the east of the Project Site because of the proposed Project's potential to impact biological resources there.

Urban

The Project Site is fully developed and occurs in a highly urbanized context. Lakeside Park and the open waters of Lake Merritt lie to the east across busy Lakeside Drive from the Kaiser Center, but all other directions are dominated by urban land uses. Urban, developed areas, dominated by roads, structures, concrete, and asphalt, provide little wildlife habitat and essentially no habitat for plants other than opportunistic weedy species adapted to harsh conditions or the horticultural plants used in landscaped areas (see discussion below). Wildlife species utilizing urban areas must be able to tolerate the presence of humans and their activities and are typically generalists, capable of utilizing the limited food sources available, such as garbage and horticultural plants and their fruit. Urban wildlife species in the Oakland area include common raven (*Corvus corax*), northern mockingbird (*Mimus polyglottos*), raccoon (*Procyon lotor*), Norway rat (*Rattus norvegicus*), and Virginia opossum (*Didelphis virginiana*). Several exceptions to the generalist rule are red-tailed hawks (*Buteo jamaicensis*), which prey on rodents and birds often found in urban parks, and Cooper's hawks (*Accipiter cooperi*) and peregrine falcons (*Falco peregrinus anatum*), which prey almost exclusively on small to medium sized birds. Peregrine falcons have been observed roosting on the Kaiser Center building and another tall building within two blocks of the Project Site over a number of years, as well as preying on local birds, including pigeons (*Columba livia*), European starlings (*Sturnus vulgaris*), and Brewer's blackbirds (*Euphagus cyanocephalus*) (Nevill, 2007a, 2007b, 2008; Scalf, 2008). However, although this species is known to use tall buildings and bridges in highly urbanized areas for nesting, there is only one known peregrine nesting site in Oakland, on the Fruitvale Bridge (Nevill, 2010).

Landscaped

Habitat provided by landscaped areas occurs within the Project Site, on the Kaiser Center roof garden, and in Lakeside Park within the greater Study Area. Street trees within the Study Area also provide some marginal foraging, roosting and, potentially, nesting habitat for common urban adapted birds. The Kaiser Center roof gardens were originally planted over 30 years ago and now contain mature trees and shrubs capable of providing nesting habitat for birds. Tree species include southern magnolia (*Magnolia grandiflora*), olive (*Olea europea*), cork oak (*Quercus suber*), Japanese maple (*Acer palmatum*), strawberry tree (*Arbutus unedo*). These trees are maintained at heights of generally less than 20 feet and with open canopies and thus provide relatively marginal nesting habitat. Mature shrubs in the roof gardens include English laurel (*Prunus laurocerasus*), hydrangea (*Hydrangea macrophylla*), rhododendron and azalea (*Rhododendron* spp.), and camellia (*Camellia japonica*) and many of these have dense enough foliage to provide good cover for nesting birds.

Landscaped areas and planted trees can typically provide cover, foraging, and nesting habitat for a variety of bird species, especially those that are tolerant of disturbance and human presence. Birds commonly found in such areas include the non-native English sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), dark-eyed junco (*Junco hyemalis*), western scrub jay (*Aphelocoma californica*), and Anna's hummingbird (*Calypte anna*). The latter two species were observed at the roof garden.

Bird Use of Lake Merritt and Lakeside Park

Lake Merritt and surrounding Lakeside Park provide habitat for a diversity of bird species. Black-crowned night herons (*Nycticorax nycticorax*) and egrets (*Egretta thula*, *Ardea alba*) nest on the protected islands. A large colony of Canada geese (*Branta canadensis*) forage in the turfgrass and also utilize the island habitat. Numerous water birds forage in the open waters of the lake and species such as eared and pied-billed grebes (*Podiceps nigricollis*, *Podilymbus podiceps*) are common. Brown pelicans (*Pelecanus occidentalis californicus*), double-crested cormorants (*Phalacrocorax auritus*) and numerous duck species, including bufflehead (*Bucephala albeola*) and scaup (*Aythya marila*, *A. affinis*) also frequent the aquatic habitat provided by the Lake. Trees in Lakeside Park have been documented as supporting nesting Cooper's hawks and red-tailed hawk also likely nest in trees there. Undoubtedly many common passerine birds nest there as well.

Wetlands and Aquatic Habitat

There are no wetlands or other aquatic habitats on the Project Site. While there is a series of three linked pools in the roof garden, these are maintained with chemicals that would preclude the presence of aquatic invertebrates and the rooftop location precludes colonization by aquatic vertebrates from adjacent habitat. Within the area of potential Project impact, the banks of Lake Merritt are confined with concrete retaining walls and therefore provide no substrate for wetland vegetation.

Lake Merritt is affected by twice daily tidal flows and receives water from 60 storm drain outfalls around the lake. Salinity of the waters varies throughout the year according to the volume of freshwater input but the Lake is basically brackish. The open waters of Lake Merritt within the Study Area also support primarily marine fish species common to the San Francisco Estuary (Pham, 2001). The species composition within the Study Area is expected to vary by season and regularly changing physical conditions created by variation in freshwater flow from the creeks and other freshwater sources into the Lake. Fish commonly found within the Bay include such diverse species as northern anchovy (*Engraulis mordax*), striped bass (*Morone saxatilis*), threadfin shad (*Dorosoma petenense*), and yellowfin goby (*Acanthogobius flavimanus*). Fish species actually documented as occurring within the Glen Echo Creek watershed, which includes Lake Merritt, are goldfish (*Carassius auratus*), western mosquitofish (*Gambusia affinis*), and three-spine stickleback (*Gasterosteus aculeatus*) (Leidy, 2007). Leidy also notes the potential for Chinook salmon (*Oncorhynchus tshawytscha*) in the watershed but presence is apparently not confirmed.

The benthic invertebrate community of Lake Merritt is expected to be composed of various annelids, mysid shrimp, copepods, amphipods, shrimp, crabs and other macroinvertebrates, similar to those that occur in San Francisco Bay. All of these organisms provide important food sources for the fish and bird species that use Lake Merritt.

Sensitive Natural Communities

Sensitive natural communities are designated as such by various resource agencies, such as CDFG, or in local policies and regulations and are generally considered to have important functions or values for wildlife or humans and/or are recognized as declining in extent or distribution and are considered threatened enough to warrant some sort of protection. For example, many local agencies in California consider protection of oak woodlands important and federal, state, and most local agencies also consider wetlands and riparian habitat as sensitive communities. The CNDDB tracks communities it believes to be of conservation concern and these communities are typically considered sensitive for the purposes of CEQA analysis. The CNDDB lists three sensitive natural communities as occurring in the vicinity of the Study Area: northern coastal salt marsh, northern maritime chaparral, and serpentine bunchgrass grasslands. However, although riparian habitat and tidal salt marsh were historically present within the Study Area, none of these communities currently occur within the Project Site or within the Study Area.

Jurisdictional Waters and Wetlands

There are no potentially jurisdictional waters or wetlands on the Project Site. However, within the Study Area the open waters of Lake Merritt would be considered ‘other waters’ of the U.S and thus a jurisdictional feature. The Proposed Project is not expected to result in any direct impacts on Lake Merritt.

Special-status Species

A number of species known to occur in the Project Site vicinity are protected pursuant to federal and/or State of California endangered species laws, or have been designated Species of Special Concern by CDFG. In addition, Section 15380(b) of the California Environmental Quality Act (CEQA) Guidelines provides a definition of rare, endangered, or threatened species that are not included in any listing.⁴ Species recognized under these terms are collectively referred to as “special-status species.” For the purposes of this EIR, special-status species include:

- Plant and wildlife species listed as rare, threatened or endangered under the federal or state endangered species acts;
- Species that are candidates for listing under either federal or state law;
- Species formerly designated by the USFWS as Species of Concern or designated by CDFG as Species of Special Concern;
- Species protected by the federal Migratory Bird Treaty Act (16 U.S.C. 703-711); and/or
- Species such as candidate species that may be considered rare or endangered pursuant to Section 15380(b) of the CEQA Guidelines.

Appendix D provides comprehensive lists of the special-status species that have been documented from, or have potential to occur in suitable habitat within, the Study Area. These lists include occurrences documented by the CNDDB (CDFG, 2010), the CNPS Electronic Inventory (CNPS,

⁴ For example, vascular plants listed as rare or endangered or as List 1 or 2 by the California Native Plant Society (CNPS) are considered subject to Section 15380(b).

2008), and the USFWS database (USFWS, 2010). Based on review of the biological literature of the region, information presented in previous environmental documentation, and an evaluation of the habitat conditions of the Proposed Project Site, many of these species were eliminated from further evaluation because (1) the Study Area does not and/or never has provided suitable habitat for the species, or (2) the known range for a particular species is outside of the Study Area.

The remaining special-status species presented in **Table IV.C-1** include those that are documented as occurring within the Study Area or for which potential habitat (i.e., general habitat types) occurs within the Study Area. Species for which generally suitable habitat occurs but that were nonetheless determined to have low potential to occur in the Study Area are also listed in Table IV.C-1. This table also provides the rationale for each potential-to-occur determination. Species observed or with a moderate to high potential to occur in the Study Area are discussed in further detail below.

Special-Status Animals

Thirteen special-status wildlife species were identified in Table IV.C-1 as having potential for occurrence within the Project Study Area. Please refer to Table IV.C-1 for a summary of each species' habitat preferences and the rationale for our determinations with regard to potential for occurrence within the Study Area. None of these species is expected to occur within the Project area, with the exception of several raptors, which may prey on birds using the Kaiser roof garden.

Of the special-status plants and animals presented in Table IV.C-1, only the following nine species, which have been observed or determined to have a moderate to high potential to occur within the Study Area, were fully considered in the impact analysis:

- Peregrine falcon
- California brown pelican
- Cooper's hawk
- Red-shouldered hawk
- Red-tailed hawk
- Double-crested cormorant
- Pallid bat
- Silver-haired bat
- Hoary bat

These species are described in further detail below.

Birds

Peregrine falcon (*Falco peregrinus anatum*). The peregrine falcon is known throughout California and is a year-around resident along the Pacific coast. The peregrine is a specialist, preying primarily on mid-sized birds, such as pigeons and doves, in flight. Occasionally these birds will take insects and bats. Although typical nesting sites for the species are tall cliffs, preferably over or near water, peregrines are also known to use urban sites (Peeters, 2005), including the Bay Bridge and tall buildings in San Francisco and San Jose.

**TABLE IV.C-1
SPECIAL-STATUS SPECIES CONSIDERED**

Common Name Scientific Name	Listing Status USFWS/CDFG/ CNPS	General Habitat	Potential for Occurrence in Project Study Area
Species Listed and Proposed for Listing			
Birds			
Peregrine falcon <i>Falco peregrinus anatum</i>	Delisted/Delisted/ Fully Protected	Nests on ledges on cliffs, bridges, and tall buildings. In SF Bay area the species is known to nest on the Bay Bridge and buildings in San Francisco and San Jose.	High. This species is documented as foraging at Lake Merritt (CNDDDB, 2010), as well as roosting and foraging in the Kaiser Center. There is one known nesting site for this species in Oakland.
California brown pelican <i>Pelecanus occidentalis californicus</i>	FE/CE	Nests on islands, seeks cover on islands, mudflats, beaches, wharves.	High. Documented as occurring on Lake Merritt within the Study Area, but no suitable nesting habitat is present. Would not occur within the Project area.
Fish			
Tidewater goby <i>Eucyclogobius newberryi</i>	FE/CSC	Shallow waters of bays and estuaries.	Low. Reported as present in Lake Merritt in the late 1990's (CNDDDB, 2008). However, thought to be extirpated since then due to poor water quality (City of Oakland, 2006).
Central California coast steelhead <i>Oncorhynchus mykiss</i>	FT/CSC	Spawns and rears in coastal streams between the Russian River and Aptos Creek, as well as drainages tributary to San Francisco Bay, where gravelly substrate and shaded riparian habitat occurs.	Low. Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Sacramento winter-run Chinook salmon <i>Oncorhynchus tshawytscha</i>	FE/CE	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	Low. Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Central Valley spring-run Chinook salmon <i>Oncorhynchus tshawytscha</i>	FT/CT	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	Low. Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Additional Special-Status Species			
Invertebrates			
Mimic tryonia (=California brackishwater snail) <i>Tryonia imitator</i>	FSC/--	Inhabits permanently submerged areas in coastal lagoons, estuaries, and salt marshes, from Sonoma County south to San Diego County.	Low. Historical collection from vicinity of Lake Merritt. However species is thought likely to be extirpated as a result of habitat degradation (CNDDDB, 2010).
Fish			
Central Valley fall/late fall-run Chinook salmon <i>Oncorhynchus tshawytscha</i>	FSC/CSC	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	Low. Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Birds			
Cooper's hawk <i>Accipiter cooperii</i>	--/CSC	Commonly nests in conifers and riparian woodland but also known to nest in large trees in urban areas throughout the East Bay, especially near riparian corridors.	High. Documented as nesting in Lakeside Park within the Project Study Area (CNDDDB, 2010). May forage within the Project area but not expected to nest there.

TABLE IV.C-1 (CONTINUED)
SPECIAL-STATUS SPECIES CONSIDERED

Common Name Scientific Name	Listing Status USFWS/CDFG/ CNPS	General Habitat	Potential for Occurrence in Project Study Area
Birds (Continued)			
Red-shouldered hawk <i>Buteo lineatus</i>	--/3503	Commonly nests in riparian corridors but becoming increasingly common in urban areas throughout the East Bay, nesting in large trees.	High. Fairly common locally in urban areas. May nest at Lakeside Park. May forage occasionally at Kaiser Center but not expected to nest there.
Red-tailed hawk <i>Buteo jamaicensis</i>	--/3503	Nests in large oaks and conifers. The Bay Area's most common urban raptor.	High. Known to occur in downtown Oakland. May nest at Lakeside Park. May forage occasionally at Kaiser Center but not expected to nest there.
Northern harrier <i>Circus cyaneus</i>	--/CSC	Nests on ground primarily in emergent vegetation, wet meadows, or near rivers and lakes, but may nest in grasslands away from water.	Low. May occasionally forage within the Study Area but no suitable nesting habitat is present. Not expected to occur within Project area.
Double-crested cormorant <i>Phalacrocorax auritus</i>	--/CSC	Nests along coast on isolated islands or in trees along lake margins.	High. Known to forage and roost at Lake Merritt but not known to nest in Study Area. Not expected to occur within Project area.
Mammals			
Pallid bat <i>Antrozous pallidus</i>	FSC/CSC	Occurs in various habitats including grasslands, scrubs, woodlands, mixed conifer forests, but it is most common in open, dry habitats with rocky areas for roosting. Day roosts include hollow trees, buildings, caves, crevices, and mines.	Moderate. Marginally suitable roosting habitat occurs within Lakeside Park, with foraging habitat available over Lake Merritt and open turf areas. May forage within Project area but not expected to roost or breed there.
Silver-haired bat <i>Lasionycteris noctivagans</i>	FSC/--	Roost almost exclusively in trees – in natural hollows and bird excavated cavities or under loose bark of large diameter snags.	Moderate to High. Suitable roosting habitat is present in trees within the Study Area. Foraging habitat also present over Lake Merritt and adjacent turfgrass areas. May forage within Project area but not expected to roost or breed there.
Hoary bat <i>Lasiurus cinereus</i>	--/CSC	Prefers open habitats or habitat mosaics, with trees for cover and open areas or habitat edges for feeding. Prefers to roost in dense foliage of medium to large trees.	Moderate to High. Suitable roosting habitat is present in trees within the Study Area. Foraging habitat also present over Lake Merritt and adjacent turfgrass areas. May forage within Project area but not expected to roost or breed there.

STATUS CODES:FEDERAL: (U.S. Fish and Wildlife Service)

FE = Listed as Endangered (in danger of extinction) by the Federal Government.

FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.

FP = Proposed for Listing as Endangered or Threatened.

FC = Candidate to become a *proposed* species.

FSC = former Federal Species of Concern. Species so designated as such were listed by the Sacramento FWS office until 2006 but Sacramento FS no longer maintains this list. These species are still considered to be at-risk by other federal and state agencies, as well as various organizations with recognized expertise such as the Audubon Society.

STATE: (California Department of Fish and Game)

CE = Listed as Endangered by the State of California

CT = Listed as Threatened by the State of California

CSC = California Species of Special Concern

3503.5=Protection for nesting species of Falconiformes (hawks) and Strigiformes (owls)

SOURCES: CDFG, 2010; USFWS, 2010

Only one peregrine nesting site is documented in Oakland, on the Fruitvale Bridge (Nevill, 2010), and the species is known to use the Kaiser Center outside of breeding season. Juvenile peregrines have been observed perched or roosting on the nearby Kaiser Permanente building as recently as May 2008 (Nevill, 2008 and 2007a) and a breeding pair that used to nest on the Bay Bridge was observed multiple times at the Kaiser Center in the post-breeding season (Scaf, 2008). More recently, peregrines have also been observed using Oakland City Hall and the California State Building in downtown Oakland (Lowe, 2010), as well as in Emeryville (Nevill, 2008). The open skies over Lakeside Park, combined with adjacent tall buildings for perching and roosting and the abundance of birds using habitat at the Lake provide excellent foraging habitat for peregrine falcons.

Brown pelican (*Pelecanus occidentalis*). The brown pelican is a regular summer and fall migrant to San Francisco Bay and, in some years, these birds can be found in the Bay year-round. However, these birds are colonial breeders that favor rocky islands along the southern California coast to Mexico and, historically, only rarely north as far as Point Lobos (Cogswell, 1977). Brown pelicans are often seen foraging in deep water and channel habitat or perched on pilings or docks and have been observed foraging and roosting at Lake Merritt.

Cooper's hawk (*Accipiter cooperi*). Cooper's hawk ranges over most of North America and may be seen throughout California, most commonly as a winter migrant. Nesting pairs have declined throughout the lower-elevation, more populated parts of the state. Cooper's hawk forages in open woodlands and wooded margins and nests in tall trees, often in riparian areas (Ehrlich et al., 1988; Sibley, 2001). This species may forage at Kaiser Center roof garden as well as Lakeside Park; coast live oak and conifers provide suitable nesting habitat for Cooper's hawk at Lakeside Park and the species is documented as breeding there (CNDDB, 2010).

Red-tailed hawk (*Buteo jamaicensis*). Red-tailed hawks are commonly found in woodlands and open country with scattered trees. These large hawks feed primarily on small mammals, but will also prey on other small vertebrates, such as snakes and lizards, as well as on small birds and invertebrates. Red-tailed hawks nest in a variety of trees in urban, woodland, and agricultural habitats. Large coast live oaks as well as taller non-native trees such as conifers, may be used by red-tailed hawks for nesting in woodlands within Lakeside Park.

Red-shouldered hawk (*Buteo lineatus*). Red-shouldered hawks are relatively common in both rural and urban situations and can be found in residential neighborhoods and along riparian corridors or other waterbodies. These hawks hunt primarily for mammals, reptiles, and amphibians (Sibley, 2000). Large conifers provide potential nesting habitat for this species within the Project Study Area, primarily in Lakeside Park.

Double-crested cormorant (*Phalacrocorax auritus*). The double-crested cormorant is the only one of the three cormorants occurring in California that occurs on freshwater and is the most common cormorant in San Francisco Bay. The species feeds on a variety of fish and some crustaceans. These birds are colonial breeders, building stick nests or platforms in trees inland and using rocky ledges along the coast (Cogswell, 1977). Double-crested cormorants are known to nest locally on the Richmond San Rafael Bridge, at Lake Merced in San Francisco.

Mammals

Special status bat species. The Project Study Area provides potential foraging and roosting habitat for three special-status bat species. **Pallid bat** (*Antrozous pallidus*) ranges throughout western North America, from British Columbia to Mexico and east to Texas. This species is most abundant in arid lands, including deserts and canyonlands, shrub-steppe grasslands, and higher elevation coniferous forests and is therefore only likely to occur within the Study Area on a transient basis during spring and summer migrations. Pallid bats may roost alone or in groups in trees in cavities or under bark and structures such as bridges and buildings. Pallid bats forage over open areas and are opportunistic feeders on a wide variety of insects, foraging both on surfaces and in the air. Prey includes beetles, centipedes, crickets, moths, and rarely, lizards, and small rodents (WBWG, 2005a). **Silver-haired bat** (*Lasionycteris noctivagans*) occurs throughout most of North America and is primarily associated with conifer and mixed conifer/hardwood forests. This species would most likely be found in the Study Area during winter and seasonal migrations. Silver-haired bats roost almost exclusively in cavities and under the bark of tree, although they are sometimes found in structures as well. Moths are apparently the primary prey for this species, although they have been documented as feeding on a wide variety of insects. Seasonal records suggest considerable north to south migration, with animals moving to warmer, more southern climates in the winter (WBWG, 2005b). The **hoary bat** (*Lasiurus cinereus*) is the most widespread of all North American bats. This species ranges from Canada to South America and is primarily associated with forested habitats. Hoary bats are solitary and roost primarily in foliage of both coniferous and deciduous trees, often at the edge of a clearing. The species is highly migratory but neither wintering sites nor migratory routes are well documented. Hoary bats reportedly have a strong preference for moths, but are also known to eat beetles, flies, grasshoppers, termites, dragonflies, and wasps (WBWG, 2005c). These three bat species may utilize trees for roosting in Lakeside Park and forage over the park's turfgrass and the Lake itself during migratory periods but are not expected to breed and reproduce there.

Special-Status Plants

No special-status plant species are expected to occur on the Proposed Project Site or within the larger Study Area. Although a number of special-status plant species are identified in Appendix D as occurring within the Project vicinity there are no intact native communities remaining within the Study Area. In addition, distribution of a number of these species is restricted to specific habitat types or soils that are not, and/or never were, present within the Study Area, such as vernal pools or serpentine soils. Many plant species presented in Appendix D are considered by CNPS (2008) to be extirpated from the Project vicinity due to a long-standing history of disturbance within the Study Area.

Regulatory Setting

This subsection briefly describes federal, state, and local regulations, permits, and policies pertaining to biological resources and wetlands as they apply to the Proposed Project.

Special-Status Species

Federal Endangered Species Act

The USFWS, which has jurisdiction over plants, wildlife, and most freshwater fish, and the National Marine Fisheries Service (NMFS), which has jurisdiction over anadromous fish, marine fish, and mammals, oversee implementation of the Federal Endangered Species Act (FESA). Section 7 of the FESA mandates that all federal agencies consult with the USFWS and NMFS to ensure that federal agency actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. A federal agency is required to consult with USFWS and NMFS if it determines a “may affect” situation will occur in association with the Proposed Project. The FESA prohibits the “take”⁵ of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

Under Section 9 of the FESA, the take prohibition applies only to wildlife and fish species. However, Section 9 does prohibit the removal, possession, damage, or destruction of any endangered plant from federal land. Section 9 also prohibits acts to remove, cut, dig up, damage, or destroy an endangered plant species in non-federal areas in knowing violation of any state law or in the course of criminal trespass. Candidate species and species that are proposed or under petition for listing receive no protection under Section 9 of the FESA.

Section 10 of the FESA requires the issuance of an “incidental take” permit before any public or private action may be taken that would potentially harm, harass, injure, kill, capture, collect, or otherwise hurt (i.e., take) any individual of an endangered or threatened species. To offset the take of individuals that may occur incidental to implementation of a project, the permit requires preparation and implementation of a habitat conservation plan that provides for the overall preservation of the affected species through specific mitigation measures.

Federal Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (16 USC, Section 703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and egg.

Federal Essential Fish Habitat

The Sustainable Fisheries Act of 1996 (Public Law 104-297), amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal Fisheries Management

⁵ “Take,” as defined in Section 9 of the FESA, is broadly defined to include intentional or accidental “harassment” or “harm” to wildlife. “Harass” is further defined by the U.S. Fish and Wildlife Service as an intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to, breeding, feeding, and sheltering. “Harm” is defined as an act that actually kills or injures wildlife. This may include significant habitat modification or degradation that actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Plans (FMPs) and to require federal agencies to consult with the NMFS on activities that may adversely affect EFH. The Magnuson-Stevens Act requires all fishery management councils to amend their FMPs to describe and identify EFH for each managed fishery. The act also requires consultation for all federal agency actions that may adversely affect EFH (i.e., direct versus indirect effects); it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside of EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of the activity's location. Under section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. However, state agencies and private parties are not required to consult with NMFS unless state or private actions require a federal permit or receive federal funding. Although the concept of EFH is similar to that of critical habitat under the FESA, measures recommended to protect EFH by NMFS are advisory, not proscriptive.

California Endangered Species Act

Under the California Endangered Species Act (CESA), CDFG has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code Section 2070). CDFG also maintains a list of “candidate species,” which are species formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. In addition, CDFG maintains lists of “species of special concern,” which serve as “watch lists.” Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species could be present on the Project Site and determine whether the proposed project could have a potentially significant impact on such species. In addition, CDFG encourages informal consultation on any proposed project that may affect a candidate species.

California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed CDFG to carry out the legislature's intent to “preserve, protect, and enhance endangered plants in this state.” The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. The California Endangered Species Act (CESA) expanded upon the original NPPA and enhanced legal protection for plants. The CESA established threatened and endangered species categories, and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

California Fish and Game Code

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any

regulation made pursuant thereto. Section 3503.3 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

The California Fish and Game Code (Sections 3511-birds, 4700-mammals, 5050-reptiles and amphibians, and 5515-fish) also allows the designation of a species as Fully Protected. This designation provides a greater level of protection than is afforded by the CESA, since it means the designated species cannot be taken at any time.

Sensitive Natural Communities

Sensitive natural communities are identified as such by CDFG's Natural Heritage Division and include those that are naturally rare and those whose extent has been greatly diminished through changes in land use. The CNDDDB tracks 135 such natural communities in the same way that it tracks occurrences of special-status species: information is maintained on each site's location, extent, habitat quality, level of disturbance, and current protection measures. CDFG is mandated to seek the long-term perpetuation of the areas in which these communities occur. While there is no statewide law that requires protection of all special-status natural communities, CEQA requires consideration of a project's potential impacts on biological resources of statewide or regional significance.

Jurisdictional Waters (Including Wetlands)

Definitions

Waters of the United States

The term "waters of the United States," as defined in the Code of Federal Regulations (33 CFR § 328.3[a]; 40 CFR § 230.3[s]), refers to:

1. All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:
 - which are or could be used by interstate or foreign travelers for recreational or other purposes; or
 - from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - which are used or could be used for industrial purposes by industries in interstate commerce.
4. All impoundments of waters otherwise defined as waters of the United States under the definition;

5. Tributaries of waters identified in paragraphs (1) through (4);
6. Territorial seas; and
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6).
8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA (33 CFR 328.3[a][8]).

Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance of wetlands has increased due to their value as recharge areas and filters for water supplies and to their widespread filling and destruction to enable urban and agricultural development. Examples of wetlands may include freshwater marsh, seasonal wetlands, and vernal pool complexes that are adjacent to waters of the U.S. In a jurisdictional sense, there are two commonly used wetland definitions, one adopted by the USEPA and U.S. Army Corps of Engineers (Corps) and a separate definition, originally developed by USFWS, which has been adopted by agencies in the State of California that have regulatory authority over wetlands. Both definitions are presented below.

Federal Wetland Definition

Under federal law, wetlands are a subset of “waters of the United States” and receive protection under Section 404 of the Clean Water Act (CWA). Wetlands are defined as those areas that are inundated or saturated by surface or ground water at a frequency and duration that are sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetland determination under the federal wetland definition adopted by the Corps requires the presence of three factors: (1) wetland hydrology; (2) plants adapted to wet conditions; and (3) soils that are routinely wet or flooded [33 C.F.R. § 328.3(b)]. In January 2001, the Supreme Court of the United States ruled that certain isolated wetlands do not fall under the jurisdiction of the CWA (*Solid Waste Agency of Northwestern Cook County v. United States Army Corps of Engineers et al.*).

California Wetland Definition

The CDFG and the California Coastal Commission (CCC) have adopted the USFWS (Cowardin, 1979) definition of wetlands. While the federal definition of wetlands requires three wetland identification parameters to be met, the Cowardin definition can be satisfied under some circumstances with the presence of only one parameter. Thus, identification of wetlands by State agencies may include areas that are permanently or periodically inundated or saturated and without wetland vegetation or soils, such as rocky shores, or areas that presume wetland hydrology based on the presence of at least one of the following: a) a seasonal or perennial dominance by hydrophytes⁶ or b) the presence of hydric⁷ soils. CDFG does not normally assert

⁶ A *hydrophyte* is, literally, a water loving plant, i.e., one that is adapted to growing in conditions where the soil lacks oxygen, at least periodically during the year, due to saturation with water.

⁷ A *hydric* soil is one that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile.

jurisdiction over wetlands unless they are subject to Streambed Alteration Agreements (CDFG Code Sections 1600–1616) or they support state-listed endangered species.

Other Waters of the U.S.

“Other waters of the U.S.” refers to additional features that are regulated by the CWA but are not wetlands (33 CFR 328.4). To be considered jurisdictional, these features must exhibit a defined bed and bank and an ordinary high water mark. The term ordinary high water mark refers to a line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other means appropriate to the characteristics of the surrounding areas. Examples of other waters of the U.S. include rivers, creeks, ponds, and lakes.

U.S. Army Corps of Engineers and U.S. Environmental Protection Agency Regulations

The Corps and the USEPA regulate the discharge of dredged or fill material into waters of the United States, including wetlands, under Section 404 of the CWA. Projects that would result in the placement of dredged or fill material into waters of the United States require a Section 404 permit from the Corps. Some classes of fill activities may be authorized under General or Nationwide permits if specific conditions are met. Nationwide permits do not authorize activities that are likely to jeopardize the existence of a threatened or endangered species (listed or proposed for listing under the FESA). In addition to conditions outlined under each Nationwide Permit, project-specific conditions may be required by the Corps as part of the Section 404 permitting process. When a project’s activities do not meet the conditions for a Nationwide Permit, an Individual Permit may be issued.

Section 401 of the CWA requires an applicant for a Corps permit to obtain state certification that the activity associated with the permit will comply with applicable state effluent limitations and water quality standards. In California, water quality certification, or a waiver, must be obtained from the Regional Water Quality Control Board (RWQCB) for both Individual and Nationwide Permits.

The Corps also regulates activities in navigable waters under Section 10 of the Rivers and Harbors Act. The construction of structures, such as tidegates, bridges, or piers, or work that could interfere with navigation, including dredging or stream channelization, may require a Section 10 permit, in addition to a Section 404 permit if the activity involves the discharge of fill.

Finally, the federal government also supports a policy of minimizing “the destruction, loss, or degradation of wetlands.” Executive Order 11990 (May 24, 1977) requires that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

In recent years several Supreme Court cases have challenged the scope and extent of the Corps’ jurisdiction over waters of the United States and have led to several reinterpretations of that authority. The most recent of these decisions are the case of *Solid Waste Agency of Northern Cook County (SWANCC) v. the Army Corps of Engineers* (January 9, 2001) and *Rapanos v. United States* (June, 2006). The SWANCC decision found that jurisdiction over non-navigable, isolated, intrastate waters could not be based solely on the use of such waters by migratory birds. The reasoning behind the SWANCC decision could be extended to suggest that waters need a demonstrable connection with a ‘navigable water’ to be protected under the CWA. The introduction of the term isolated has led to the consideration of the relative connectivity between waters and wetlands as a jurisdictionally relevant factor. The more recent Rapanos case further questioned the definition of “waters of the United States” and the scope of federal regulatory jurisdiction over such waters but resulted in a split decision which did not provide definitive answers but expanded on the concept that a ‘significant nexus’ with traditional navigable waters was needed for certain waters to be considered jurisdictional.

On June 5, 2007 the USEPA and the Corps released guidance on CWA jurisdiction in response to the Rapanos Supreme Court decisions, which can be used to support a finding of CWA coverage for a particular water body when either a) there is a significant nexus between the stream or wetland in question and navigable waters in the traditional sense; or b) a relatively permanent water body is hydrologically connected to traditional navigable waters and/or a wetland has a surface connection with that water. According to this guidance the Corps and the USEPA will take jurisdiction over the following waters: 1) Traditional navigable waters, which are defined as all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; 2) Wetlands adjacent to traditional navigable waters; including adjacent wetlands that do not have a continuous surface connection to traditional navigable waters; 3) Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and 4) Wetlands adjacent to non-navigable tributaries as defined above; that have a continuous surface connection to such tributaries (e.g. they are not separated by uplands, a berm, dike, or similar feature).

The USEPA and the Corps decide jurisdiction over the following waters based on a fact-specific analysis to determine if there is a significant nexus, as defined below, to a traditional navigable water: a) Non-navigable tributaries that are not relatively permanent; b) Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and c) wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

The USEPA and the Corps *generally* do not assert jurisdiction over: 1) swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow) or 2) ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

The USEPA and the Corps have defined the significant nexus standard as follows:

1. A significant nexus analysis assesses the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters;
2. Significant nexus analysis includes consideration of hydrologic and ecologic factors including: a) volume, duration, and frequency of flow, including consideration of certain physical characteristics of the tributary; b) proximity to a traditional navigable water; c) size of the watershed; d) average annual rainfall; e) average annual winter snow pack; f) potential of tributaries to carry pollutants and flood waters to traditional navigable waters; g) provision of aquatic habitat that supports a traditional navigable water; h) potential of wetlands to trap and filter pollutants or store flood waters; and i) maintenance of water quality in traditional navigable waters.

State Policies and Regulations

State regulation of activities in waters and wetlands resides primarily with CDFG and the State Water Resources Control Board (SWRCB). In addition, the CCC has review authority for wetland permits within its planning jurisdiction. CDFG provides comment on Corps permit actions under the Fish and Wildlife Coordination Act. CDFG is also authorized under the California Fish and Game Code, Sections 1600-1616, to enter into a Streambed Alteration Agreement with applicants and to develop mitigation measures when a proposed project would obstruct the flow or alter the bed, channel, or bank of a river or stream in which there is a fish or wildlife resource, including intermittent and ephemeral streams. The SWRCB, acting through the nine RWQCBs, must certify that a Corps permit action meets state water quality objectives (Section 401, Clean Water Act).

Bay Conservation and Development Commission (BCDC) Regulations

The Bay Conservation and Development Commission (BCDC) is authorized by the McAteer - Petris Act to analyze, plan, and regulate San Francisco Bay and its shoreline. BCDC implements the San Francisco Bay Plan and regulates filling and dredging in the bay, its sloughs and marshes, and certain creeks and their tributaries. BCDC jurisdiction includes the waters of San Francisco Bay as well as a shoreline band that extends inland 100 feet from the high tide line. Any fill, excavation of material, or substantial change in use within BCDC jurisdiction requires a permit from BCDC.

Other Plans and Policies

City of Oakland General Plan

The OSCAR Element of the City of Oakland General Plan was adopted in 1996. OSCAR policies pertaining to natural resources with potential relevance to implementation of the Proposed Project include the following:

Policy CO-6.1: Protect Oakland's remaining natural creek segments by retaining creek vegetation, maintaining creek setbacks, and controlling bank erosion. Design future flood control projects to preserve the natural character of creeks and incorporate provisions for public access, including trails, where feasible. Strongly discourage projects which bury creeks or divert them into concrete channels.

Policy CO-7.1: Protect native plant communities, especially oak woodlands, redwood forests, native perennial grasslands, and riparian woodlands, from the potential adverse impacts of development. Manage development in a way which prevents or mitigates adverse impacts to these communities.

Policy CO-7.4: Discourage the removal of large trees on already developed sites unless removal is required for biological, public safety, or public works reasons.

Policy CO-8.1: Work with federal, state, and regional agencies on an ongoing basis to determine mitigation measures for development which could potentially impact wetlands. Strongly discourage development with unmitigatable adverse impacts.

Policy CO-9.1: Protect rare, endangered, and threatened species by conserving and enhancing their habitat and requiring mitigation of potential adverse impacts when development occurs within habitat areas.

Policy CO-11.1: Protect wildlife from the hazards of urbanization, including loss of habitat and predation by domestic animals.

Policy CO-11.2: Protect and enhance migratory corridors for wildlife. Where such corridors are privately owned, require new development to retain native habitat or take other measures which help sustain local wildlife population and migratory patterns.

The following policy is from the Land Use and Transportation Element:

Policy W3.3: Native plant communities, wildlife habitats, and sensitive habitats should be protected and enhanced.

City of Oakland Tree Ordinance

City of Oakland Tree Preservation and Removal Ordinance (Oakland Municipal Code (OMC) Chapter 12.36) prohibits removal of protected trees under certain circumstances. Factors to be considered in determining significance include:

The number, type, size, location and condition of (a) the protected trees to be removed and/or impacted by construction and (b) the protected trees to remain, with special consideration given to native trees.⁸

Protected trees include the following:

Quercus agrifolia (California or coast live oak) measuring four inches diameter at breast height (dbh) or larger, and any other tree measuring nine inches dbh or larger except *Eucalyptus* and *Pinus radiata* (Monterey pine); provided, however, that Monterey pine trees on City property and in development-related situations where more than five Monterey pine trees per acre are proposed to be removed are considered to be Protected trees.

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

The SCAs relevant to the biological resources that could be significantly impacted by the Proposed Project are listed below. If the Project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to biological resources. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA BIO-1 Tree Removal During Breeding Season**

Prior to issuance of a tree removal permit. To the extent feasible, removal of any tree and/or other vegetation suitable for nesting of raptors shall not occur during the breeding season of March 15 and August 15. If tree removal must occur during the breeding season, all sites shall be surveyed by a qualified biologist to verify the presence or absence of nesting raptors or other birds. Pre-removal surveys shall be conducted within 15 days prior to start of work from March 15 through May 31, and within 30 days prior to the start of work from June 1 through August 15. The pre-removal surveys shall be submitted to the Planning and Zoning Division and the Tree Services Division of the Public Works Agency. If the survey indicates the potential presences of nesting raptors or other birds, the biologist shall determine an appropriately sized buffer around the nest in which no work will be allowed until the young have successfully fledged. The size of the nest buffer will be determined by the biologist in consultation with the CDFG, and will be based to a large extent on the nesting species and its sensitivity to disturbance. In general, buffer sizes of 200 feet for raptors and 50 feet for other birds should suffice to prevent disturbance to birds nesting in the urban environment, but these buffers may be increased or decreased, as appropriate, depending on the bird species and the level of disturbance anticipated near the nest.

- **SCA BIO-2 Tree Removal Permit**

Prior to issuance of a demolition, grading, or building permit. Prior to removal of any protected trees, per the Protected Tree Ordinance, located on the Project Site or in the public right-of-way adjacent to the Project, the Project applicant must secure a tree removal permit from the Tree Division of the Public Works Agency, and abide by the conditions of that permit.

⁸ Oakland Planning Code section 17.158.280E2 states that “Development related” tree removal permits are exempt from CEQA if no single tree to be removed has a dbh of 36 inches or greater **and** the cumulative trunk area of all trees to be removed does not exceed 0.1 percent of the total lot area.

- **SCA BIO-3 Tree Replacement Plantings**

Prior to issuance of a final inspection of the building permit. Replacement plantings shall be required for erosion control, groundwater replenishment, visual screening and wildlife habitat, and in order to prevent excessive loss of shade, in accordance with the following criteria:

1. No tree replacement shall be required for the removal of nonnative species, for the removal of trees which is required for the benefit of remaining trees, or where insufficient planting area exists for a mature tree of the species being considered.
2. Replacement tree species shall consist of *Sequoia sempervirens* (Coast Redwood), *Quercus agrifolia* (Coast Live Oak), *Arbutus menziesii* (Madrone), *Aesculus californica* (California Buckeye) or *Umbellularia californica* (California Bay Laurel) or other tree species acceptable to the Tree Services Division. Replacement trees shall be at least of twenty-four (24) inch box size, unless a smaller size is recommended by the arborist, except that three fifteen (15) gallon size trees may be substituted for each twenty-four (24) inch box size tree where appropriate.
3. Minimum planting areas must be available on site as follows:
 - For *Sequoia sempervirens*, three hundred fifteen square feet per tree;
 - For all other species listed in #2 above, seven hundred (700) square feet per tree.
4. In the event that replacement trees are required but cannot be planted due to site constraints, an in lieu fee as determined by the master fee schedule of the city may be substituted for required replacement plantings, with all such revenues applied toward tree planting in city parks, streets and medians. Plantings shall be installed prior to the issuance of a final inspection of the building permit, subject to seasonal constraints, and shall be maintained by the Project applicant until established. The Tree Reviewer of the Tree Division of the Public Works Agency may require a landscape plan showing the replacement planting and the method of irrigation. Any replacement planting which fails to become established within one year of planting shall be replanted at the Project applicant's expense.

- **SCA BIO-4 Tree Protection During Construction.**

Prior to issuance of a demolition, grading, or building permit. Adequate protection shall be provided during the construction period for any trees which are to remain standing, including the following, plus any recommendations of an arborist:

1. Before the start of any clearing, excavation, construction or other work on the site, every protected tree deemed to be potentially endangered by said site work shall be securely fenced off at a distance from the base of the tree to be determined by the City Tree Reviewer. Such fences shall remain in place for duration of all such work. All trees to be removed shall be clearly marked. A scheme shall be established for the removal and disposal of logs, brush, earth and other debris which will avoid injury to any protected tree.
2. Where proposed development or other site work is to encroach upon the protected perimeter of any protected tree, special measures shall be incorporated to allow the roots to breathe and obtain water and nutrients. Any excavation, cutting, filing, or compaction of the existing ground surface within the protected perimeter shall be minimized. No change in existing ground level shall occur within a distance to be determined by the City Tree Reviewer from the base of any protected tree at any

time. No burning or use of equipment with an open flame shall occur near or within the protected perimeter of any protected tree.

3. No storage or dumping of oil, gas, chemicals, or other substances that may be harmful to trees shall occur within the distance to be determined by the Tree Reviewer from the base of any protected trees, or any other location on the site from which such substances might enter the protected perimeter. No heavy construction equipment or construction materials shall be operated or stored within a distance from the base of any protected trees to be determined by the tree reviewer. Wires, ropes, or other devices shall not be attached to any protected tree, except as needed for support of the tree. No sign, other than a tag showing the botanical classification, shall be attached to any protected tree.
 4. Periodically during construction, the leaves of protected trees shall be thoroughly sprayed with water to prevent buildup of dust and other pollution that would inhibit leaf transpiration.
 5. If any damage to a protected tree should occur during or as a result of work on the site, the Project applicant shall immediately notify the Public Works Agency of such damage. If, in the professional opinion of the Tree Reviewer, such tree cannot be preserved in a healthy state, the Tree Reviewer shall require replacement of any tree removed with another tree or trees on the same site deemed adequate by the Tree Reviewer to compensate for the loss of the tree that is removed.
 6. All debris created as a result of any tree removal work shall be removed by the Project applicant from the property within two weeks of debris creation, and such debris shall be properly disposed of by the Project applicant in accordance with all applicable laws, ordinances, and regulations.
- **SCA BIO-5: Bird Collision Reduction**

These development standards apply to ALL new construction, including telecommunication towers, which include large uninterrupted expanses of glass that account for more than 40 percent of any one side of the building's exterior AND at least one of the following:

- The project is located immediately adjacent to a substantial water body (i.e., Oakland Estuary, San Francisco Bay, Lake Merritt or other substantial lake, reservoir, or wetland; OR
- The project is located immediately adjacent to a substantial recreation area or park (i.e., Region-Serving Park, Resource Conservation Areas, Community Parks, Neighborhood Parks, and Linear Parks and Special Use Parks over 1 acre in size), which contain substantial vegetation; OR
- The project includes a substantial vegetated or greenroof (roofs with growing medium and plants taking the place of asphalt, tile, gravel, or shingles, but excluding container gardens):

Concurrent with submittal of planning applications or a building permit, whichever occurs first, and ongoing. The Project applicant, or his or her successor shall submit plans to the Planning and Zoning Division, for review and approval, indicating how they intend to reduce potential bird collisions to the maximum feasible extent. The applicant shall implement the approved plan, including all mandatory measures, as well as applicable and specific project Best Management Practice (BMP) strategies to reduce bird strike impacts to the maximum feasible extent.

- a. Mandatory measures include **all** of the following:

1. Comply with federal aviation safety regulations for large buildings by installing minimum intensity white strobe lighting with three second flash instead of blinking red or rotating lights.
2. Minimize the number of and co-locate rooftop-antennas and other rooftop structures.
3. Monopole structures or antennas shall not include guy wires.
4. Avoid the use of mirrors in landscape design.
5. Avoid placement of bird-friendly attractants (i.e. landscaped areas, vegetated roofs, water features) near glass.
- b. Additional BMP strategies to consider include the following:
 - i. Make clear or reflective glass visible to birds using visual noise techniques. Examples include:
 1. Use of opaque or transparent glass in window panes instead of reflective glass.
 2. Uniformly cover the outside clear glass surface with patterns (e.g., dots, decals, images, abstract patterns). Patterns must be separated by a minimum 10 centimeters (cm).
 3. Apply striping on glass surface. If the striping is less than 2 cm wide it must be applied vertically at a maximum of 10 cm apart (or 1 cm wide strips at 5 cm distance)
 4. Install paned glass with fenestration patterns with vertical and horizontal mullions of 10 cm or less.
 5. Place decorative grilles or louvers with spacing of 10 cm or less.
 6. Apply one-way transparent film laminates to outside glass surface to make the window appear opaque on the outside.
 7. Install internal screens through non-reflective glass (as close to the glass as possible) for birds to perceive windows as solid objects.
 8. Install windows which have the screen on the outside of the glass.
 9. Use UV-reflective glass. Most birds can see ultraviolet light, which is invisible to humans.
 10. If it is not possible to apply glass treatments to the entire building, the treatment should be applied to windows at the top of the surrounding tree canopy or the anticipated height of the surrounding vegetation at maturity.
 - ii. Mute reflections in glass. Examples include:
 1. Angle glass panes toward ground or sky so that the reflection is not in a direct line-of-sight (minimum angle of 20 degrees with optimum angle of 40 degrees).
 2. Awnings, overhangs, and sunshades provide birds a visual indication of a barrier and may reduce image reflections on glass, but do not entirely eliminate reflections.
 - iii. Reduce Light Pollution. Examples include:
 1. Turn off all unnecessary interior lights from 11 p.m. to sunrise.
 2. Install motion-sensitive lighting in lobbies, work stations, walkways, and corridors, or any area visible from the exterior and retrofitting operation systems that automatically turn lights off during after-work hours.
 3. Reduce perimeter lighting whenever possible.
 - iv. Institute a building operation and management manual that promotes bird safety. Example text in the manual includes:
 1. Donation of discovered dead bird specimens to authorized bird conservation organization or museums to aid in species identification and to benefit scientific study, as per all federal, state and local laws.
 2. Production of educational materials on bird-safe practices for the building occupants
 3. Asking employees to turn off task lighting at their work stations and draw office blinds or curtains at end of work day.

4. Schedule nightly maintenance during the day or to conclude before 11 p.m., if possible.

In addition, other standard conditions would also serve to reduce impacts to biological resources, including:

- SCA AES-1 Lighting Plan (Section IV.A *Aesthetics, Shadow and Wind*)
- SCA AIR-1 Dust Control (Section IV.B *Air Quality and Greenhouse Gases*)
- SCA GEO-1 Erosion and Sedimentation Control Plan (Section IV.E *Geology, Soils and Geohazards*)
- SCA HYD-1 Stormwater Pollution Prevention Plan (Section IV.G *Hydrology and Water Quality*)
- SCA HYD-2 Post Construction Stormwater Pollution Plan (Section IV.G *Hydrology and Water Quality*)
- SCA HYD-3 Maintenance Agreement for Stormwater Treatment Measures (Section IV.G *Hydrology and Water Quality*)

Impacts and Mitigation Measures

Significance Criteria

The Proposed Project would have a significant impact to biological resources if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service;
3. Have a substantial adverse effect on federally protected wetlands (as defined by Section 404 of the Clean Water Act) or state protected wetlands, through direct removal, filling, hydrological interruption, or other means;
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
5. Fundamentally conflict with any applicable habitat conservation plan or natural community conservation plan;
6. Fundamentally conflict with the City of Oakland Tree Protection Ordinance (Oakland Municipal Code (OMC) Chapter 12.36) by removal of protected trees under certain circumstances. Factors to be considered in determining significance include:

7. The number, type, size, location and condition of (a) the protected trees to be removed and/or impacted by construction and (b) the protected trees to remain, with special consideration given to native trees.⁹

8. Protected trees include the following:

Quercus agrifolia (California or coast live oak) measuring four inches diameter at breast height (dbh) or larger, and any other tree measuring nine inches dbh or larger except eucalyptus and pinus radiata (Monterey pine); provided, however, that Monterey pine trees on City property and in development-related situations where more than five Monterey pine trees per acre are proposed to be removed are considered to be Protected trees.

9. Fundamentally conflict with the City of Oakland Creek Protection Ordinance (OMC Chapter 13.16) intended to protect biological resources. Although there are no specific, numeric/quantitative criteria to assess impacts, factors to be considered in determining significance include whether there is substantial degradation of riparian and aquatic habitat through: (a) discharging a substantial amount of pollutants into a creek; (b) significantly modifying the natural flow of the water; (c) depositing substantial amounts of new material into a creek or causing substantial bank erosion or instability; or (d) adversely impacting the riparian corridor by significantly altering vegetation or wildlife habitat.

Impact Assessment Methodology

Potential impacts resulting from implementation of the Proposed Project elements were evaluated based on field reconnaissance surveys performed by qualified ESA biologists and a review of the following sources:

- Existing resource information and aerial photographs of the Project Site and surrounding area that included downtown Oakland¹⁰, Lakeside Park and Lake Merritt (“Study Area”);
- Data presented in the CNDDB (CDFG, 2010), CNPS *Electronic Inventory of Rare and Endangered Vascular Plants of California* (CNPS, 2010), and USFWS (2010) for the Oakland West and Oakland East USGS 7.5 minute topographic quadrangles, which include the Project Site and vicinity;
- Standard biological references (e.g., Holland, 1986; Hickman, 1993; Zeiner et al., 1990; Sawyer, Keeler-Wolf, 1995; Sibley, 2001);
- Surveys and environmental documents including specific information on species or habitats found in the Study Area (e.g. Leidy, 2008);
- Other available literature regarding the natural resources of the area.

⁹ Oakland Planning Code section 17.158.280E2 states that “Development related” tree removal permits are exempt from CEQA if no single tree to be removed has a dbh of 36 inches or greater **and** the cumulative trunk area of all trees to be removed does not exceed 0.1 percent of the total lot area.

¹⁰ Downtown Oakland for purposes of the biological resources “study area” is defined as the area from West Grand Avenue on the north to I-880 on the south, and I-980 on the west to the east shore of Lake Merritt on the east.

Once site surveys were completed and all sources reviewed, a list was prepared of special-status species that were observed or had the potential to occur in the Study Area, due to the presence of the basic habitat types that they inhabit. Species were designated as follows:

- Low Potential for occurrence if: (1) their known current distribution or range is outside of the Study Area, (2) only limited or marginally suitable habitat is present within the Study Area, (3) their specific habitat requirements (e.g., serpentine grasslands, as opposed to grasslands occurring on other soils) are not present, or (4) they are presumed, based on the best scientific information available, to be extirpated from the Study Area or region.
- Moderate Potential for occurrence if there is low to moderate quality suitable habitat within the Study Area or immediately adjacent areas, even though the species was not observed during biological surveys.
- High Potential for occurrence if (1) moderate to high quality habitat is present within the Study Area, and (2) the Study Area is within the known range of the species.
- Observed if the species were recently observed within the Study Area by ESA biologists or other sources.

Project Impacts and Mitigation Measures

Due to the presence of existing development and immediate adjacency to busy city streets, as well as the long-standing history of urban development in the area, the Proposed Project footprint does not contain significant biological resources that would require elaborate analysis or mitigation, or that could significantly influence Project design. Although adjacent Lake Merritt and Lakeside Park support a well-known bird refuge and both wintering and breeding habitat for migratory birds, the Proposed Project is not expected to have direct impacts on these biological resources. Typically, analyses for projects located in such highly urbanized areas have focused primarily on ensuring landscape trees are removed without disturbing nesting birds (which would potentially violate the Migratory Bird Treaty Act or California Fish and Game Code), as well as focusing on adherence to local tree preservation ordinances such as those found in the City of Oakland's Municipal Code. The current analysis also considers the potential indirect impacts of a new source of shadows on Lake Merritt, Lakeside Park, and the wildlife inhabiting those areas.

Impact BIO-1: The Proposed Project would not adversely affect special-status species. (Less than Significant)

Special-status plants

Special-status plants do not occur on the Project Site or within the Study Area. Therefore, neither construction nor Project operations are expected to result in adverse impacts on special-status plants.

Special-status wildlife

Peregrine falcons have been documented as using the Kaiser Center and other nearby tall buildings during the post-breeding season for purposes such as perching, roosting, and foraging and therefore

has continued potential to occur within the Project Site. Both adults and juveniles have been observed in the immediate Project vicinity over a period spanning at least 15 years. There is also potential for other special-status raptors, such as red-tailed hawk and Cooper's hawk, to roost in trees and forage in the Kaiser Center roof garden. However, none of these species is expected to nest within the Kaiser Center and other special-status animals are not expected to occur on the Project Site due to current uses and lack of habitat. Several special-status species are known to use habitat within the Study Area, i.e., Lakeside Park and Lake Merritt, including brown pelican, double-crested cormorant, and numerous species of migratory waterfowl, as Lake Merritt is a stopover in the Pacific Flyway migration corridor. Several special-status bats may use trees in Lakeside Park for roosting and to forage for insects over open turfgrass and Lake Merritt. However, as noted in the *Setting* section, none of these species are expected to use the marginal habitat provided by the Kaiser roof garden or street trees with the Project footprint. The Project is therefore not expected to have direct impacts on individual special-status species. A further discussion of direct and indirect impacts on wildlife is discussed later in this section.

Mitigation: None required.

Impact BIO-2: The Proposed Project would not adversely affect sensitive natural communities. (Less than Significant)

There are no sensitive communities within the Proposed Project Site or within the Project Study Area. The original mosaic of tidal wetlands, native grasslands, and riparian corridors that historically occupied the Study Area have been altered over the past 150 years to the point that no natural communities remain. Therefore, the Proposed Project will have no impact on sensitive communities.

Mitigation: None required.

Impact BIO-3: The Proposed Project would not adversely affect wetlands. (Less than Significant)

No direct impacts on wetlands and other waters are expected because there are no jurisdictional waters located on the Project Site. The Proposed Project is not expected to increase stormwater runoff as the site is already fully developed. However, potential increases in transmittal of oil, diesel fuel, transmission fluids, and other toxic materials from construction of the Proposed Project via runoff from the impermeable surfaces of the site, could result in significant adverse impacts to aquatic habitat and organisms that use it within the Study Area. Incorporation of the City's SCAs relating to erosion control, stormwater management, and hazardous materials will address potential degradation of water quality that could result from Project construction. SCA GEO-1, SCA HAZ-10, SCA HYD-1, SCA HYD-2, and SCA HYD-3 are relevant and will minimize potential indirect impacts to water quality in Lake Merritt to less-than-significant levels.

Mitigation: None required.

Impact BIO-4: Project construction and operations have the potential to affect migratory and breeding birds, and wildlife, corridors, and nursery sites, through building collisions, increases in night lighting, increases in noise pollution due to Project construction, shading of existing habitat, and vegetation removal. (Less than Significant)

Migrating Birds

The San Francisco Estuary is designated as a Western Hemisphere Shorebird Reserve Network of international importance, because more than one million shorebirds use San Francisco Bay wetlands each winter, between 300,000 and 900,000 shorebirds pass through San Francisco Bay during spring and fall migration periods, more than 50% of the diving ducks in the Pacific Flyway winter in the shallow wetlands of the Bay, and several species breed in the wetlands during the summer (Goals Project, 1999). Lake Merritt is a major wintering site for ducks and other waterfowl, with numbers easily reaching the thousands during fall, winter, and early spring. Many landbirds also use migratory routes along the Pacific Flyway and Lake Merritt provides a stopover point for these species as well. Avian movement patterns in and around Lake Merritt have not been studied and it is unknown how most birds approach the area, although it would be most likely that they would approach from the south or the west, as these would be shortest routes to the open water of San Francisco Bay.

Breeding Birds

Although the Project Site does not appear to provide suitable nesting habitat for most birds, upland areas at Lakeside Park provides potential nesting habitat for a number of species, including raptors such as Cooper's hawk (CNDDDB, 2010), red-tailed hawk, and red-shouldered hawk, as well as assorted passerine species. As noted in the Environmental Setting, the man-made islands near the northern central shore of Lake Merritt support breeding colonies of black-crowned night heron and two species of egrets. All of these birds, their nests, and their eggs are protected under the federal Migratory Bird Treaty Act, CDFG Code 3513, and CDFG Code 3503. In addition, all raptors (eagles, hawks, and owls), their nests, and eggs are protected under CDFG Code 3503.5.

Impacts of Building Collisions and Night Lighting on Migratory Birds

It is estimated that, in North America alone, millions of songbirds are killed due to collisions with buildings and other structures each year (Lochhead, 2008). Collisions are currently recognized as one of the leading causes of bird population declines worldwide (Brown et al., 2007). Daytime collisions occur most often when birds fail to recognize window glass as a barrier and many collisions are induced by artificial night lighting, particularly from large buildings, which can be especially problematic for migrating songbirds since many species are nocturnal migrants (Ogden, 1996). The tendency of birds to move towards lights at night when migrating, and their reluctance to leave the sphere of light influence for hours or days once encountered, has been well documented. It has been suggested that structures located at key points along migratory routes may present a greater hazard than those at other locations (Ogden, 1996). Other research suggests that fatal bird collisions increase as light emissions increase, that weather often plays an important part in increasing the risk of collisions, and that nights with heavy cloud cover and/or

precipitation present the conditions most likely to result in high numbers of collisions (Ogden, 2002). Direct effects include death or injury as the birds collide with lighted structures and other birds that are attracted to the light, as well as collisions with glass during the daytime, while indirect effects include delayed arrival at breeding or wintering grounds, and reduced energy stores necessary for migration, winter survival, or subsequent reproduction (Gauthreaux and Belser, 2006). The type of light used may affect its influence on the birds, for example, studies have indicated that blinking lights or strobe lights affect birds significantly less than non-blinking lights (Gauthreaux and Belser, 2006).

Project Site Lighting. The Project Site and Study Area currently contain street lights and building lights and are located in an urban setting, surrounded by other light sources. Existing lighting sources already provide a significant source of illumination that affects nearby natural areas to some extent. SCA AES-1 would be incorporated as part of the Project which would minimize potential impacts resulting from Project related lighting to less-than-significant levels. SCA AES-1 would require outside lighting fixtures to be shielded sufficiently to prevent unnecessary glare onto adjacent properties, and exterior lighting to be designed with downward-pointing lights, side shields, and visors. Therefore, the Proposed Project is not expected to significantly increase the amount of light generated at ground-levels on the Project Site or within the Study Area.

However, the Project Site is adjacent to Lake Merritt, a migratory bird stopover attractive to both waterfowl and songbirds, and the Proposed Project entails the construction of two buildings that will be significantly taller than most of the existing or other proposed buildings in the downtown and Lake Merritt areas of Oakland. While specific avian flight routes in and out of Lake Merritt are not known, and there is no local data on bird kills due to building collisions, the Proposed Project has the potential to result in a significant new source of lighting at elevations where none currently exist, that may act as an attractant for nocturnal migrating birds, resulting in collisions and avian mortality. In addition, the proposed building heights fall within the range identified as posing a threat to migratory birds, particularly in areas prone to fog and in areas proximate to migratory stopover points (Brown et al., 2007). With a lack of local data it is not possible to determine the significance of this potential impact in relation to the Proposed Project. Therefore, no mitigation measures would be required under CEQA. However, a growing recognition of the severity of the impact on migratory birds suggests that, whenever feasible, measures to reduce the risk of avian collisions should be incorporated in the construction and operations of tall buildings, particularly when they are to be located in areas where the risk of collision may be heightened due to a number of risk factors, including location along a known migratory route, proximity to migratory stopover locations, proximity to open space and areas of natural habitat, and areas where low cloud ceilings are frequent (Brown et al., 2007).

SCA BIO-5 shall apply here because of the increase in building height and in the use of glass exteriors that would occur and result in adverse effect of potential bird strikes. Implementation of the SCA would reduce the impact to less than significant.

Impacts of Noise on Migrating and Breeding Birds

Noise pollution can have detrimental impacts on wildlife, and bird populations are particularly susceptible because they rely on acoustic signals for mating, predator evasion, and communication between adults and offspring, among other behaviors. Ellis (1981) describes studies that show “noticeably alarmed” responses in raptors to sounds within the 82 to 114 dBA range. At comparable levels (72-89 dBA), seabirds flushed off nests (Jehl and Cooper, 1980). Though these studies did not necessarily establish nest failure, the thresholds for a single stimulus event clearly had an effect on bird behavior and suggest that short-term loud noises may affect foraging and roosting birds, by temporarily disturbing these types of behaviors and, perhaps, deterring use of an area if such noises persisted over the long term. Reijnene and Foppen (1994) showed that male willow warblers (*Phylloscopus trochilus*) experience difficulties in mate attraction near highways as a result of noise pollution. This information also suggests that nesting disruption may occur if the noises persist over a longer period of time. More recent research has found certain types of unnatural noise to be disruptive to bird life at a much lower level. For example, Delaney et al. (1999) found that spotted owl flush rates in response to chain saws were apparent at levels above 46 dBA.

With regard to the effects of continuous noise on bird communities one source reports, “An increase of 10 dBA above background noise is probably acceptable in most situations” (Nicholoff, 2003). On the other hand, a 10 dBA increase in noise level is perceived by the human ear as a doubling in loudness, potentially causing an adverse response. Wildlife perception of noise appears to be generally more sensitive than that of humans; therefore, it is assumed for the purposes of this analysis that a 10 dBA increase in noise (a doubling of loudness) over the existing maximum levels should be considered to be material for birds, as well as other wild animals.

Within the Study Area, increasing noise pollution could potentially hinder mate attraction, disrupt reproductive success of breeding birds, and/or deter the general use of the Study Area by migratory birds for wintering, foraging, or roosting purposes.

Current Noise Levels at the Project Site and within the Study Area. Ambient noise levels in the Project Study Area are relatively high and are generated primarily by automobile and truck traffic on the surrounding City streets, including busy Lakeside Drive and 12th Street, as well as nearby Highway 880, and ongoing building construction throughout the downtown area. Short-term noise measurements taken in the Project vicinity resulted in average daytime noise levels ranging from 57 A-weighted decibels (dBA) to 70 dBA and maximum noise levels ranging from 66 to 84 dBA, depending on the location. Birds that are currently resident in the Study Area have habituated to the ambient noise levels. Birds that use the area seasonally either habituate to existing noise levels or are deterred from using the habitat there.

Noise Resulting from the Proposed Project. Noise exceeding ambient levels will be produced through Project construction activities. Because pile driving will occur at the Project Site, construction activities are expected to produce maximum daytime noise levels of approximately 78-105 dBA as measured at 50 feet from the source of the sound within the Project Site. When

attenuated by distance¹¹, maximum construction generated noise levels could range from 72 to 99 dBA at a distance of 100 feet; from 66 to 93 dBA at 200 feet; from 60 to 87 dBA at a distance of 400 feet, 54 to 81 dBA at a distance of 800 feet, and 48 to 75 dBA from a distance of 1,600 feet.

The nearest potential raptor nesting habitat in Lakeside Park is approximately 1,300-1,400 feet from the Project Site and the heron and egret rookeries are located 3,000 feet and more distant. SCA NOI-1 Days/Hours of Construction, SCA NOI-2 Noise Control, and SCA NOI-5 Pile Driving and Other Extreme Noise Generators shall be incorporated as part of the Project in order to help minimize potential impacts resulting from Project related construction noise to less-than-significant levels. Therefore, any Project-related increases in ambient noise would be virtually indiscernible at such distances.

Through expected attenuation over distance alone, increases over existing noise levels due to Project-related construction and operation noise would be considered less-than-significant at 1,300 feet (i.e. less than a 10 decibel increase over ambient levels) and indiscernible at distances greater than 1,600 feet. Application of the abovementioned SCAs would serve to further attenuate construction noise. Current noise levels have not been shown to deter birds from using Lake Merritt and Lakeside Park for breeding, loafing and foraging purposes. Consequently, it is not expected that noise generated by construction of the Proposed Project would deter use of nearby habitat within the Study Area by birds. Therefore, no further mitigation is required.

Impacts of Shading from Proposed Buildings on Existing Habitat for Special-status Species

The Proposed Project includes construction of buildings significantly taller than existing structures within the Study Area. Increased building height would cause larger shaded areas in the terrestrial and aquatic environment within the Project Site (the Kaiser Center roof garden). Increased shading could reduce water temperatures in open water areas and potentially interfere with the health of existing vegetation over time. Were existing vegetation that supports breeding special-status birds to be adversely affected to such a degree that it could no longer perform this function, it would be considered a significant effect in this EIR. As discussed in Section IV.A *Aesthetics, Shadow and Wind*, shadow diagrams show that the Proposed Project would not create shade or shadow on Lake Merritt or Lakeside Park. Effects on vegetation are discussed below.

Plants have the ability to survive under various light and shade regimes. Quantifying effects of shade on any individual species is poorly understood due to the interaction of multiple factors in nature. For example, Callaway (1992) determined that shade was critical to the survival of blue oak (*Quercus douglasii*) seedlings, but that at least one other factor (acorn predation) was reduced by shade and protection from herbivores may have been as important as shade tolerance. In an urban situation, shading from buildings, except for that cast closest to the building, is dynamic—increasing and decreasing in length throughout the year, as well as changing in terms of its angle with respect to the building casting it. Due to the obvious complexity of the physical phenomenon

¹¹ Noise from a stationary source typically attenuates by 6dBA for each doubling of distance.

of moving shade, and the equal complexity of plant interaction, scientific studies of shade relevant to a CEQA process are limited.

San Clements (2003) studied the effects of shading by bridges on estuarine wetlands in an attempt to improve environmental analysis and quantify impacts. The SanClements study measured photosynthetically available light, soil nitrogen and attributes of plant vigor such as numbers of flowers and stems. Results only identified effects when the Height-to-Width ratio (HW) of the shadow source (e.g., building, bridge, etc.) was less than 0.5, and there was no measurable effect when the ratio was greater than 0.7. Thus the shade of a bridge 100 ft wide, by this standard, would have no effect on wetland vegetation if higher than 70 ft (0.7 HW). The study showed that at a certain distance from the source of the shadow, shade has no effect. Furthermore, SanClements' effects were limited to the area immediately under and adjacent to the bridges under study, i.e. the direct vertical projection of the shade at noon during the summer solstice. Extrapolating to the current Project, measurable effects would only be likely immediately adjacent to buildings because that is where shadow frequency and duration are the highest. Shadows cast by the new buildings on the rooftop garden would not only move throughout the day but throughout the year, such that no one spot would be in constant shade as a result of new construction. Therefore, no negative effects on vegetation and/or its ability to support breeding birds within the Study Area are expected as a result of the Proposed Project. The conclusion is therefore, that building shade cast on habitats, primarily on the rooftop garden, is a less-than-significant impact.

Impacts of Vegetation Removal on Breeding Birds

Project construction will require the removal of existing trees and shrubs in the Kaiser Center roof garden. While no evidence of nesting birds was found during ESA's 2008 survey, the possibility that common bird species may use vegetation here for nesting cannot be ruled out. With the exception of English sparrow and European starling, the nests, eggs, and nestlings of all birds are protected under the California Fish and Game Code. Therefore, their destruction would be considered a significant impact under the criteria set forth earlier in this EIR. SCA BIO-3 would be required as part of the Proposed Project which would minimize potential impacts resulting from Project related vegetation removal to less-than-significant levels.

SCA BIO-3 and SCA BIO-5, along with SCA AES-1, SCA NOI-1, SCA NOI-2, and SCA NOI-5 would be required as part of the Proposed Project and would serve to minimize potential impacts on migratory and breeding birds to less-than-significant levels.

Mitigation: None required.

Impact BIO-5: The Proposed Project would not adversely affect adopted Habitat Conservation Plans. (Less than Significant)

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional, or state habitat conservation plans that apply to the Project Site or Study Area.

Mitigation: None required.

Impact BIO-6: The Proposed Project would not adversely affect biological resources governed by the City's Tree Preservation or Removal Ordinance. (Less than Significant)

The Applicant has prepared a map and table (Appendix D-4) indicating the size and species of existing protected trees slated for removal by construction activities on the Project Site and any right-of-way abutting the site. All the protected trees identified for removal have a dbh of greater than 9 inches and therefore qualify for protected status under City Ordinance, and are located on the rooftop garden. One of the trees is greater than 36 inches. As shown in the tree removal plan map, the Project Site has 68 protected trees, with 17 of those slated for removal.

Oakland's Tree Protection Ordinance (Oakland Municipal Code, Title 12, Chapter 12.36) requires a permit for removal of any protected tree (12.36.040). The removal of a protected tree would require that an appropriate replacement tree be planted on the Project Site for each tree removed (1:1 replacement).

SCA BIO-1, SCA BIO-2, SCA-BIO-3, and SCA BIO-4 would be required as part of the Proposed Project and would serve to minimize potential impacts on protected trees to less-than-significant levels.

Mitigation: None required.

Impact BIO-7: The Proposed Project would not adversely affect resources governed by the City's Creek Protection Ordinance. (Less than Significant)

Oakland's Creek Protection Ordinance (Oakland Municipal Code, Title 13, Chapter 13.16.120) requires a Creek Protection Permit for construction that will take place within close proximity to a creek, as defined in the Ordinance. Since no Project-related work will take place within 20 feet of the top of bank or within 100 feet of the centerline of any Creek, the Project will not require a City of Oakland Creek Protection Permit. Nevertheless, Projects exempt from the Creek Protection Permit requirement must comply with the remaining portions of the ordinance and must incorporate site design/landscape characteristics which maximize infiltration (where appropriate), provide retention or detention, slow runoff, and minimize impervious land coverage

(i.e., use hydrologic source controls) to the maximum extent practicable. The Project is replacing existing buildings and not expected to increase impervious surface amounts over those already existing at the site. In fact, the Project will expand the roof garden, which may result in a net increase of permeable surface at the Project site. SCA GEO-1, SCA HAZ-1, SCA HYD-1, SCA HYD-2, and SCA HYD-3 would be applied to the Proposed Project and would serve to minimize potential impacts on water quality, which will ensure that the Project is in compliance with all aspects of the Creek Protection Ordinance.

Mitigation: None required.

Cumulative Impacts

Impact BIO-8: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in impacts on special-status species, wetlands, and other waters of the U.S. (Less than Significant)

This analysis evaluates whether the impacts of the Proposed Project, together with the impacts of cumulative development, would result in a cumulatively significant impact on special-status species, wetlands and other waters of the U.S., or other biological resources protected by federal, state, or local regulations or policies (based on the significance criteria and thresholds presented earlier). This analysis then considers whether the incremental contribution of the Proposed Project to this cumulative impact would be considerable. Both conditions must apply in order for a project's cumulative effects to rise to the level of significance.

Geographic Context

The geographic context for analysis of cumulative impacts to biological resources in this DEIR encompasses downtown Oakland, Lakeside Park, and Lake Merritt. This analysis considers, but is not limited to major projects in the aforementioned areas as identified in Table IV-1, List of Relevant Cumulative Projects from the City's Major Project List.

Impacts

The cumulative analysis considers the effect of the Proposed Project combined with past, present, pending and reasonably foreseeable projects in the defined geographic area. Past projects, i.e., the principal determinant of existing conditions in the downtown and Lakeside areas of Oakland, which are completely developed and where natural communities no longer exist—even where open space persists, have already caused adverse cumulative effects on biological resources. With the addition of current and other proposed projects, there is an existing cumulative impact *without* the Project, which could be considered to combine with the Proposed Project to increase the aggregate effect and be considered cumulatively significant.

However, relative to the CEQA baseline, the impacts of the proposed Project *do not* aggregate to breach the CEQA significance thresholds described elsewhere in the Draft EIR. The projects identified in Table IV-1 considered for the cumulative effect on biological resources would be the displacement of a few scattered pockets of wildlife. These outcomes are essentially similar to those anticipated for the Proposed Project and generally represent a less-than-significant re-shuffling of disturbance-tolerant plants and animals. With respect to the peregrine falcon, the Proposed Project could be viewed as having a beneficial impact in that it will provide two new, tall buildings with the potential to provide roosting habitat and, perhaps, nesting habitat for these birds.

Environmentally protective laws and regulations, have been applied with increasing rigor since the early 1970s and include the California Endangered Species Act, Federal Endangered Species Act, and the Clean Water Act, as described in the *Regulatory Setting* earlier in this EIR chapter. The Proposed Project and other future projects within the cumulative geographic context are and would be required to comply with local, state, and federal laws and policies and all applicable permitting requirements of the regulatory and oversight agencies intended to address potential impacts on biological resources, including wetlands, other waters of the U.S., and special-status species. Additionally, new projects would be required to demonstrate that they would not have significant effects on these biological resources, although it is possible that some projects may be approved even though they would have significant, unavoidable impacts on biological resources.

The current impact analysis has shown that the Kaiser Center Project has the potential for relatively minor impacts on biological resources and that these impacts can be minimized to less-than-significant levels through the application of the City of Oakland's SCAs BIO-1, BIO-2, BIO-3, BIO-4 and BIO-5. When considered with impacts of past, present, pending and reasonably foreseeable future projects within the geographic context for this analysis, the minor incremental contribution of the Proposed Project to an already existing cumulative impact is not cumulatively considerable. Therefore, the cumulative effect of the Proposed Project on biological resources would be less-than-significant.

Mitigation: None required.

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D. Cultural Resources

This section examines the potential impact of the Kaiser Center Project on cultural resources (archaeological, historic, and paleontological). Resources for this section include an Historic Resources Evaluation report on the Kaiser Center in February 2009 by an historic preservation consultant, Page & Turnbull (Page & Turnbull, 2009), an Archaeological Survey Report (ASR) prepared by ESA in August 2008 (Koenig, 2008); archival research conducted at the California Historical Resources Information System's Northwest Information Center (NWIC) on April 22, 2008 (file dated 2007); and consultation with the Oakland Cultural Heritage Survey. Potential impacts are discussed and evaluated, and appropriate mitigation measures are identified, as necessary.

Setting

Prehistoric Setting

The Project Site is located in downtown Oakland. The area is now mostly urbanized, although, prehistorically, it was a biologically rich alluvial plain and estuarine environment between the East Bay Hills and San Francisco Bay.

The natural marshland biotic communities along the edges of bays and channels were the principal source for subsistence and other activities during the prehistory of the San Francisco Bay region. Many of the original surveys of archaeological sites in the Bay region were conducted between 1906 and 1908 by Stanford (and, later, UC Berkeley) archaeologist N.C. Nelson. Such surveys yielded the initial documentation of nearly 425 "earth mounds and shell heaps" along the littoral zone of the Bay (Nelson, 1909). From these beginnings, the most notable sites in the Bay region were excavated scientifically, like the Emeryville shellmound (CA-ALA-309), the Ellis Landing Site (CA-CCO-295) in Richmond, and the Fernandez Site (CA-CCO-259) in Rodeo Valley (Moratto, 1984). These dense midden sites, such as CA-ALA-309, have been carbon 14 dated to be 2310 ± 220 years old, but other evidence from around the Bay suggests that human occupation in the region is of greater antiquity, or around 5000 B.C. (Davis & Treganza, 1959 as cited in Moratto, 1984).

As of 2000 B.C., the bayshore and marsh-adapted peoples began appearing in the archaeological record. The so-called Berkeley Pattern (2000 B.C. to A.D. 300) reflected a change in socioeconomic complexity and settlement patterns (Fredrickson, 1973). This artifact pattern was represented by minimally-shaped cobble mortar and cobble pestle, dart and atlatl, and bone industry. Given the size of these settlements, it is probable that the populations were denser and more sedentary, yet continued to exploit a diverse resource base from woodland to grassland and marshland, to bayshore resources throughout the San Francisco Bay Area (Bickel, 1978; King, 1974 as cited in Moratto, 1984). Many of the Berkeley traits diffused throughout the region and spread to the interior areas of central California during this time period.

Ethnographic Setting

Prior to Euroamerican contact, the Ohlone (also known by their linguistic group, Costanoan¹) occupied the area that is currently Alameda County. Politically, the Costanoan were organized into groups called tribelets. A tribelet constituted a sovereign entity that held a defined territory and exercised control over its resources. It was also a unit of linguistic and ethnic differentiation. Oakland, and a large area of the East Bay, is located within the territory of a people that spoke Chochenyo, one of several Costanoan languages.

The Ohlone economy was based on fishing, gathering, and hunting, with the land and waters providing a diversity of resources including acorns, various seeds, salmon, deer, rabbits, insects, and quail. The acorn was the most important dietary staple of the Costanoan, and the acorns were ground to produce a meal that was leached to remove the bitter tannin. Technologically, the Costanoan crafted tule balsa, basketry, lithics (stone tools) such as mortars and metates (a mortar-like flat bowl used for grinding grain), and household utensils. The Costanoan, like many other Native American groups in the Bay Area, likely lived in conical tule thatch houses.

In 1770 the Costanoan-speaking people lived in approximately 50 separate and politically autonomous nations or tribelets. At this time, the number of Chochenyo speakers reached 2,000, substantially more than the typical size of a tribelet, which ranged from 40 to 200 members.

During the mission period, 1770–1835, the Costanoan people experienced cataclysmic changes in almost all areas of their life, particularly a massive decline in population due to introduced diseases and declining birth rate, resulting in large part from colonization by the Spanish missionaries. Following the secularization of the missions by the Mexican government in the 1830s, most Native Americans gradually left the missions to work as manual laborers on the ranchos that were established in the surrounding areas.

Historic Setting

The Project Site is within the Rancho San Antonio land grant that was granted to Luis Maria Peralta on August 3, 1820 for his service to the Spanish government. The 43,000-acre rancho included the present-day cities of Oakland, Berkeley, Alameda, and parts of San Leandro and Piedmont. Peralta's land grant was confirmed after Mexico's independence from Spain in 1822, and the title was honored when California entered the Union by treaty in 1848. Despite the title, by the middle of the 19th century, squatters had moved in to use portions of Peralta's undeveloped land. The Gold Rush and California statehood brought miners, businessmen, lumbermen and other speculators to the area in search of opportunities. Early settlers of that period include Edson Adams, Andrew Moon, and Horace Carpentier, who squatted on 480 acres of Vicente Peralta's (one of Luis Peralta's sons) land. Adams, Moon, and Carpentier subsequently hired Jules Kellersberger, an Austrian-educated Swiss military engineer, to plot a new city—Oakland—which was incorporated in 1852.

¹ "Costanoan" is derived from the Spanish word Costanos meaning "coast people." No native name of the Costanoan people as a whole existed in prehistoric times as the Costanoan were neither a single ethnic group nor a political entity.

The city originally encompassed the area roughly bordered by the Oakland Estuary on the south, Market Street on the west, 14th Street on the north, and the Lake Merritt Channel on the east. Broadway served as the main street. The majority of the early city dwellers, numbering under one hundred, lived near the foot of Broadway in proximity to the estuary. From there, city development moved north along the street car lines of Broadway and Telegraph Avenue towards the Oakland Hills and ultimately towards East Oakland.

Lake Merritt was originally part of a tidal estuary formed by several creeks draining into the San Francisco Bay. The estuary, alternately known as San Antonio Creek or San Antonio Slough, was initially used as a depository for Oakland's sewer system. Sixty miles of brick and wood channels sent raw sewage from the new city to the estuary. A wooden box sewer line ran down 20th Street adjacent to the Project Site (Warring, 1886). The daily tidal flushing was deemed ideal for everyone in the new city except those who lived near the shore. One of those residents was Oakland mayor, Dr. Samuel Merritt, who wished to clean up the water and create a source of civic pride. In 1868 he proposed and funded the construction of a dam that would control the flow of water between the estuary and the bay. Two new sewer line projects were constructed to divert sewage to other locations. The new lake was called "Lake Peralta," "Merritt's Lake," and ultimately Lake Merritt. In order to protect the great number of migratory birds as well as stop noise and gunfire in the city, Dr Merritt also proposed to protect the lake as a wildlife refuge. In 1870, the California state legislature created the Lake Merritt Wildlife Refuge. No hunting was allowed and fishing could only be done with a hook.

After the damming and improvement of Lake Merritt, this area of Oakland was home to an affluent residential neighborhood along the lake, and later became the site of a mix of mid-rise multiple family residential, religious, and institutional buildings. The area included residential hotels such as the Lake Merritt Hotel (1927); civic and institutional buildings such as the College of the Holy Names (1868, demolished 1957) the Veterans Memorial Building (1926) at 200 Grand Avenue, and religious buildings such as St. Paul's Episcopal Church (1912) at 110–116 Montecito Avenue. After the construction of the Kaiser Center in 1960, Lakeside Drive developed as an area for skyscraper office buildings, though many institutional buildings remained in place. In addition to the Kaiser Center, the twenty-eight-story Ordway Building, also constructed by Kaiser (1970), the twenty-seven-story Lake Merritt Plaza (1985) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s are located on prominent intersections in the immediate area. The surrounding area is mixed residential, institutional, and religious with multiple-family dwellings, commercial buildings, and religious buildings. The building scale of the area includes low, mid- and high-rise historic and non-historic buildings of various styles and materials (Page and Turnbull, 2009).

Brief History of the Kaiser Center Project Site

The subject property was first developed when the Convent of the Sacred Heart was constructed in 1868. Father Michael King, the priest of the Church of the Immaculate Conception, purchased the five-acre campus in 1866 for \$4,922. Though the site on Lake Merritt was considered "far out in the country, wild and brush-covered," King envisioned a large convent and novitiate that would not fit on the city blocks near the church. Two years later, the two-and-a-half-story

convent was built in time for the arrival of the Sisters of the Holy Names. An addition to the convent was constructed later that year; it likely contained additional living quarters and classrooms. In 1873 a four-story multi-purpose building was built to house the sisters' growing school, and a chapel was constructed in 1885. An auditorium and music hall building was constructed in 1909 (Page and Turnbull, 2009).

By the mid-1950s, the Holy Names campus was considered close to downtown. Various commercial interests began to discuss the potential of purchasing the site, which covered a large parcel over a city block in area. On June 27, 1955, Kaiser Industries acquired the Holy Names site for a reported sum of \$2,560,000. Kaiser had been headquartered in Oakland since 1921 and at the time of the acquisition the main office was located at 1924 Broadway. After the sale, the College of the Holy Names was relocated to a hillside site at Redwood Road and Mountain Boulevard. The Kaiser Center site was cleared beginning on June 24, 1957 (Page and Turnbull, 2009).

Henry J. Kaiser, the magnate of the Kaiser industrial empire, intended to consolidate the Kaiser offices located around Oakland (see discussion of Henry J. Kaiser, below). Welton Becket and Associates, a Los Angeles architecture firm that designed prominent office and hotel buildings, was hired as the project architect (see discussion below of Welton Becket). Henry Kaiser wanted the building to be an outstanding piece of architecture and a showcase in the use of Kaiser products.

Construction of the steel-frame, aluminum-and-glass-clad Kaiser Center began in May 1958 and was completed in late 1959. Final construction costs reached \$46 million, and Henry Kaiser could boast of having the largest building west of Chicago, with 976,000 square feet of space. The first employees moved into the office tower on December 20, 1959, and the Center officially opened on September 27, 1960. The Center included a twenty-eight-story office tower, with three basement levels; a three story department store; and a five-level, 1,200-car parking garage with a 3.5-acre garden (Kaiser Center roof garden) on the roof of the parking garage. The Kaiser Center contained 80 percent Kaiser products or Kaiser raw materials, including 1,000 tons of anodized aluminum, 8,000 tons of steel, 60,000 cubic yards of concrete, 98,000 tons of aggregates and dolomite, and 250,000 yards of gypsum products from Kaiser Industries. Aluminum was used in exterior curtain walls and as sheets, strips, fluted panels, and artwork.

The plan for the roof garden, designed by the landscape firm Osmundson & Staley, was organized along a north-south axis running from the main garden entrance at the third floor of the 20th Street Mall across the reflecting pool to the central circular lawn and plaza. The reflecting pool, which a 1960 Oakland Tribune article described as the approximate shape of Lake Merritt, was designed to contain water circulated by perimeter jets (Page & Turnbull, 2009). Curving concrete walkways wound around the planting areas, which were mounded around the trees and in some lawn spaces. The roof garden atop the parking garage opened to the public on October 3, 1960 and received early recognition in 1962 when the American Society of Landscape Architects awarded the garden the Industrial Landscape Design award. The garden was documented by a variety of publications, including *Sunset* magazine, *Landscape Architecture*, and *Landscape*

Design and Construction (Page & Turnbull, 2009). Overall, the garden was highly regarded by landscape architects, and was the center piece of the Kaiser Center complex.

The Kaiser Center has had minimal modifications to the exterior since its original construction. The office building retains its original exterior finishes and materials. Most of the interior of the office spaces, however, have been renovated over the years by various tenants, and the lobby underwent a major renovation in the mid-1990s. Similarly, the interior of the mall buildings have been substantially altered due to tenant improvements, but the exterior of the buildings have undergone few substantial alterations which were typically limited to storefront alterations, changes in signage, and the installation of ornament above the entrances. Finally, the only additions to the roof garden appear to have been the bridge over the pool which was incorporated in the design in the 1970s. Many of the original hardscape design components of the garden remain intact including the low perimeter walls, aggregate paths, planters, benches, and an original water fountain. While many of the plant materials have been replaced over time, the replacement plantings have been consistent with the original design.

Brief History of Master Planning Efforts at the Kaiser Center Site

By 1967, the growth of the Kaiser industries created the need for additional office space. An office tower was planned to the north of the existing tower. The twenty-eight-story tower was called the Ordway Building after A. B. Ordway, the vice president of Kaiser Industries. Designed by Skidmore, Owings & Merrill, construction of the Ordway Building began in 1968 and was completed in 1970. Even before the Ordway Building opened, Kaiser Industries was preparing for a long-range plan for the expansion of the Kaiser Center. The 1971 plan recommended an \$85 million expansion project including a third office tower on the Project Site, which was never completed. More master plans were developed for the Kaiser Center complex in 1982 and 1986, both of which envisioned an office campus in the form of additional office towers connected with pedestrian walkways, roof top gardens, and sky bridges. The 1986 plan, specifically, called for the addition of four major towers connected to the existing Kaiser Center with a large pedestrian plaza near the Ordway Building. None of these master plans were ever realized.

Brief History of Henry J. Kaiser

Henry J. Kaiser (1882–1967) oversaw an industrial empire which began with road-building in the 1920s and dam-building in the 1930s. In 1938, Kaiser launched a cement company to provide the raw materials for building dams; his first foray into manufacturing durable goods. Kaiser helped to completed Hoover Dam, and by the early 1940s, Kaiser was preparing to compete in magnesium, steel, aircraft, and shipping. In anticipation of World War II, Kaiser opened shipyards in Richmond, California and Portland, Oregon in 1940 and 1941. By the end of the war the Kaiser Shipyards were producing one Liberty ship per month. In 1945, the Kaiser Permanente Medical Care Program which was formerly offered to shipyard workers, opened enrollment to the general public. Kaiser Permanente became the country's first health maintenance organization (HMO). Kaiser coordinated the manufacture of automobiles and cargo planes, increased magnesium production, and launched a successful aluminum business. In 1954 Henry Kaiser moved to Hawaii, where he became involved in building hotels, beaches, a new city, a hospital,

and a cement plant. Edgar F. Kaiser took over the management of the Kaiser empire when his father moved to Hawaii. Although Henry Kaiser died in 1967, Kaiser Companies continued to grow as a multi-national business with diversified interests ranging from aluminum and steel to engineering to television broadcasting to real estate development.

Brief History of Welton Becket and Associates

Led by well-known modernist architect Welton Becket (1902–1967) the firm of Welton Becket and Associates grew to be one of the largest architectural firms in the United States, with headquarters in Los Angeles and offices in San Francisco, New York, Houston, and Chicago. Welton Becket and Associates completed numerous high profile projects, mostly in and around Los Angeles, including such icons of mid-twentieth century Modernism as the Capitol Records Building (1954–1956) and the Cinerama Dome, the world's first concrete geodesic dome (1963–1964). The firm was also responsible for the Beverly Hilton Hotel (1955), Memorial Sports Arena (1959), Los Angeles International Airport Theme Building (1962, with Pereira & Luckman and Paul R. Williams), and the Federal Office Building in Los Angeles (1966, with Paul R. Williams and A.C. Martin & Associates). In 1987, Ellerbe Associates acquired Welton Becket Inc. to become Ellerbe Becket Inc. The firm continues today as Ellerbe-Becket.

Paleontological Setting

Paleontological resources are the fossilized remains of plants and animals, including vertebrates (animals with backbones), invertebrates (e.g., starfish, clams, ammonites, and coral marine), and fossils of microscopic plants and animals (microfossils). The age and abundance of fossils depend on the location, topographic setting, and particular geologic formation in which they are found. Fossil discoveries not only provide a historic record of past plant and animal life, but may assist geologists in dating rock formations. Often, fossil discoveries constrain the time period and the geographic range of flora or fauna.

On a regional scale, fossilized plants, animals and microorganisms are prevalent throughout the East Bay. Many of the hills in the east bay are made up of sedimentary bedrock that is known to contain a wide range of fossils, including radiolarians, mullusks, diatoms, foraminifers and non-marine vertebrates. In addition, even geologically young fluvial deposits have been known to contain fresh water mullusks and extinct late Pleistocene vertebrate fossils (Graymer, 2000).

The Proposed Project overlies geologic units that have low paleontological sensitivity. Beneath artificial fills lies deposits of mud and silt associated with the present-day bay estuary (Bay Mud). The Bay Mud overlies the Merrit Sand, which is composed of older deposits of wind-blown sand (Graymer, 2000). Deep excavations associated with building foundations and the 1.5 stories of underground parking are likely to disturb both the Bay Mud and the Merrit Sand. Generally, these types of geologic deposits do not preserve vertebrate fossils. While the Bay Mud may preserve a variety of marine invertebrate fossils (mullusks, clams, fomanifera, microorganisms, etc...), such fossils are likely to exists in other Bay Mud deposits all around the Bay Area and would not be considered significant or unique.

The University of California Museum of Paleontology maintains the world's largest database of fossil discoveries and collections, with thousands of records for the East Bay. A search of the database by both formation name and location revealed few invertebrate fossils and no vertebrate fossils in the formations underlying the site. Fourteen invertebrate fossils of quaternary age (within the last 10,000 years) were found in various locations in Oakland, three of which were found in or around Lake Merritt (UCMP, 2008). Whether or not these fossils were found within the specific geologic units underlying the site was not specified.

Regulatory Framework

National Register of Historic Places

The National Register is the nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

To be listed on the National Register, a property must be shown to be "significant" at the local, state, or national level under one or more of the following criteria.

1. Criterion A (Event): That are associated with events that have made a significant contribution to the broad patterns of our history.
2. Criterion B (Person): That are associated with the lives of persons significant in our past.
3. Criterion C (Design/Construction): That embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
4. Criterion D (Information Potential): That have yielded, or may be likely to yield, information important in prehistory or history.

Integrity: The property must also possess historic "integrity." Integrity is defined as "the ability of a property to convey its significance." The National Register criteria recognize seven qualities that define integrity: location, design, setting, materials, workmanship, feeling, and association.

- "Location" refers to the place where the historic property was constructed.
- "Design" is the combination of architectural elements that create the form, structure and style of the property.
- "Setting" is the physical environment surrounding a historic property.
- "Materials" are the original physical components that were combined during a particular period in time and in a particular pattern to form the historic property.
- "Workmanship" is the physical evidence of the building crafts and skills of a particular culture during a given period.

- “Feeling” is a property’s expression of the aesthetic or historic sense of a particular period of time.
- “Association” is the direct link between an important historic event or person and a historic property.

Special considerations apply to moved or reconstructed properties, cemeteries, religious or commemorative properties, and properties achieving significance within the past 50 years. Properties listed in the National Register are automatically listed in the California Register.

California Register of Historical Resources

The California Register of Historical Resources (California Register) is an authoritative guide to the state’s historical resources, and by which properties are considered significant for CEQA purposes. The California Register includes resources listed in or formally determined eligible for listing in the National Register of Historic Places (National Register; see discussion below), California State Landmarks, and Points of Historical Interest. The State Office of Historic Preservation (OHP) maintains a list of historical resources by county in their Directory of Properties in the Historic Property Data File. A building or structure identified on OHP’s Directory with a rating of 1 or 2 (on or determined eligible for the National Register) is considered to be “listed” on the California Register.

Properties of local significance that have been designated under a local preservation ordinance (i.e., local landmarks), or that have been identified in a local historical resources inventory may also be eligible for listing in the California Register and are presumed to be significant resources for purposes of CEQA.

In order for a resource to meet the criteria for listing in the California Register, it must satisfy all of the following three provisions:

1. It meets one of the following four criteria of significance (PRC 5024.1(c) and CEQA Guidelines 15064.5):
 - a. the resource “is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage”.
 - b. the resource “is associated with the lives of persons important in our past.
 - c. the resource “embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values”; or
 - d. the resource “has yielded, or may be likely to yield information important in prehistory or history” (this criterion applies primarily to archaeological sites).
2. The resource retains historic integrity ; and
3. It is fifty years old or older (except where it can be demonstrated that sufficient time has passed to understand the historical importance of the resource).

City of Oakland Historical Resources

In the City of Oakland, an historical resource under CEQA is a resource that meets any of the following criteria:

1. A resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources;
2. A resource included in Oakland's Local Register of historical resources (defined below), unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
3. A resource identified as significant (e.g., rated 1–5) in a historical resource survey recorded on Department of Parks and Recreation Form 523, unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
4. Any object, building, structure, site, area, place, record, or manuscript which the Oakland City Council determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the determination is supported by substantial evidence in light of the whole record. Generally, a resource is considered "historically significant" if it meets the criteria for listing on the California Register of Historical Resources CEQA Guidelines section 15064.5; or
5. A resource that is determined by the City Council to be historically or culturally significant even though it does not meet the other four criteria listed here.

A "local register of historical resources" means a list of properties officially designated or recognized as historically significant by a local government pursuant to a local ordinance or resolution, unless the preponderance of evidence demonstrates otherwise.

In March 1994, the Oakland City Council adopted a Historic Preservation Element of the General Plan (amended July 21, 1998). The Historic Preservation Element sets out a graduated system of ratings and designations resulting from the Oakland Cultural Heritage Survey (OCHS) and Oakland Zoning Regulations. The Element provides the following policy related to identifying historical resources under CEQA:

Policy 3.8. Definition of "Local Register of Historical Resources" and Historic Preservation "Significant Effects" for Environmental Review Purposes: For purposes of environmental review under the California Environmental Quality Act, the following properties will constitute the City of Oakland's Local Register of Historic Resources:

1. All Designated Historic Properties (Landmarks, Heritage Properties, Study List Properties, Preservation Districts, and S-7 and S-20 Preservation Combining Zone Properties); and
2. Those Potential Designated Historic Properties that have an existing rating of "A" or "B" or are located within an Area of Primary Importance.

The Local Register also includes properties within Areas of Primary Importance (API). An API is a district that appears eligible for the National Register of Historic Places.

The Oakland Cultural Heritage Survey uses a five-tier rating system for individual properties, ranging from “A” (highest importance) and “B” (major importance) to “E” (of no particular interest). This letter rating is termed the Individual Property Rating of a building and is based on the following criteria:

1. Visual Quality/Design: Evaluation of exterior design, interior design, materials and construction, style or type, supporting elements, feelings of association, and importance of designer.
2. History/Association: Association of person or organization, the importance of any event, association with patterns of history, and the age of the building.
3. Context: Continuity and familiarity of the building within the city, neighborhood, or district.
4. Integrity and Reversibility: Evaluation of the building’s condition, its exterior and interior alterations, and any structural removals.

Properties with conditions or circumstances that could change substantially in the future are assigned both an “existing” and a “contingency” rating. The existing rating (UPPER CASE letter) describes the property under its present condition, while the contingency rating (lower case letter, if any), describes it under possible future circumstances.

All areas of the City that are not yet intensively surveyed by the OCHS have been evaluated through “windshield” surveys in 1985–1986 and 1996–1997. This Preliminary Citywide Historical and Architectural Inventory, known as the *Reconnaissance Survey*, employs the same A-B-C-D-E rating system as the OCHS, but is not as thorough and is intended to be confirmed or modified over time by the OCHS.

Local Plans and Policies

City of Oakland goals and policies that pertain to cultural resources (specifically for this Project) are provided primarily in the General Plan Historic Preservation Element (HPE) (1994) and the General Plan Land Use and Transportation Element (LUTE) (1998).

As discussed in detail in Section IV.H, *Land Use, Plans and Policies*, policies are discussed in the EIR solely for the benefit of the decision-makers who will, as a policy matter, consider and apply them for consistency prior to issuing discretionary permits for the Project. In doing so, the City must “balance” potentially competing General Plan policies.

The following HPE goals and policies are applicable to the Kaiser Center Project:

- HPE Historic Preservation Goal 2: To preserve, protect, enhance, perpetuate, use, and prevent the unnecessary destruction or impairment of properties or physical features of special character or special historic, cultural, educational, architectural or aesthetic interest or value. Such properties or physical features include buildings, building components, structures, objects, districts, sites, natural features related to human presence, and activities taking place on or within such properties or physical features.

- HPE Policy 3.1: Avoid or Minimize Adverse Historic Preservation Impacts Related to Discretionary City Actions: The City will make all reasonable efforts to avoid or minimize adverse effects on the Character-Defining Elements of existing or Potential Designated Historic Properties which could result from private or public projects requiring discretionary City actions.
- HPE Policy 3.5: Historic Preservation and Discretionary Permit Approvals. For additions or alterations to Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design matches or is compatible with, but not necessarily identical, to the property's existing or historical design; or (2) the proposed design comprehensively modifies and is at least equal in quality to the existing design and is compatible with the character of the neighborhood; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood.
- For any project involving complete demolition of Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design quality of the proposed project is at least equal to that of the original structure and is compatible with the character of the neighborhood; or (2) the public benefits of the proposed project outweigh the benefit of retaining the original structure; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood.
- HPE Policy 3.7: Property Relocation Rather than Demolition. As a condition of approval for all discretionary projects involving demolition of existing or Potential Designated Historic Properties, the City will normally require that reasonable efforts be made to relocate the properties to an acceptable site.
- HPE Policy 3.8: Local Register of Historical Resources. See discussion above.

The above policies from the Historic Preservation Element generally encourage, but do not mandate, the preservation of Oakland's historic resources, within the context of and consistent with other General Plan goals, objectives, and policies (as discussed in Section IV.H, *Land Use, Plans and Policies*, and other sections of this EIR). So, for example, the admonition in HPE Historic Preservation Goal 2 against "the unnecessary destruction" of historic buildings and HPE Policy 3.1's direction to employ "all reasonable efforts to avoid or minimize adverse effects" on historic resources are reviewed against the Proposed Project's provision of additional office space in Downtown Oakland.

A determination of consistency with the above policies by the Planning Commission and City Council must be predicated upon a finding that, as specified in HPE Policy 3.5, "(1) the design quality of the proposed project is at least equal to that of the original structure and is compatible with the character of the neighborhood; or (2) the public benefits of the proposed project outweigh the benefit of retaining the original structure; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood."

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

The City's SCAs relevant to the cultural resources that might be impacted by the Proposed Project are listed below. If the Project is approved by the City, all applicable SCAs will be adopted as conditions of approval and required of the Proposed Project to help ensure no significant impacts to cultural resources occur. Because the conditions of approval are incorporated as part of the Proposed Project they are not listed as mitigation measures.

- **SCA CUL-1 Archaeological Resources**

Ongoing throughout demolition, grading, and/or construction.

1. Pursuant to CEQA Guidelines section 15064.5 (f), "provisions for historical or unique archaeological resources accidentally discovered during construction" should be instituted. Therefore, in the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 50 feet of the resources shall be halted and the project applicant and/or lead agency shall consult with a qualified archaeologist or paleontologist to assess the significance of the find. If any find is determined to be significant, representatives of the project proponent and/or lead agency and the qualified archaeologist would meet to determine the appropriate avoidance measures or other appropriate measure, with the ultimate determination to be made by the City of Oakland. All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and a report prepared by the qualified archaeologist according to current professional standards.
2. In considering any suggested measure proposed by the consulting archaeologist in order to mitigate impacts to historical resources or unique archaeological resources, the project applicant shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is unnecessary or infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the project site while measure for historical resources or unique archaeological resources is carried out.
3. Should an archaeological artifact or feature be discovered on-site during project construction, all activities within a 50-foot radius of the find would be halted until the findings can be fully investigated by a qualified archaeologist to evaluate the find and assess the significance of the find according to the CEQA definition of a historical or unique archaeological resource. If the deposit is determined to be significant, the project applicant and the qualified archaeologist shall meet to determine the appropriate avoidance measures or other appropriate measure, subject to approval by the City of Oakland, which shall assure implementation of appropriate measure measures recommended by the archaeologist. Should archaeologically-significant materials be recovered, the qualified archaeologist would recommend appropriate analysis and treatment, and would prepare a report on the findings for submittal to the Northwest Information Center.

- **SCA CUL-2 Human Remains**

Ongoing throughout demolition, grading, and/or construction. In the event that human skeletal remains are uncovered at the project site during construction or ground-breaking activities, all work shall immediately halt and the Alameda County Coroner shall be contacted to evaluate the remains, and following the procedures and protocols pursuant to

Section 15064.5 (e)(1) of the CEQA Guidelines. If the County Coroner determines that the remains are Native American, the City shall contact the California Native American Heritage Commission (NAHC), pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, and all excavation and site preparation activities shall cease within a 50-foot radius of the find until appropriate arrangements are made. If the agencies determine that avoidance is not feasible, then an alternative plan shall be prepared with specific steps and timeframe required to resume construction activities. Monitoring, data recovery, determination of significance and avoidance measures (if applicable) shall be completed expeditiously.

- **SCA CUL-3 Paleontological Resources**

Ongoing throughout demolition, grading, and/or construction. In the event of an unanticipated discovery of a paleontological resource during construction, excavations within 50 feet of the find shall be temporarily halted or diverted until the discovery is examined by a qualified paleontologist (per Society of Vertebrate Paleontology standards (SVP 1995,1996)). The qualified paleontologist shall document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in Section 15064.5 of the CEQA Guidelines. The paleontologist shall notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. If the City determines that avoidance is not feasible, the paleontologist shall prepare an excavation plan for mitigating the effect of the project on the qualities that make the resource important, and such plan shall be implemented. The plan shall be submitted to the City for review and approval.

- **SCA CUL-4 Compliance with Policy 3.7 of the Historic Preservation Element (Property Relocation Rather than Demolition)**

Prior to issuance of a demolition permit. The project applicant shall make a good faith effort to relocate the building to a site acceptable to the Planning and Zoning Division and the Oakland Cultural Heritage Survey. Good faith efforts include, at a minimum, the following:

- a. Advertising the availability of the building by: (1) posting of large visible signs (such as banners, at a minimum of 3'x 6' size or larger) at the site; (2) placement of advertisements in Bay Area news media acceptable to the City ;and (3) contacting neighborhood associations and for-profit and not-for-profit housing and preservation organizations;
- b. Maintaining a log of all the good faith efforts and submitting that along with photos of the subject building showing the large signs (banners) to the Planning and Zoning Division;
- c. Maintaining the signs and advertising in place for a minimum of 90 days; and
- d. Making the building available at no or nominal cost (the amount to be reviewed by the Oakland Cultural Heritage Survey) until removal is necessary for construction of a replacement project, but in no case for less than a period of 90 days after such advertisement.

- **SCA CUL-5 (Same as SCA GEO-2) Vibrations Adjacent Historic Structures**

Prior to issuance of a demolition, grading or building permit. The project applicant shall retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could damage the Kaiser Center Tower building or other nearby historic resource and design means and methods of construction that shall be

utilized to not exceed the thresholds. The engineer's analysis shall be submitted to the City of Oakland for review and approval. The applicant shall implement the approved plan.

Study Results

Historical Resources (Buildings and Structures)

City of Oakland Historic Resources on the Project Site and Vicinity

Project Site

Kaiser Center was included in the OCHS *Reconnaissance Survey* of 1985–1986. At the time of the survey, the Kaiser Center was not yet 50 years of age; the typical threshold for eligibility as a City of Oakland Historic Resource. The Kaiser Center is listed in the OCHS with a status code of “A1+,” which indicates that the property has an “A”-rating, defined as a property of “Highest Importance.” “A”-rated buildings are labeled as buildings with, “exceptional historical or architectural value which are clearly eligible individually for the National Register of Historic Places.” The building’s “1” rating signifies that the property is located within the Lake Merritt District Area of Primary Importance (see discussion below), and the “+” rating indicates the property is a contributor to the Area of Primary Importance.

The Lake Merritt District was also surveyed as part of the OCHS *Reconnaissance Survey* in 1986. The District is considered an Area of Primary Importance (API), one that appears eligible for the National Register for “the governmental history and public uses of the lake, and for the landscape architecture of the lake and for the high architectural quality of many of the buildings on its shores to take advantage of views across lakes and parks.” According to the OCHS Historic Resources Inventory form, “The boundaries of the Lake Merritt District include the lake itself, the parklands on its shores, and all buildings fronting on the lake which were constructed over 50 years ago and are not reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries.” The Lake Merritt API has the rough boundaries of the Lake, Lakeside Park, and one parcel deep around the perimeter of the lake. The Kaiser Center was not over the 50-year threshold at the time of the 1986 survey, and therefore was not included as a contributor to the district. However, both Page & Turnbull and OCHS concur that the Kaiser Center would be considered a contributor to an updated district evaluation due to its historic and architectural significance (Page & Turnbull, 2009). For conservative purposes therefore, the Kaiser Center is considered a contributor to the Lake Merritt District API.

The Kaiser Center has never been formally designated a City of Oakland Landmark. However, in 2003, members of the City of Oakland’s Landmarks Preservation Advisory Board particularly interested in Modern design began the process of pursuing a Landmark nomination for the Kaiser Center. While the process was never completed, it indicates that the Kaiser Center would be determined eligible for listing as a City of Oakland Landmark.

As a property with an existing OCHS rating of “A+1,” a contributor to an updated Lake Merritt District API, and a likely candidate as a City of Oakland landmark, the Kaiser Center is an historical resource for CEQA purposes.

Project Vicinity

City of Oakland Landmarks in the Project vicinity include the Lake Merritt Necklace of Lights on Lake Shore Avenue (LM #97), the Lake Merritt Lakeside Park and Wildlife Refuge (LM# 39), the Municipal Boathouse at 1520 Lakeside Drive (LM#139), the Cameron-Stanford House at 1420 Lakeside Drive (LM#2), and the Don Lee-Cox Cadillac Showroom (currently the Whole Foods Market) at 213 Bay Place (LM# 131).

Other historic resources in the Project vicinity which are not designated landmarks but have high (A and B) ratings by OCHS, and are be considered preliminary designated historic properties (PDHPs), include the Beaux-Arts style Regillus Apartments & Garage (1921) at 200 Lakeside Drive, the Schilling House Garage (1909) at 244 Lakeside Drive, and Lakeside Drive Apartments & Garage (1924) located at 244 Lakeside Drive (see discussion of 244 Lakeside Drive Building Group Area of Primary Importance [API], and Lake Merritt API, below). These properties are also included in the California Register and are contributors to the National Register-eligible Lake Merritt Historic District. In addition to these buildings, the August Schilling Gardens are located behind 244 Lakeside Drive, and Snow Park is located at 19th Street between Alice and Harrison Streets. The historic Schilling Gardens are the last remaining portion of landscaped gardens originally planted behind spice magnate August Schilling’s Victorian mansion (now demolished). Snow Park was the site of the Snow Museum, established in 1922 when big game hunter Henry A. Snow donated his collection of pelts and animal eggs to the City of Oakland. The Schilling Gardens and Snow Park are also contributors to the National Register-eligible Lake Merritt Historic District.

According to the OCHS, the project site is located within the Lake Merritt Historic District, an Area of Primary Importance (API) which includes Lake Merritt, Lakeside Park, and all the parcels immediately adjacent thereto. The project site is located across 20th Street from the 244 Lakeside Drive Building Group API which includes the 244 Lakeside Drive Apartments, the Schilling garage, and the Schilling Garden. These API’s are described below.

Lake Merritt API. According to the OCHS, the Lake Merritt API includes "Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries." As of 1986, when the API was established, the API included approximately 85 buildings, structures, objects, and cultural landscapes. Additional structures have since surpassed 50 years of age and/or may have gained historical significance in their own right and may now also be considered contributors.

244 Lakeside Drive Building Group API. The 244 Lakeside Drive Building Group API was defined in 1984 as part of the OCHS, and includes three contributors: the 244 Lakeside Drive . Apartments, the Schilling Garage and the Schilling Garden. The 244 Lakeside Drive Building

Group API lies entirely within the larger Lake Merritt API, and its contributors are also contributors to the Lake Merritt API.

California Register Historical Resources on the Project Site and Vicinity

Project Site

The Kaiser Center is not listed in the California Register, nor does it have an existing California Register rating. Although the Center was completed in 1960 and is less than 50 years old as of 2009, Page & Turnbull determined that the property currently meets the criteria for listing in the California Register and demonstrated that sufficient time has passed to understand the historical importance of the resource. The following is an excerpt from the historical resources evaluation describing how the Kaiser Center meets each of the California Register criteria, including an assessment of physical integrity.

Criterion 1 (Events). The Kaiser Center appears to be eligible under Criterion 1 (Events) as a complex that reflects “events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.” In this case, the event is the influence of the Kaiser Industries on the history of California and the West Coast. As the only remaining headquarters building of Kaiser Industries, the multinational corporation that influenced the World War II war effort, infrastructure in California, and throughout the West Coast, and changed the health care industry, the Kaiser Center is a significant landmark testifying to an important industrial institution that helped Oakland remain a significant site of commercial and industrial activities in the post-War era.

The complex is also significant as a reminder of the movement of Oakland’s Downtown commercial core toward Grand Avenue and Lake Merritt. The Kaiser Center led the shift of the commercial core from 14th and Broadway in downtown Oakland to Lake Merritt. While earlier residential towers such as the Lake Merritt Hotel (1927) and the Bellevue-Staten Building (1929) had been present on the lake, the Kaiser Center was the first true modern commercial skyscraper complex to be located on Lake Merritt. Other modern office towers followed the shift away from downtown including the Ordway Building (1970), the twenty-seven-story Lake Merritt Plaza (1985) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s are located on prominent intersections in the immediate area.

Criterion 2 (Persons). The Kaiser Center appears eligible for the California Register under Criterion 2 (Persons) for its association with Henry J. Kaiser. Kaiser is significant as an innovative industrialist who built more ships than any other builder during World War II, completed massive construction projects like the Hoover Dam, headed the first company to manufacture steel on the West Coast, and developed a health care organization for workers that became a model for Health Maintenance Organizations (HMOs) across the country. Kaiser was influential in the design of the Kaiser Center; purportedly telling the management team and the architects to “double it” when asked his opinion of the proposed size of the building. Kaiser is also frequently credited for the creation of roof garden. Additionally, Kaiser held his offices, where he oversaw his multitude of companies and had an apartment at the 27th floor of the

building. While many of Kaiser's industrial buildings still exist, the Kaiser Center in Oakland is the only remaining corporate headquarters connected to Kaiser Industries. Kaiser's earlier Oakland headquarters building, at 1924 Broadway, was demolished in the 1990s and therefore the Kaiser Center is an important building that expresses the importance of Oakland as the world headquarters of Kaiser Industries.

Criterion 3 (Architecture). The Kaiser Center appears eligible for the California Register under Criterion 3 for embodying the distinctive characteristics of the Modern style. The Kaiser Center is a well-preserved example of the style as applied to a corporate headquarters complex.

Characteristic features of the complex include its variety of building types: office tower, retail wings, and parking garage all designed in a compatible style; its site in a landscaped plaza with views to Lake Merritt. The complex appears as a strong horizontal base that is contrasted by a vertical office tower. The office tower features structural piers elevating the building's mass above the plaza, a mezzanine podium at the base, a T-shaped plan, a sweeping curved façade, flat roof, polychrome aluminum and glazed wall surfaces, aggregate concrete panels at secondary facades, and standardized bays with little variation. The Mall Buildings are completed in the same style and feature rectangular plans, flat roofs, structural piers elevating the building's mass above the first floor, and dolomite panel cladding. The materials used throughout the complex were selected to showcase the variety of Kaiser manufactured materials including aluminum and dolomite.

The Kaiser Center is also important as a designed office and retail complex, with an office tower, retail, landscaped open space, and parking incorporated on one site. Kaiser's headquarters was not envisioned as solely an office building, but as a group of associated buildings and landscapes that were intended to be used by both Kaiser Industries employees and Oakland community members. In addition to being an example of a type, the Kaiser Center is also significant as the work of a master, Welton Becket & Associates. Welton Becket & Associates was an important modernist architecture firm working throughout the United States. The firm specialized in corporate headquarters, hotels, and cultural centers and was the largest architecture firm in the United States in the 1950s. The Kaiser Center is an excellent example of Welton Becket's work for corporate clients, who relied upon the firm to embody the corporation's philosophy in physical form. Welton Becket's design for the Kaiser Center showcases not only the materials produced by Kaiser Industries but also the characteristics Kaiser Industries were known for: innovation, in the use of a curved façade; and concern for employee well-being embodied in the inclusion of a roof garden.

The roof garden is significant for its design and as the largest contiguous roof garden in North America at the time of its construction. The garden features many of the hallmarks of modern landscape design including undulating topography, curvilinear pathways, geometrically shaped lawns, simple materials such as concrete pathways, planters, and benches; trimmed hedges, shrubs, specimen trees, and an asymmetrical pool. The design by Osmundson & Staley is indicative of the Bay Area Modern landscape architecture popularized by designers such as Thomas Church, Robert Royston, and Lawrence Halprin. The Kaiser Center roof garden by Osmundson & Staley exemplifies the mid-century California Style first popularized by Church

and his contemporaries in the 1940s. The California Style emphasized the importance of indoor/outdoor living and relied heavily on a modern landscape architectural vocabulary to achieve this effect. The decision to include a roof garden as part of the Kaiser Center complex marked an important recognition of the potential of the roof garden to create a more healthful and attractive office environment within the city.

Integrity. Page & Turnbull found that exterior of the Kaiser Center, inclusive of the office tower, mall buildings, and roof garden, have been little altered since their original construction in 1960, and retains sufficient integrity to convey their historic significance. The Page & Turnbull report (Page & Turnbull, 2009) also identified a number of character-defining exterior features of the Kaiser Center that enable the property to convey its historic identity. The character-defining exterior features of the office tower includes its overall shape, siting, and massing, as well as the building's curtain wall comprised of polychrome aluminum cladding and aggregate wall panels (i.e., dolomite). The character-defining exterior features of the mall buildings includes their overall shape, siting, and massing, as well as their aggregate wall panels (i.e., dolomite) and their appearance of the main massing of the buildings "floating" above the first floor. However, it should be noted that it is not structurally or economically feasible to reuse the dolomite panels as part of a new building façade (Page & Turnbull, 2009). The character-defining features of the roof garden include the axial plan (north-south axis from 20th Street Mall garden entrance to central lawn), the undulating topography consisting of irregularly shaped lawns, curvilinear paths and aggregate walkways, the reflecting pool, low perimeter wall, the original furnishings including benches and water fountain, and the perimeter plantings.

Project Vicinity

Historical resources within a one-block area of the Project Site that are listed in the California Register include the Beaux-Arts style Regillus Apartments & Garage (1921) at 200 Lakeside Drive, the Schilling House Garage (1909) at 244 Lakeside Drive, and Lakeside Drive Apartments & Garage (1924) located at 244 Lakeside Drive. The August Schilling Gardens located behind 244 Lakeside Drive, and Snow Park at 19th Street between Alice and Harrison Streets, are also listed in the California Register. These properties are also contributors to the National Register-eligible Lake Merritt Historic District. As described above, the 244 Lakeside Drive Building Group API, as well as the Lake Merritt API, are located directly across the Harrison and 20th Street intersection from the project site.

National Register of Historic Places on the Project Site and Vicinity

Project Site

The Kaiser Center is not listed in the National Register. However, according to the Oakland Cultural Heritage Survey, the Kaiser Center appears to be potentially eligible to the National Register both individually and as a potential contributor to the Lake Merritt Historic District (see discussion above). As a property eligible for listing in the National Register, both individually and as a contributor to a Nation Register-eligible historic district, the Kaiser Center is a historical resource under CEQA Guidelines Section 15064.5.

Project Vicinity

The Lake Merritt Wild Duck Refuge is listed on the National Register (Site #66000205) as a National Historic Landmark. The site is significant as the first official wildlife refuge in the United States. National Register-listed resources in the general Project vicinity include the Cameron-Stanford House at 1426 Lakeside Drive, the Harrison and Fifteenth Streets Historic District (between 1401--1501 Harrison Street, 300--312 14th Street, and 300--349 15th Street), the Oakland YWCA Building at 1515 Webster Street, and the Paramount Theater at 2025 Broadway. Aside from the Lake Merritt Wild Duck Refuge, all other resources are three to four blocks (between 0.25 and 0.5 mile) away from the Project Site.

Archaeological Resources

A records search was conducted at the Northwest Information Center (NWIC) of the California Historical Resources Information System at Sonoma State University on April 22, 2008 (File No. 07-1502). The records were accessed by utilizing the Oakland West, California, U.S. Geological Survey 7.5-minute quadrangle base maps. The records search, which encompassed a one-half-mile radius around the Kaiser Center Project Site, was conducted to: (1) determine whether known cultural resources had been recorded within or adjacent to the Project Site; (2) assess the likelihood of unrecorded cultural resources based on historical references and the distribution of nearby sites; and (3) develop a context for the identification and preliminary evaluation of cultural resources.

During the records search, the following sources were reviewed: the *California Inventory of Historical Resources* (OHP, 1976), *California Historical Landmarks* (OHP, 1990), *California Points of Historical Interest* (OHP, 1992), and *Historic Properties Directory Listing* (OHP, 2007). The *Historic Properties Directory Listing* includes listings of the National Register and the California Register, and the most recent listings of California Historical Landmarks and California Points of Historical Interest. Sanborn Fire Insurance Company maps from 1889, 1902, 1911, and 1951 were also consulted to determine the sensitivity for historic-period archaeological resources within the Project Site.

The records search at the NWIC revealed no recorded archaeological resources in the Project Site. Five recorded archaeological resources have been identified within a ½-mile radius of the Project Site. Each of these is described below.

One prehistoric archaeological site (CA-ALA-22) is located approximately 0.5 mile southwest of the Project Site. Remains from at least one human burial were discovered in 1928 during excavation for an elevator shaft in the basement of the Easton Building at the corner of Broadway and 13th Street. According to the *San Francisco Chronicle*, the bones were uncovered approximately 1 foot below the concrete basement floor; approximately 15 feet from the street or ground level. A large animal tooth was also discovered beneath the building's basement floor (*San Francisco Chronicle*, July 1, 1928:1).

One prehistoric archaeological site is located near Lake Merritt, approximately one mile from the Project Site. The shell mound was recorded by N.C. Nelson in 1909 on the south side of the lake

(Nelson's 314a; CA-ALA-5). Subsequent surveyors have been unable to relocate the site although an alternate location has been proposed. An additional archaeological site, P-01-010694, is located approximately 200 meters west of the mapped location of CA-ALA-5. The site contains shell and dark sand although no artifactual materials were observed (Baker and Smith, 2004).

Three historic-period archaeological sites are located within a ½-mile radius of the Project Site. Two abandoned manholes constructed of concrete and red masonry brick were uncovered during trenching for fiber-optic cable. The resources are located in the roadways at the intersection of 23rd and Waverly streets (P-01-010534; Way, 2001a) and at 17th Street near Telegraph (P-01-010535; Way, 2001b). They date to the late 20th century and are not considered historic-period.

Archaeological site P-01-010532 is a concentration of historic-period refuse intermixed with demolition debris and dredging materials from Lake Merritt uncovered at the intersection of 20th and Harrison streets (Way, 2000). No diagnostic artifacts were observed. The materials may have been used as fill during road construction.

Materials relating to an old railway system were uncovered in the roadway at the intersection of 20th and Franklin streets (P-01-010529; Martorana and Way, 2000). Wooden railroad ties and hardware were intact from approximately 9 inches below the current road surface along a fragmented railroad bed.

Archaeological Sensitivity

During the historic-period the Project Site was the location of the Convent of Our Lady of the Sacred Heart. The school was established in 1868 and remained at the location until 1957. The 1889 Sanborn map shows that within the Project Site there was a large four-story boarding school building with an attached chapel and "sister's house." Outbuildings included a green house, a hen house, laundry facilities, sheds, a corral, and a windmill. A bathing tank, bath house, and boat house were located on the shore of Lake Merritt. Many of the same buildings can be seen on the 1902 Sanborn map. Some of the outbuildings had been replaced and the proposed boulevard along Lake Merritt (Harrison Street) is shown at the location of the former bathing facilities. Nine years later the Sanborn map shows a new large two-story building northwest of the boarding school building. The new building contained a gymnasium, music rooms, a dormitory, auditorium, and class rooms. Laundry facilities remained at the former location. A new two-story barn was located west of the laundry.

According to National Park Service guidelines, archaeological sites in urban areas "are likely to be more or less invisible, buried under modern created land surfaces." Here, "the reconnaissance consists of field checking predictions made on the basis of archival research" (National Park Service 1985:36). Predictions as to the location, nature, and significance of archaeological resources have been made on the basis of the archival record and previous experience with similar deposits in Oakland and other urban Bay Area locales (Praetzellis, 2001; Praetzellis, 2004).

The existing building at the Project Site has a one-story basement that extends approximately 10 feet below ground surface, therefore it is likely that this ground disturbance and construction

has destroyed archaeological features and deposits created during the historic period. There is a low possibility for archaeological deposits associated with the Convent of Our Lady of the Sacred Heart to be located within the Project Site.

Furthermore, ground disturbance has also likely destroyed and/or disturbed any prehistoric archaeological features and materials. There is a low possibility that prehistoric archaeological resources are located at the Project Site.

Native American Consultation

On April 21, 2008, a sacred lands search request was submitted to the Native American Heritage Commission (NAHC) on for the Kaiser Center Project Site. A response from the NAHC was received on April 25, 2008. The records search of the sacred lands file failed to indicate the presence of Native American cultural resources in the Project Site. The NAHC provided a list of Native American contacts that might have further knowledge of the vicinity with respect to cultural resources. Each person or organization identified by the NAHC was contacted by letter on April 28, 2008. No response has been received as of July, 2010. Copies of the correspondence is provided in Appendix E.

Impacts and Mitigation Measures

Significance Criteria

The Proposed Project would have a significant impact on the environment if it would:

1. Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines §15064.5. Specifically, a substantial adverse change includes physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be “materially impaired.” The significance of an historical resource is “materially impaired” when a project demolishes or materially alters, in an adverse manner, those physical characteristics of the resource that convey its historical significance and that justify its inclusion on, or eligibility for inclusion on an historical resource list (including the California Register of Historical Resources, the National Register of Historical Resources, Local Register, or historical resources survey form (DPR Form 523) with a rating of 1-5);
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5;
3. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
4. Disturb any human remains, including those interred outside of formal cemeteries.

Project Impacts and Mitigation Measures

Historic Architectural Resources (Buildings and Structures)

Historical resources are any building, structure, object, archaeological site, or traditional cultural place that is listed on or appears eligible for listing on the California Register for the purposes of CEQA.

Impact CUL-1: The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. (Potentially Significant)

The Proposed Project would demolish the two Kaiser Center Mall Buildings, which are components of a qualified historic resource (the Kaiser Center). Demolition is considered to be a significant adverse impact, since it would materially alter in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the federal, state, and local registers. The physical characteristics of the Mall Buildings that would be materially altered by the Project would include the Mall Buildings' height, massing, rectangular plans, dolomite wall panels, the appearance of main massing of the buildings "floating" above the first floor, the strong, solid horizontally-oriented band at the base of the tower, the relationship between the tower building's exterior finishes with the base of the complex, and the terrazzo floors.

Implementation of SCA CUL-4 would require the Project applicant to make a good faith effort to relocate the building to a site acceptable to the Planning and Zoning Division and the Oakland Cultural Heritage Survey. However, this may not be economically or physically feasible.

The mitigation measures described below would help reduce the significance of the impact to historic architectural resources. However, because design details are not yet available, this impact is conservatively identified (i.e., worst case scenario) as significant and unavoidable. Specifically, this is a Preliminary Development Plan application and the Project applicant has not prepared or submitted detailed architectural designs of the proposal for consideration by the City. Without those details, the impact must conservatively be determined to be significant and unavoidable at this point. The final, approved design may mitigate the impacts to less than significant levels, but such cannot be determined at this time.

Policy 3.8.1 of the Historic Preservation Element (HPE) of the City of Oakland General Plan states that measures appropriate to mitigate significant effects to an historic resource may include one or more of the following depending on the extent of the proposed addition or alteration:

1. Modification of the Project design to avoid adversely affecting the character-defining elements of the property.
2. Relocation of the affected Historical Resource to a location consistent with its historic or architectural character.

If the above measures are not feasible, then other measures may be considered including, but not limited to the following:

3. Modification of the Project design to include restoration of the remaining historic character of the property.
4. Modification of the Project design to incorporate or replicate elements of the building's original architectural design.
5. Salvage and preservation of significant features and materials of the structure in a local museum or within the Proposed Project.
6. Measures to protect the Historical Resource from effects of on-site or other construction activities.
7. Documentation in a Historic American Buildings Survey report or other appropriate format: photographs, oral history, video, etc.
8. Placement of a plaque, commemorative marker, or artistic or interpretive display on the site providing information on the historical significance of the resource.
9. Contribution to a Facade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource.

The following provides a list of measures that would help to reduce impacts to historic architectural resources.

Mitigation Measure CUL-1.1. The Project applicant shall modify the design of the base of the new structures to retain the existing street level design and character, and shall prepare a salvage program.

The Project applicant shall modify the design of the base of the new tower structures to retain the existing street level design and character of the Mall Buildings, which include its height, massing, flat roofs, dolomite panels, the strong, solid horizontally-oriented band at the base of the tower “floating” above the first floor, the relationship between the Office Tower’s side exterior dolomite panels with the Mall Building’s side exterior dolomite panels, and the terrazzo floors. Other than the terrazzo floors, the majority of the remaining historic fabric is expressed on the exterior of these buildings. This mitigation would satisfy Policy 3.8.1 (1) of the Historic Preservation Element of the City of Oakland General Plan (Modification of the Project design to avoid adversely affecting the character defining elements of the property).

It should be noted that it is not structurally or economically feasible to reuse the dolomite panels as part of a new building façade (Page & Turnbull, 2009; Turner, 2008). However, historic features such as dolomite panels and terrazzo flooring are easily replicated. All replicated elements should retain the character and quality of the original design, but not necessarily the individual physical elements of the dolomite panels themselves. In addition, the modified design would not be required to retain the precise dimensions of the existing Mall Buildings, but rather, should allow reasonable flexibility in their interpretation, consistent with the HRE report and the purpose of the mitigation measures. Retention of the quality and character of the Mall Buildings could reduce the impact on the environment to a less than significant level. However, because design details are not yet available, and it is therefore unknown whether the Proposed Project would meet Secretary of the Interior’s Standards described above, this impact is conservatively deemed to be significant and unavoidable at this time. A copy of the HRE report is included in Appendix E.1. The

Turner letter discussing the infeasibility of reusing the dolomite panels is included in Appendix E.3.

The Project Applicant shall also undertake a salvage program to save and reuse historically significant materials and features from the Mall Buildings at the site, such as terrazzo flooring, or possibly other materials or features not yet identified herein. As such the Project Applicant shall conduct a full survey of all historic architectural elements, including those which are suitable for re-use on the site, as well as those which can be salvaged for re-use off the site. The Project Applicant shall develop a reuse/salvage plan, whose goal is to maximize reuse of materials on and off the site, and submit such for Landmarks Preservation Advisory Board (LPAB) consideration. The LPAB would make advisory recommendations either to the Planning Commission or Development Director. Demolition shall not occur until all significant historic features or materials that have been identified, are properly removed and relocated for temporary storage under the supervision of a historic architect. The applicant shall implement the approved plan. Implementation of a salvage program would satisfy Policy 3.8.1 (5) of the Historic Preservation Element of the City of Oakland General Plan (Salvage and preservation of significant features and materials of the structure in a local museum or within the Proposed Project). While salvage and reuse of historic materials would help to reduce the impact of the loss of the Mall Buildings, the impact to historic resources is conservatively considered to be significant and unavoidable at this time since design and salvage details are not yet available.

Impacts to historic resources could be mitigated to a less-than-significant level if the Project applicant modifies the design of the base of the new structures to retain the existing street level design and character in accordance with the Secretary of the Interior's Standards, and completes the salvage program. However, because these activities have not yet been completed, the impact is conservatively deemed to be significant and unavoidable.

Mitigation Measure CUL-1.2. HABS /HALS Level Recordation: The Project applicant shall complete a recordation of the Kaiser Center which meets the requirements of the National Park Service's Historic American Buildings Survey (HABS) and the Historic American Landscape Survey (HALS).

A complete set of HABS/HALS documentation typically consists of a set of measured drawings (or a copy of original drawings if available), large-format black and white photographs, and a written history. A complete set of the HABS/HALS recordation photos, drawings, and report should be presented to following repositories:

- Library of Congress
- Oakland History Room at the Oakland Public Library.
- Oakland Heritage Alliance, and
- Oakland Cultural Heritage Survey.

This mitigation would satisfy Policy 3.8.1 (7) of the Historic Preservation Element of the City of Oakland General Plan (Documentation in a Historic American Building Survey report or other appropriate format: photographs, oral history, video, etc.)

While applications of HABS/ HALS efforts are common mitigation strategies used to reduce the significance of an adverse impact to historic resources, they do not alter the loss

to community character and collective history. Section 15126.4(b)(2) of the Public Resources Code is clear in this regard: “In some circumstances, documentation of an historical resource, by way of historic narrative, photographs or architectural drawings, as mitigation for the effects of demolition of the resource will not mitigate the effects to a point where clearly no significant effect on the environment would occur.”

Mitigation Measure CUL-1.3. Financial Contributions to a historic resource-related program such as the Façade Improvement Program or the Property Relocation Assistance Program: If Mitigation Measure CUL-1.1 is not satisfied, the Project applicants shall make a financial contribution to the City of Oakland, which can be used to fund other historic preservation projects at the Project Site or in the immediate vicinity.

This mitigation would satisfy Policy 3.8.1.(9) of the Historic Preservation Element of the City of Oakland General Plan (Contribution to a Façade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource. Contributions to the fund shall be determined by staff based on the linear feet of the facades to be demolished.

Potential preservation projects that may benefit from the fund could include, without limitation; 1) an update of the Lake Merritt Historic District survey and/or Lake Merritt historic context statement, or, 2) physical improvements to potential contributor(s) to the District so that they may become a formal contributor in the future, or improvements to existing contributor(s) that are currently in a state of disrepair.

However, such financial contribution, even in conjunction with Mitigation Measure CUL-1.2 (HALS/HABS Recordation), would not reduce the impacts to less than significant levels. Thus, the impact would remain significant and unavoidable if Mitigation Measure CUL-1.1 is not satisfied.

The City of Oakland would not impose Mitigation Measure CUL-1.3 (financial contribution) if the Project applicant can demonstrate through the subsequent submission and review and approval by the City (with review by the LPAB) of design modifications to the Proposed Project that they would meet the requirements of Mitigation Measure CUL-1.1. For conservative purposes, however, and because no such designs are currently available for review, Mitigation Measure CUL 1.3 is included in this document.

Significance after Implementation of Mitigation Measures: Conservatively Deemed Significant and Unavoidable.

Impact CUL-2: The proposed new construction would adversely affect remaining portion of the qualified historic resource on the Project Site. (Potentially Significant)

The Proposed Project would retain the Kaiser Center Office Tower, the majority of the Kaiser Center roof garden, and the Parking Garage, and construct two new commercial towers on the site of the existing Mall Buildings. The new construction would affect the resource’s integrity of setting, since the Mall Buildings would be removed and the view corridor from the west on

21st Street to the rear of the Office Tower would be altered by the construction of the new commercial towers. Due to the substantial height difference between the proposed new towers and the adjacent historic Kaiser Center Office Tower, the Proposed Project would affect the resource's "setting" and "feeling," which are two aspects of historic integrity. The new construction would remove a portion of the historic roof garden and introduce new garden area. The impacts to the resource's setting and roof garden design are considered to be significant adverse impacts, since new construction would impact the character-defining features of the historic resource. Demolition and construction activities, such as vibration and dust, could also potentially damage the remaining historic resources on the Project Site.

Mitigation Measures CUL-2.1 through CUL-2.3, described below, would help reduce the significance of the impact to historic architectural resources by modifying the Project design to ensure that new additions to the Kaiser Center would be designed to relate to the architectural and landscape character, spatial relationships, and organizing principles of the existing design. However, because design details are not yet available, this impact is conservatively identified as significant and unavoidable.

Mitigation Measure CUL-2.1 Historically-Sensitive Roof Garden Design: The Project Applicant shall ensure that a qualified Historic Landscape Architect under the Historic Preservation Professional Qualifications Standards familiar with landscape history and historic resources designs a roof garden addition that is differentiated from the old and compatible with the historic design to protect the integrity of the historic roof garden.

The additional roof garden area would be designed specifically with respect to the following character-defining features of the garden; the viability of the plant palette under new shadows and altered micro-climate created by the proposed new towers; the north-south axial plan, curvilinear shaped lawns, and curvilinear aggregate pathways, original furnishings, undulating topography, irregularly shaped pools, and raised planters. Since the Kaiser Center roof garden was included in articles in many landscape architecture journals at the time of its construction, historic images of the roof garden are easily located. The landscape plan shall be submitted the LPAB for review and approval. The LPAB would make advisory recommendations to the Planning Commission, and the Applicant shall implement the approved plan. The qualified Historic Landscape Architect shall also evaluate the effects of implementing Mitigation Measure AES-1 (which is also AES-2), which includes installation of 20-foot trees, bamboo screening, canopies, and lattice fencing to reduce significant wind speeds within the roof garden, and sensitively incorporate these measures, as necessary, into the design to protect the integrity of the historic resource.

The proposed alterations to the lawns and walkways can be mitigated by clearly demarcating the original garden material and new configuration with signage and design features. As part of the design process for the buildings, garden entrances, and new garden area, the architects and landscape architect should consult with a historic landscape expert who would prepare a landscape plan to ensure that new designs are compatible yet differentiated from the historic garden material and plans. The restored portion of the garden, as well as any wind reduction elements introduced into the garden, must adhere to the Secretary of the Interior's Standards for the Treatment of Historic Properties with

Guidelines for the Treatment of Cultural Landscapes. In this way, the design of the new roof garden addition could reduce the impact to historic resources.

Mitigation Measure CUL-2.2. Historically Sensitive Tower Design: The Proposed Project shall be compatible with, yet clearly differentiated from, the existing Kaiser Center Office Tower.

Existing views of Downtown Oakland to the southwest and northwest should be maintained as part of the design of the towers at the roof garden level, possibly through the use of non-reflective, transparent glass, pursuant to SCA BIO-5 (Bird Collision Reduction), or other feasible methods. The final design of each tower will include an “amenity floor” at the roof garden level that will facilitate access and views to and from the rooftop garden, and incorporate publically accessible spaces such as, but not limited to, restaurant, fitness center, retail, and common areas. Plans should be reviewed and approved by the LPAB, which would make advisory recommendations to the Planning Commission.

Mitigation Measure CUL-2.3. Protection During Demolition and Construction: The Project applicant shall prepare a historic resources protection plan which describes how the resource (both building and landscape) will be protected from vibration, equipment, storage of materials, and dust resulting from demolition and construction activities.

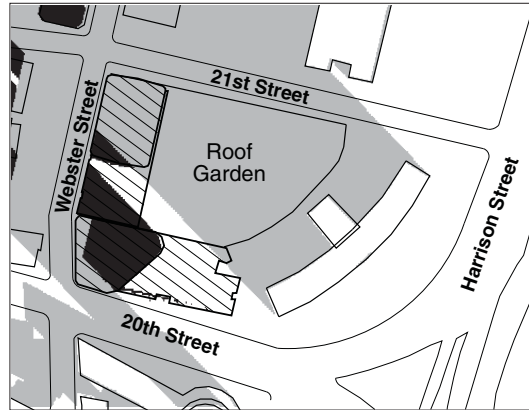
SCA CUL-5 shall be incorporated into the plan. To further reduce Impact CUL-2, the Project applicant shall also implement Mitigation Measure CUL-1.2 (HABS/HALS Level Recordation).

Significance after Implementation of Mitigation Measures: Conservatively Deemed Significant and Unavoidable.

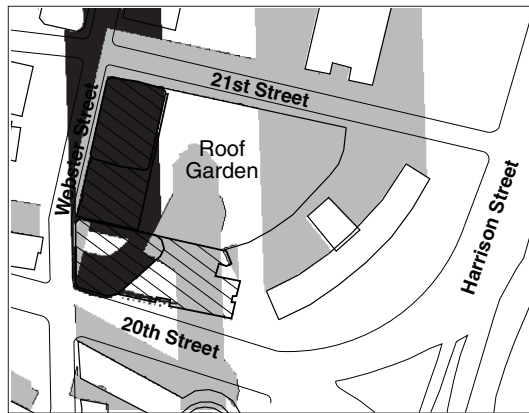
Impact CUL-3: The Proposed Project would have indirect shadow effects on the historic roof garden. (Less than Significant)

For a detailed discussion project shadows, see Section IV.A, *Aesthetics, Shadow, and Wind*, in this EIR. This section focuses only on shadow effects to the historic roof garden. Shadows cast on to the historic roof garden specifically, and around the Project Site in general, depend greatly on the time of day and the time of year. Shadows cast by existing structures generally extend to the west and northwest in the morning, to the north at noon, and to the east and northeast in the afternoon. Shadows are generally longest during the shortest day of the year (December 21st), and shortest during the longest day of the year (June 21st).

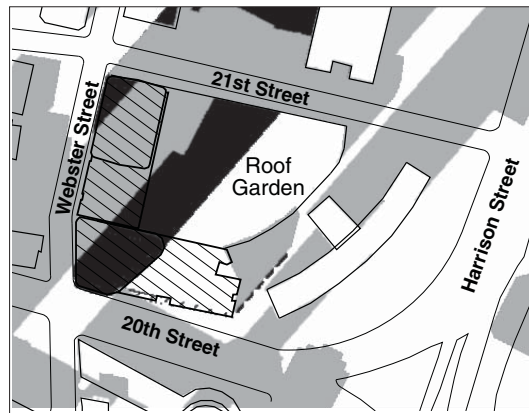
Figures IV.A-6 through A-17 (in Section IV.A, *Aesthetics, Shadow and Wind*, of this EIR) identify Project and cumulative shadows on the historic roof garden. As shown on these figures, no new Project or cumulative shadows would be cast upon the roof garden at 9:00 am or 12:00 noon on March 21st, June 21st, September 21st, and December 21st. However, by 3:00 pm on these dates, the northeastern half of the roof garden would be in shadow, while the southwestern half would remain free of shadow, under both Project and cumulative conditions. **Figure IV.D-1**, is a close-up view of shadow effects on the roof garden during the December 21st scenario and delineates in more detail the shadow pattern that occurs when shadows are longest and most affect the roof garden.



December 21, 9:00 am PST



December 21, 12:00 pm PST



December 21, 3:00 pm PST



Development Area



Existing Shadow



New Project Shadow

While new shadow would be cast on a portion of the historic roof garden from the proposed new towers, particularly in the late afternoon, such shadow effects would not substantially detract from the use or enjoyment of the garden such that the garden would no longer remain eligible as an historic resource. In addition, the Project would result in a net increase of new, publicly accessible roof garden by approximately 4,500 square feet. Much of this new roof garden would be located on the southern end of the site along 20th Street, and would remain shadow-free for a good portion of the day, partially offsetting the existing garden areas which would be newly shaded. Finally, implementation of Mitigation Measure CUL-2.1, described above, would ensure that a historically sensitive roof garden design protects the integrity of the roof garden with respect to the viability of the plant palette under new shadows and altered micro-climate created by the proposed new towers. As a result, the Proposed Project would have a less-than-significant shadow impact on the historical Kaiser Center roof garden.

Mitigation: None required.

Impact CUL-4: The Proposed Project could affect the eligibility of the Lake Merritt Historic District. (Less than Significant)

According to the inventory form completed in 1986, the Lake Merritt Historic District consists of “Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries.” As of 1986, the Lake Merritt Historic District included approximately 92 total resources, of which 64 were contributors, five were contingency contributors and 23 were non-contributors. It should be noted that contributors included six parks and two objects. As with most historic districts, changes have been made over time within the boundaries of the district. According to the inventory form, “the Lakeside area has gradually changed from a neighborhood of 19th century single family dwellings to one of 20th century apartment, civic, and office buildings.”

Since the district was identified, a number of additions have been made including the Lake Merritt Plaza a 27-story office tower constructed in 1986, at 1999 Harrison Street, the 20-story The Essex on Lake Merritt, a residential building constructed in 2001, at the corner of Lakeside Drive and 17th Street, and the Cathedral of Christ the Light, constructed in 2008, on Harrison Street between 21st Street and Grand Avenue. One contributor, located at 1330 Lakeshore Drive was demolished and replaced by a non-contributor. Other smaller-scale development along the shores of Lake Merritt has also taken place during this time. However, these projects have retained the basic nature of the district, which includes a combination of residential, institutional, and commercial uses and a variety of building heights all focused on and respecting the lake. The northwest shore is predominantly high-rise, the southwest shore is predominantly mid- and high-rise, the southeast shore is predominantly mid-rise, and the northeast shore is predominantly mid-rise.

The proposed projects, located along the northwest shore, appear to be an adaptation of the district to meet the needs of the current day. As stated previously, the Kaiser Center Office tower

was the first Modern high-rise office complex on Lake Merritt and led to an expansion of high-rise office tower development from downtown Oakland to the shores of Lake Merritt. While the Proposed Project includes towers that are substantially taller than extant towers in the district, they would not adversely affect the district's integrity. The proposed towers would be non-contributors to the district. The proposed towers would not directly front on the lake; they would be placed behind other existing historic buildings that contribute to the district, lessening the visual impact on the district. They would also perpetuate a pattern of building heights stepping down toward the lake.

The Lake Merritt Historic District currently includes approximately 107 total resources, of which 90 are contributors, and 17 are non-contributors. The Proposed Project would demolish a portion of one contributor to the district (the Mall Buildings at the Kaiser Center) and add two non-contributing buildings (two new office towers at the Kaiser Center) to the district. However, the district would retain over two-thirds contributing properties, therefore retaining its integrity and its API and NRHP status. Since the proposed deletions and additions to the district would not adversely affect the district's potential eligibility as an API or NRHP historic district, the Proposed Project would not cause a significant impact on the Lake Merritt Historic District.

Mitigation: None required.

Archaeological and Unique Archaeological Resources

Impact CUL-5: Construction of the Proposed Project could cause substantial adverse changes to the significance of archaeological resources at the Project Site. Archaeological resources are potentially historical resources as defined in CEQA Section 15064.5(a) or unique archaeological resources as defined in CEQA Section 21083.2(g). (Less than Significant)

During the historic-period the Project Site was the location of the Convent of Our Lady of the Sacred Heart. The school was established in 1868 and remained at the location until 1957. The existing building at the Project Site has a one-story basement that extends approximately 10 feet below ground surface, therefore it is likely that this ground disturbance and construction has destroyed archaeological features and deposits created during the historic period. Furthermore, ground disturbance has also likely destroyed and/or disturbed any prehistoric archaeological features and materials.

In the unlikely event that archaeological materials or human remains are inadvertently discovered during construction activity SCA CUL-1 Archaeological Resources should be applied.

Further, any archaeological property that meets the criteria listed at CEQA Section 21083.2 is considered a unique archaeological resource for the purposes of CEQA.

In the unlikely event that archaeological materials are unearthed during construction implementation of SCA CUL-1 Archaeological Resources also will reduce the Project's potential impact on unique archaeological resources to a less than significant level.

Mitigation: None required.

Paleontological Resources

Impact CUL-6: The Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant)

As discussed above in the paleontological setting, the paleontological sensitivity of the units underlying the site is low. Deep excavations associated with building foundations and the 1.5 stories of underground parking are likely to disturb these geologic units of low paleontological sensitivity. However, it is nevertheless possible that fossils would be discovered during excavation associated with the Project. Because the significance of such fossils would be unknown, such an event represents a potentially significant impact to paleontological resources. If any fossils are discovered within the rock units, implementation of the following uniformly-applied SCA CUL-3 Paleontological Resources would reduce this impact to a less than significant level.

Mitigation: None required.

Human Remains

Impact CUL-7: The Proposed Project may adversely affect unidentified human remains at the Project Site. (Less than Significant)

There is no indication that the Project Site has been used for burial purposes in the recent or distant past. Therefore, it is unlikely that human remains would be encountered. However, in the event of the discovery of any human remains during Project construction activities, work would be halted and SCA CUL-2 Human Remains implemented. Damage to significant buried human remains would be a significant impact. Implementation of the following uniformly-applied SCA CUL-2 would reduce potential impacts to a less than significant level.

Mitigation: None required.

Cumulative Impacts

Impact CUL-8: The Proposed Project Could Have a Cumulative Impact to Historic Architectural Resources. (Less than Significant)

Geographic Context

Cumulative analysis includes a review of the Proposed Project and its relationship with past, present, and reasonably foreseeable projects. Given the nature of the potential impacts analyzed for this topic, the geographic scope would generally include projects within the Project area and include but not be limited to those on the City of Oakland's Active Major Development Projects list (see Section IV Introduction, **Table IV-1** List of Relevant Cumulative Projects from the City's Major Project List), that are within a five-block radius of the Project Site. The geographic context considered for the cumulative cultural resources impacts consists of the area that includes the Project Site which, when combined with the Proposed Project area, could result in cumulative impacts.

There are 13 reasonably foreseeable future development projects within the Project area, some of which could combine with the loss of a portion of the Kaiser Center complex to form a significant cumulative impact to historic resources. Of all the projects identified in Table IV-1, only the following six projects would affect historic resources:

Proposed Projects including Rehabilitation of Historic Resources

- 1938 Broadway; approximately 85,200 square foot retail/fitness club, approximately 829,500 square feet of office space, 220 residential units, 384 parking stalls, rehabilitation of the Tapscott Building, a historic resource.
- Oak to Ninth Mixed Use Development: demolition of the Ninth Avenue Terminal Building, a historic resource.
- Wood Street Development (formerly Central Station): renovation of the former 16th Street Train Station, a historic resource.
- 1443 Alice Street; 245 residential units; alterations to a historic resource.
- Emerald Views (formerly 222 19th Street Development Project); 42-story residential high-rise (457'-9" to the top of the pyramidal roof form), containing 370 residential units, 357 parking spaces in five levels of underground parking, 933 square foot café; and demolition of a historic resource (the garden associated with the historic August Schilling estate). Located within Lake Merritt Historic District and 244 Lakeside Drive Building Group API.
- Broadway West Grand at 2365 Broadway (formerly known as Negherbon Mixed Use Project); 367 residential units, 8, 500 square feet retail; demolition of seven historic resources (mostly former brick auto showrooms).

Cumulative Impacts to the Lake Merritt Historic District

Aside from the Proposed Project, the only other reasonably foreseeable project within the Lake Merritt Historic District boundaries is the proposed 42-story Emerald Views Development project. The proposed 34- and 42-story office towers associated with the Kaiser Center Project, in combination with the proposed 42-story Emerald Views development, may form a cumulative

impact to historic resources within the Lake Merritt Historic District, as both would demolish contributors to the district (an historic garden and the Mall Buildings at the Project Site), and would introduce a total of three new non-contributing towers to the District.

The proposed towers of the Kaiser Center and Emerald Views can be understood as a continuation of the development of modern towers on the northwestern shores of Lake Merritt, a characteristic of the district that has already been established. Collectively, these projects would continue the trend of redevelopment along this portion of Lake Merritt. With approximately 90 contributory resources to the District, the combination of these projects would retain over two-thirds of its contributing properties, thereby retaining its integrity and its API and NRHP status. Since these proposed changes to the district would not adversely affect the district's potential eligibility to the NRHP or as an APE, no significant cumulative impacts to the Lake Merritt Historic District are anticipated.

Cumulative Impacts to Historic Resources in the Immediate Project Vicinity and to the City of Oakland

Taken collectively, the reasonably foreseeable projects listed above such as those along Broadway and Harrison Streets, contribute to the on-going demolition or alteration of historic resources within the Project vicinity. The Proposed Project would demolish a portion of a historic resource, therefore contributing to this trend. However, the Project is consistent with the typical development found in this area and would not directly or indirectly affect the eligibility of any other historic resources within the vicinity.

While cumulative development projects may affect individual historic resources, the affected resources include a broad range of building typologies, and would not have a clear, measurable impact on an individual type of historic resource. For example, the Proposed Project would demolish a portion of a Modern historic resource in the Lake Merritt Historic District. None of the other proposed projects would affect Modern historic resources, and only one other proposed project, the Emerald Views project, would affect the Lake Merritt area or a resource in the Lake Merritt Historic District. Therefore, the cumulative impact would be less than significant.

Other reasonably foreseeable projects throughout the City of Oakland which may affect citywide historic resources and have been considered in the cumulative analysis include alterations to the Ninth Avenue Terminal Building along the Oakland waterfront, and alterations to buildings at the former Oakland Army Base. Other projects that have been approved/constructed include those in the Waterfront Warehouse District along the Oakland Waterfront, and the Courthouse Condominiums project at 29th and Telegraph Avenue. However, such citywide projects are too far away from the Project Site (and would affect such different types of historical buildings compared with the Modern Kaiser Center), that such projects would not be cumulatively considerable. As such, the Proposed Project would have no significant cumulative impacts to historic resources on a citywide basis.

Mitigation: None required.

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E. Geology, Soils and Geohazards

This section describes geologic and seismic conditions in the Proposed Project vicinity to provide relevant background information of the physical characteristics of the Project Site with respect to soils and potential geologic hazards. The following information is compiled from geologic maps and reports available from the City of Oakland, the California Geological Survey (CGS; formerly California Divisions of Mines and Geology), the Association of Bay Area Governments (ABAG), as well as the draft geotechnical evaluation report completed for the Kaiser Center Project (Treadwell and Rollo, 2008). Based on the evaluation of geologic and seismic conditions in the Project vicinity, potential impacts are discussed and evaluated, and appropriate SCAs and/or mitigation measures are identified, as necessary.

Setting

The Project Site is situated within the Coast Ranges geomorphic province of California. The Coast Ranges is the largest of the state's geomorphic provinces extending approximately 400 miles from the Klamath Mountains (near northern Humboldt County) to the Santa Ynez River in Santa Barbara County. The province lies between the Pacific Ocean and the Great Valley (Sacramento and San Joaquin valleys) provinces and is characterized by a series of northwest trending mountain ridges and valleys, running generally parallel to the San Andreas Fault zone. These mountain ridges and valleys have been formed by tectonic forces that compressed ancient sedimentary deposits over the course of millions of years.

The San Francisco Bay is located in a broad depression in the Franciscan bedrock resulting from an east-west expansion between the San Andreas and the Hayward fault systems. The bedrock surface can be found at elevations of 200 to 2,000 feet below mean sea level across the Bay Area. Sedimentary deposits that overlie the Franciscan bedrock originated from millions of years of erosion, deposition, and changes in sea level. Geologists categorize these sedimentary deposits into geologic formations based on the period of deposition and material type, as described below for the San Francisco Bay region.

- The Alameda Formation is the deepest and oldest of these sedimentary deposits and consists of a mixture of clay, silt, sand, gravel, and some shells with predominantly silt and clay sediments surrounding discontinuous layers of sand and gravel;
- Overlying the Alameda Formation is the San Antonio Formation which consists of sandy clays, gravelly clays, clayey sands and gravels with interbedded silty clay deposits.
- Younger alluvial deposits once referred to as the Temescal Formation are deposited on top of the San Antonio and consist of sandy clays, clayey sands, sands and gravels. The source material for these alluvial deposits comes from the Berkeley Hills.

It is estimated the Project Site is underlain by 7 to 13 feet of fill consisting of medium stiff to stiff silty clay and loose to dense sand and gravelly sand. The draft geotechnical report indicates that in the late 1800s and early 1900s, fill was placed over mud and tidal flats that bordered Lake Merritt. The fill is underlain by creek bank and shoreline deposits associated with the ancient San Antonio Creek and Lake Merritt. These deposits consist of soft to medium stiff clay with peat

lenses and medium dense sand and gravel. These deposits are generally 3 to 7 feet thick, except at the southeast corner of the site where the thickness of these deposits increases to a maximum of 20 feet along the old shoreline of San Antonio Creek. (Treadwell and Rollo, 2008).

The creek bank and shoreline deposits are underlain by the Temescal formation, which consists of stiff to very stiff clay with intermittent lenses of dense sand and gravel. The Temescal formation varies from about five feet thick near 20th Street to about 50 feet thick near 21st Street. Beneath the Temescal Formation is the San Antonio Formation, which consists of very stiff to hard sandy clay and sandy silt, with dense to very dense silty sand and silt lenses. The San Antonio formation is underlain by the Alameda Formation, which consists primarily of very stiff to hard silty clay. Sandstone bedrock was previously encountered by others at a nearby site (155 Grand Avenue, near 21st and Harrison Streets) at a depth of about 515 feet below the ground surface. (Treadwell and Rollo, 2008).

Seismicity

Seismic hazards include those hazards that could reasonably be expected to occur in the area during a major earthquake on any of the active faults in the region. Some hazards can be more severe than others, depending on the location, underlying materials, and level of ground shaking. The Project Site, like the entire Bay Area, lies within an area that contains many active and potentially active faults and is considered to be an area of high seismic activity.¹ The United States Geological Survey (USGS) Working Group on California Earthquake Probabilities evaluated the probability of one or more earthquakes of Richter magnitude 6.7 or higher occurring in the San Francisco Bay Area within the next 30 years (USGS, 2008).² The result of the evaluation indicated a 63-percent likelihood that such an earthquake event will occur in the Bay Area between 2007 and 2037 (USGS, 2008).

Ground movement during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material. The composition of underlying soils, even those relatively distant from faults, can intensify ground shaking. For this reason, earthquake intensities are also measured in terms of their observed effects at a given locality. The Modified Mercalli (MM) intensity scale (**Table IV.E-1**) is commonly used to measure earthquake damage due to ground shaking. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X can cause moderate to significant structural damage.³ The intensities of an earthquake will vary over the region of a fault and generally decrease with distance from the epicenter of the earthquake.

¹ An “active” fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 11,000 years). A “potentially active” fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. “Sufficiently active” is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

² Richter magnitude is a measure of the size of an earthquake as recorded by a seismograph. Richter magnitudes vary logarithmically, with each whole number step representing a ten-fold increase in the amplitude of the recorded seismic waves. Earthquake magnitudes are also measured by their Moment Magnitude (M_w) which is related to the physical characteristics of a fault including the rigidity of the rock, the size of fault rupture, and movement or displacement across a fault.

³ The damage level represents the estimated overall damage that will occur for various MM intensity levels. Damage, however, is not uniform, as the age, material, type, method of construction, size, and shape of a building all affect its performance.

**TABLE IV.E-1
MODIFIED MERCALLI INTENSITY SCALE**

Intensity Value	Intensity Description	Average Peak Acceleration (% g^a)
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.17 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	0.17-1.4 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	0.17-1.4 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	1.4–3.9g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	3.5 – 9.2 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	9.2 – 18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	18 – 34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	34 – 65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	65 – 124 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 124 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

a g (gravity) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCE: ABAG, 2008c

According to the Association of Bay Area Governments (ABAG) Shaking Intensity Maps and Information, the Project Site is located in an area subject to “moderate” to “strong” ground shaking (Modified Mercalli Intensity VI to VII) from earthquakes along the entire San Andreas (similar to the 1906 Earthquake), and “violent” to “very violent” ground shaking (Modified Mercalli Intensity IX to X) from the Northern and Southern segments of the Hayward Fault (ABAG, 2008b).

The Project area is not in an Alquist-Priolo Earthquake Fault Zone⁴, and no known active fault exists on or in the Project area boundaries. The closest active faults is the Hayward-Rodgers Creek fault approximately 5 miles east of the Project area (Treadwell and Rollo, 2008). Like the entire Bay Area, the Project Site is subject to ground shaking in the event of an earthquake on the regional faults.

Regional Faults

The San Andreas, Hayward-Rodgers Creek, and Calaveras faults pose the greatest threat of significant damage in the Bay Area according to the USGS Working Group (USGS, 2008). These three faults exhibit strike-slip orientation and have experienced movement within the last 150 years.⁵ Other principal faults capable of producing significant ground shaking in the Bay Area are listed on **Table IV.E-2**, and include the Rodgers Creek fault, the Concord–Green Valley fault, and the Marsh Creek–Greenville fault. These faults are considered active, and there are many other potentially active and inactive faults located throughout the Bay Area. Considerable seismic events can occur on faults with a long period of inactivity, although it is generally considered less likely. Occasionally, faults classified as inactive can exhibit secondary movement during a major event on another active fault.

**TABLE IV.E-2
ACTIVE FAULTS IN THE PROJECT SITE VICINITY**

Fault	Distance and Direction from Project	Recency of Movement	Fault Classification ^a	Historical Seismicity ^b	Maximum Moment Magnitude Earthquake (Mw) ^c
Hayward	5 miles east	Historic (1868 rupture)	Active	M 6.8, 1868 Many <M 4.5	7.3
Calaveras	23 miles east	Historic (1861, 1911, 1984)	Active	M 5.6–M 6.4, 1861 M 6.2, 1911, 1984	6.9
Concord-Green Valley	26 miles east	Historic (1955)	Active	Historic active creep	6.7
San Andreas	24 miles west	Historic (1906; 1989 ruptures)	Active	M 7.1, 1989 M 8.25, 1906 M 7.0, 1838 Many <M 6	7.9

^a See footnote 1.

^b Richter magnitude (M) and year for recent and/or large events. The Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave.

^c Moment Magnitude (Mw) is related to the physical size of a fault rupture and movement across a fault. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CGS, 2002). The Maximum Moment Magnitude Earthquake, derived from the joint CGS/USGS Probabilistic Seismic Hazard Assessment for the State of California, 1996 (Peterson, 1996).

SOURCES: (1) Hart, 1997; (2) Jennings, 1994; (3) Peterson, 1996; (4) USGS, 2003; (5) Treadwell and Rollo, 2008.

⁴ An Alquist-Priolo Earthquake Fault Zone is an established regulatory zone around the surface traces of active faults. Local agencies must regulate most development projects within the zones.

⁵ A strike-slip fault is a fault in which movement is horizontal, parallel to the strike of the fault plane.

Hayward Fault

The Hayward Fault Zone is the southern extension of a fracture zone that includes the Rodgers Creek fault (north of San Pablo Bay), the Healdsburg fault (Sonoma County), and the Maacama fault (Mendocino County). The Hayward fault trends to the northwest within the East Bay, extending from San Pablo Bay in Richmond, 60 miles south to east San José. The Hayward fault in San José converges with the Calaveras fault, a similar type fault that extends north to Suisun Bay. The Hayward fault is designated by the Alquist-Priolo Earthquake Fault Zoning Act as an active fault.

A characteristic feature of the Hayward fault is its well-expressed and relatively consistent fault creep. Although large earthquakes on the Hayward fault have been rare since 1868, slow fault creep has continued to occur and has caused measurable offset. Fault creep on the East Bay segment of the Hayward fault is estimated at 9 millimeters per year (Peterson, 1996). However, a large earthquake could occur on the Hayward fault with an estimated moment magnitude (M_w) of about M_w 7.3. The USGS Working Group on California Earthquake Probabilities includes the Hayward–Rodgers Creek Fault Systems in the list of those faults that have the highest probability of generating earthquakes of magnitude (M) 6.7 or greater in the Bay Area (USGS, 2008).

Calaveras Fault

The Calaveras fault is a major right-lateral strike-slip fault that has been active during the last 11,000 years. The Calaveras fault is located in the eastern San Francisco Bay region and generally trends along the eastern side of the East Bay Hills, west of San Ramon Valley, and extends into the western Diablo Range, and eventually joins the San Andreas Fault Zone south of Hollister. The northern extent of the fault zone is somewhat conjectural and could be linked with the Concord fault.

The Calaveras fault has been the source of numerous moderate magnitude earthquakes, and the probability of a large earthquake (greater than $M_{6.7}$) is much lower than on the San Andreas or Hayward faults (USGS, 2008). However, this fault is considered capable of generating earthquakes with M_w 6.9.

Concord-Green Valley

The Concord and Green Valley faults are part of the larger San Andreas Fault system. The Concord fault extends from the northwestern slope of Mt. Diablo north to Suisun Bay, where the Green Valley fault is generally thought to be connected to the Concord fault and continues north to Wooden Valley in Napa County. Several site-specific studies on these faults have been conducted in compliance with the Alquist-Priolo Earthquake Fault Zoning Act, and they report the most recent displacement on these faults between 2,600 and 2,700 years ago in the late Holocene.

San Andreas Fault

The San Andreas Fault Zone is a major structural feature that forms at the boundary between the North American and Pacific tectonic plates, extending from the Salton Sea in Southern California near the border with Mexico to north of Point Arena, where the fault trace extends out into the

Pacific Ocean. The main trace of the San Andreas fault runs through the Bay Area and trends northwest through the Santa Cruz Mountains along the eastern side of the San Francisco Peninsula. As the principal strike-slip boundary between the Pacific plate to the west and the North American plate to the east, the San Andreas is often a highly visible topographic feature, such as between Pacifica and San Mateo, where Crystal Springs Reservoir and San Andreas Lake clearly mark the rupture zone.

Seismic Hazards

Ground Shaking

Strong ground shaking from a major earthquake could affect the Project Site during the next 30 years. An earthquake on any one of the active faults (listed in Table IV.H-2) could potentially produce a range of ground shaking intensities at the Project Site. Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. Historic earthquakes have caused strong ground shaking and damage in the San Francisco Bay Area, the most recent being the Loma Prieta earthquake (moment magnitude 6.9) in October 1989. The epicenter was approximately 50 miles south of the Project Site, and the earthquake caused very strong ground shaking for about 20 seconds and resulted in varying degrees of structural damage as far as 50 miles away. This event produced moderate (Modified Mercalli VI) to very strong (Modified Mercalli VIII) shaking intensities in the Project area (ABAG, 2008b). The 1906 San Francisco earthquake, with an estimated moment magnitude of 7.9, produced moderate (Modified Mercalli VI) to strong (Modified Mercalli VII) shaking intensities in the Project area (ABAG, 2008b).

The common way to describe ground motion during an earthquake is the duration of the shaking. However, a common measure of ground motion is also the peak ground acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the equivalent acceleration of gravity (g), which is approximately 980 centimeters per second squared. (In terms of automobile acceleration, one "g" of acceleration is a rate of increase in speed equivalent to a car accelerating from a standstill to 60 mph in less than 3 seconds.) For comparison purposes, the maximum peak acceleration value recorded during the Loma Prieta earthquake was in the vicinity of the epicenter, near Santa Cruz, at 0.64 g. The lowest values recorded were 0.06 g in the bedrock on Yerba Buena Island.

An earthquake on the Hayward fault would likely produce more severe ground shaking than was observed during the Loma Prieta earthquake if the epicenter of the earthquake were closer in vicinity to the Project Site, and along the Hayward fault. Probabilistic seismic hazard maps indicate that peak ground acceleration in the Project region could reach or exceed 0.7 g (CGS, 2003).

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude, sense, and nature of fault rupture can

vary for different faults or even along different strands of the same fault. Ground rupture is considered more likely along active faults (see Table IV.E-2).

The Project Site is not within an Alquist-Priolo Fault Rupture Hazard Zone, as designated through the Alquist-Priolo Earthquake Fault Zoning Act, and no mapped active faults are known to pass through the immediate Project region. Therefore, the risk of ground rupture at the site is low and is not discussed further in this analysis.

Liquefaction

Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. Soils susceptible to liquefaction include saturated loose to medium dense sands and gravels, low-plasticity silts, and some low-plasticity clay deposits. Liquefaction and associated failures could damage foundations, disrupt utility service, and can cause damage to roadways.

Hazard maps available through ABAG and produced by the USGS depict liquefaction and lateral spreading hazards for the entire Bay Area in the event of a significant seismic event (ABAG, 2008a).⁶ According to these maps, the Project area has low to very high liquefaction susceptibility due to the variability in subsurface material in the vicinity of the site. Additionally, the draft geotechnical site investigation indicated that the soils underlying the Project Site are comprised of zones of potentially liquefiable medium dense silty sand, clayey sand, and gravelly sand (creek bank and shoreline deposits) (Treadwell and Rollo, 2008). Additionally, it has been reported that the groundwater level decreases from west to east (towards Lake Merritt) and varies between an elevation of 0 to 3 feet, and similar groundwater elevations were measured at the site at 21st and Harrison Streets (Treadwell and Rollo, 2008). Groundwater levels should be expected to fluctuate 1 to 2 feet between wet and dry seasons, depending on rainfall amounts and the level of Lake Merritt, which is controlled by flood gates (Treadwell and Rollo, 2008).

Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. A slope failure is a mass of rock, soil, and debris displaced downslope by sliding, flowing, or falling. Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. Landslides may occur on slopes of 15 percent or less; however, the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Landslide-susceptible areas are characterized by steep slopes and downslope creep of surface materials. Debris flows consist of a loose mass of rocks and other granular material that, if saturated and present on a steep slope, can move downslope. The rate of rock and soil movement can vary from a slow creep over many years to a sudden mass

⁶ Lateral spreading is a ground failure associated with liquefaction and generally results from predominantly horizontal displacement of materials toward relatively unsupported free slope faces.

movement. Landslides occur throughout the state of California, but the density of incidents increases in zones of active faulting.

The Project Site is not located in an area where earthquake-induced landslides are likely to occur because of the relatively flat topography of the Project area. Therefore, the risk of landslide at the site is low and is not discussed further in this analysis.

Geologic Hazards

Considering the geologic context of the Project area and nature of the Project, other typical geologic hazards could include soil erosion and expansive soil. These hazards are discussed briefly here.

Expansive Soils

Expansive soils possess a “shrink-swell” behavior. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. Structural damage to buildings can occur over a long period of time, usually as a result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. Soils in the area have been characterized as having a medium to high expansion potential, or shrink-swell behavior. According to the draft geotechnical evaluation conducted by Treadwell and Rollo (2008), the fill, creek bank, and shoreline deposits are not suitable for support of the proposed building loads because of their relatively low strength and high potential for compression and/or consolidation settlement. Also, isolated layers of the creek bank and shoreline deposits may be susceptible to soil liquefaction and associated ground failures..

Soil Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, the action of waves, wind and underground water. Excessive soil erosion can eventually lead to damage of building foundations and roadways. The Proposed Project includes excavation for graded soils, use of fill material, and possibly additional imported soil material. However, as part of building design requirements, the Project area will be sloped for rapid removal of surface water runoff from the foundation systems, which would reduce the risk of soil erosion that would lead to damage of building foundations and roadways.

Regulatory Setting

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act), signed into law December 1972, requires the delineation of zones along active faults in California. The Alquist-Priolo Act regulates development on or near active fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human

occupancy across these traces⁷. Cities and counties must regulate certain development projects within the delineated zones, and regulations include withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture, however, is not necessarily restricted to the area within an Alquist-Priolo Zone.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides, and its purpose is to protect public safety from the effects of strong ground shaking, liquefaction, landslides, and other ground failure, and other hazards caused by earthquakes. The Act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design.

California Building Code

The California Building Code (CBC) has been codified in the California Code of Regulations (CCR) as Title 24, Part 2. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable. The purpose of the CBC is to establish minimum standards to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, and general stability by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all building and structures within its jurisdiction. The CBC is based on the International Building Code. The 2007 CBC is based on the 2006 International Building Code (IBC) published by the International Code Conference. In addition, the CBC contains necessary California amendments which are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (flood, snow, wind, etc.) for inclusion into building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

⁷ A “structure for human occupancy” is defined by the Alquist-Priolo Act as any structure used or intended for supporting or sheltering any use or occupancy that has an occupancy rate of more than 2,000 person-hours per year.

City of Oakland Regulations

Ordinances and Oakland Municipal Code

The City of Oakland implements the following regulations and ordinances aimed at reducing soil erosion and protecting water quality and water resources:

The City's Grading Ordinance (Ordinance No. 10312 is intended to reduce erosion during grading and construction activities. Pursuant to this ordinance, Chapter 13.16 of the Oakland Municipal Code requires that a Project applicant obtain grading permits for earth moving activities under specified conditions of 1) volume of earth to be moved, 2) slope characteristics, 3) areas where "land disturbance" or 4) stability problems have been reported. To obtain a grading permit, the Project applicant must prepare and submit to the Public Works Agency a soils report, a grading plan, and an erosion and sedimentation control plan for approval (Oakland Municipal Code, 2009).

The City also implements the Sedimentation and Erosion Control Ordinance (Ordinance No. 10446) also aimed at reducing erosion during construction and operations. As a condition of development or redevelopment, the Chief of Building Services or his or her designee may require implementation of continuous or post construction best management practices such as good housekeeping practices or storm water treatment systems.

Building Services Division

In addition to compliance with building standards set forth by the 2006 IBC and 2007 CBC, the Project applicant will be required to submit to the Oakland Building Services Division an engineering analysis accompanied by detailed engineering drawings for review and approval prior to excavation, grading, or construction activities on the Project Site. Specifically, an engineering analysis report and drawings of relevant grading or construction activities on a Project Site would be required to address constraints and incorporate recommendations identified in geotechnical investigations. These required submittals and City reviews ensure that the buildings are designed and constructed in conformance with the seismic and other requirements of all applicable building code regulations, pursuant to standard City of Oakland procedures.

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

In addition to compliance with building standards set forth by the 2006 IBC and 2007 CBC, the Project applicant will be required to submit to the Oakland Building Services Division an engineering analysis accompanied by detailed engineering drawings for review and approval prior to excavation, grading, or construction activities on the Project Site. Specifically, an engineering analysis report and drawings of relevant grading or construction activities on a Project Site would be required to address constraints and incorporate recommendations identified in geotechnical investigations. These required submittals and City reviews ensure that the buildings are designed and constructed in conformance with the seismic and other requirements of all applicable building code regulations, pursuant to standard City of Oakland procedures.

The City of Oakland's SCAs relevant to reducing impacts geologic and seismic impacts due to the proposed Project are listed below. If the Project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the proposed Project to help ensure less than significant impacts from geologic and seismic conditions. The SCA are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA GEO-1 Erosion and Sedimentation Control Plan**

Prior to any grading activities. The project applicant shall obtain a grading permit if required by the Oakland Grading Regulations pursuant to Section 15.04.780 of the Oakland Municipal Code. The grading permit application shall include an erosion and sedimentation control plan for review and approval by the Building Services Division. The erosion and sedimentation control plan shall include all necessary measures to be taken to prevent excessive stormwater runoff or carrying by stormwater runoff of solid materials on to lands of adjacent property owners, public streets, or to creeks as a result of conditions created by grading operations. The plan shall include, but not be limited to, such measures as short-term erosion control planting, waterproof slope covering, check dams, interceptor ditches, benches, storm drains, dissipation structures, diversion dikes, retarding berms and barriers, devices to trap, store and filter out sediment, and stormwater retention basins. Off-site work by the project applicant may be necessary. The project applicant shall obtain permission or easements necessary for off-site work. There shall be a clear notation that the plan is subject to changes as changing conditions occur. Calculations of anticipated stormwater runoff and sediment volumes shall be included, if required by the Director of Development or designee. The plan shall specify that, after construction is complete, the project applicant shall ensure that the storm drain system shall be inspected and that the project applicant shall clear the system of any debris or sediment.

Ongoing throughout grading and construction activities. The project applicant shall implement the approved erosion and sedimentation plan. No grading shall occur during the wet weather season (October 15 through April 15) unless specifically authorized in writing by the Building Services Division.

- **SCA GEO-2 (same as SCA CUL-5 and SCA NOI-6) Vibrations Adjacent to Historic Structures**

Prior to issuance of a demolition, grading or building permit. The project applicant shall retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could damage the Kaiser Center Tower building or other nearby historic structures (as described in Section IV.D *Cultural Resources*), and design means and methods of construction that shall be utilized to not exceed the thresholds. The engineer's analysis shall be submitted to the City of Oakland for review and approval. The applicant shall implement the approved plan.

- **SCA GEO-3 Soils Report**

Required as part of the submittal of a Tentative Tract or Tentative Parcel Map. A preliminary soils report for each construction site within the project area shall be required as part if this project and submitted for review and approval by the Building Services Division. The soils reports shall be based, at least in part, on information obtained from on-site testing. Specifically the minimum contents of the report should include:

1. Logs of borings and/or profiles of test pits and trenches:

- a. The minimum number of borings acceptable, when not used in combination with test pits or trenches, shall be two (2), when in the opinion of the Soils Engineer such borings shall be sufficient to establish a soils profile suitable for the design of all the footings, foundations, and retaining structures.
 - b. The depth of each boring shall be sufficient to provide adequate design criteria for all proposed structures.
 - c. All boring logs shall be included in the soils report.
 2. Test pits and trenches
 - a. Test pits and trenches shall be of sufficient length and depth to establish a suitable soils profile for the design of all proposed structures.
 - b. Soils profiles of all test pits and trenches shall be included in the soils report.
 3. A plat shall be included which shows the relationship of all the borings, test pits, and trenches to the exterior boundary of the site. The plat shall also show the location of all proposed site improvements. All proposed improvements shall be labeled.
 4. Copies of all data generated by the field and/or laboratory testing to determine allowable soil bearing pressures, sheer strength, active and passive pressures, maximum allowable slopes where applicable and any other information which may be required for the proper design of foundations, retaining walls, and other structures to be erected subsequent to or concurrent with work done under the grading permit.
 5. A written Soils Report shall be submitted which shall include but is not limited to the following:
 - a. Site description
 - b. Local and site geology
 - c. Review of previous field and laboratory investigations for the site
 - d. Review of information on or in the vicinity of the site on file at the Information Counter, City of Oakland, Office of Planning and Building.
 - e. Site stability shall be addressed with particular attention to existing conditions and proposed corrective attention to existing conditions and proposed corrective actions at locations where land stability problems exist.
 - f. Conclusions and recommendations for foundations and retaining structures, resistance to lateral loading, slopes, and specifications, for fills, and pavement design as required.
 - g. Conclusions and recommendations for temporary and permanent erosion control and drainage. If not provided in a separate report they shall be appended to the required soils report.
 - h. All other items which a Soils Engineer deems necessary.
 - i. The signature and registration number of the Civil Engineer preparing the report.
- **SCA GEO-4 Geotechnical Report**

Prior to required as part of the submittal of a tentative Tract Map or tentative Parcel Map.

1. A site-specific, design level geotechnical investigation for the construction site within the project area (which is typical for any large, phased development project) shall be required as part of this project. Specifically:
 - a. Each investigation shall include an analysis of expected ground motions at the site from identified faults. The analyses shall be accordance with applicable City ordinances and polices, and consistent with the most recent version of the California Building Code, which requires structural design that can accommodate ground accelerations expected from identified faults.
 - b. The investigations shall determine final design parameters for the walls, foundations, foundation slabs, surrounding related improvements, and infrastructure (utilities, roadways, parking lots, and sidewalks).
 - c. The investigations shall be reviewed and approved by a registered geotechnical engineer. All recommendations by the project engineer, geotechnical engineer, shall be included in the final design, as approved by the City of Oakland.
 - d. The geotechnical report shall include a map prepared by a land surveyor or civil engineer that shows all field work and location of the “No Build” zone. The map shall include a statement that the locations and limitations of the geologic features are accurate representations of said features as they exist on the ground, were placed on this map by the surveyor, the civil engineer or under their supervision, and are accurate to the best of their knowledge.
 - e. Recommendations that are applicable to foundation design, earthwork, and site preparation that were prepared prior to or during the projects design phase, shall be incorporated in the project.
 - f. Final seismic considerations for the site shall be submitted to and approved by the City of Oakland Building Services Division prior to commencement of the project.
 - g. A peer review is required for the Geotechnical Report. Personnel reviewing the geologic report shall approve the report, reject it, or withhold approval pending the submission by the applicant or subdivider of further geologic and engineering studies to more adequately define active fault traces.
2. Tentative Tract or Parcel Map approvals shall require, but not be limited to, approval of the Geotechnical Report.

To implement SCA GEO-4, the Project shall implement the following Project-specific Conditions of Approval:

1. Structural foundation support may have to be obtained from the competent soil of the Temescal or San Antonio formation located approximately 10 to 20 feet below ground surface.
2. Use a rigid mat foundation designed for both short-term elastic settlement during construction and long-term consolidation settlement of the deep clay underlying the site, and/or the use of deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system.

3. Use tiedown anchors to prevent buoyancy of the building if the proposed structures are not heavy enough to overcome the hydrostatic uplift pressure of the groundwater (Treadwell and Rollo, 2008).

Impacts and Mitigation Measures

Significance Criteria

The Project would have a significant geological resource or seismic impact if it would:

1. Expose people or structures to substantial risk of loss, injury, or death involving:
 - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map or Seismic Hazards Map issued by the State Geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mines and Geology Special Publications 42 and 117 [Hart, 1997; Parrish, 2008] and PRC §2690 et. seq.);
 - Strong seismic ground shaking;
 - Seismic-related ground failure, including liquefaction, lateral spreading, subsidence, collapse; or
 - Landslides;
2. Result in substantial soil erosion or loss of topsoil, creating substantial risks to life, property, or creeks/waterways;
3. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as it may be revised), creating substantial risks to life or property;
4. Be located above a well, pit, swamp, mound, tank vault, or unmarked sewer line, creating substantial risks to life or property;
5. Be located above landfills for which there is no approved closure and post-closure plan, or unknown fill soils, creating substantial risks to life or property ; or
6. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Approach to Analysis

Because the Proposed Project would not use septic tanks or alternative wastewater disposal systems, the Proposed Project would have no impact resulting from use of wastewater disposal systems in unsupportive soils. Therefore, this topic will not be analyzed further in this EIR. As discussed above, the risks associated with surface fault rupture and landslides occurring at the site are low and are considered less than significant and are not discussed further in this section.

Because the Proposed Project would replace existing development and no new storm drain or sewer main facilities would be needed (BKF, 2008), the potential for long-term erosion issues to cause a geologic hazard are also considered less than significant and are not discussed further in this section; construction related erosion issues are addressed in Section IV.G *Hydrology and Water Quality*.

The following analysis focuses on potential Project impacts related to seismicity and erosion. The analyses are based on the findings of the draft geotechnical evaluation provided by Treadwell and Rollo (2008), as well as Proposed Project plans, current conditions at the Project Site and its surroundings, and various maps, resources, and applicable regulations and guidelines cited throughout this section.

Operational Impacts

Impact GEO-1: Redevelopment in the Project area could expose people or structures to seismic hazards such as groundshaking or liquefaction. (Less than Significant)

The Proposed Project is located in the San Francisco Bay Area, a region of intense seismic activity. Recent studies by the United States Geological Survey (USGS) indicate there is a 62 percent likelihood of a Richter magnitude 6.7 or higher earthquake occurring in the Bay Area before 2032. The Hayward Fault Zone, the active fault nearest the Project Site, is the most likely of the active Bay Area faults to experience a major earthquake. A seismic event in the Bay Area could produce ground shaking at the Proposed Project area that are very strong to very violent (MM-III to MM-X) (ABAG, 2008b). Seismic shaking can also trigger ground-failures caused by liquefaction.⁸ The Project Site is located in a Seismic Hazard Zone for liquefaction, as designated by the CGS (ABAG, 2008a).

Based on the MMI scale, an earthquake of this intensity on the Hayward fault would cause considerable structural damage, even in well-designed structures. Ground shaking of this intensity could lead to structural building damage, movement or damage of internal building components, or power failure. Substantial cracks could appear in the ground, and the shaking could cause other secondary damaging effects such as the failure of underground pipes. As a comparison, the great 1906 San Francisco earthquake, with an M 7.9, produced strong (MM-VII) shaking intensities in the Project area (ABAG, 2008b). A characteristic earthquake on the Calaveras, San Andreas, or Concord-Green Valley (listed in **Table IV.E-2**) could produce moderate (MM-VI) to strong (MM-V) ground shaking intensities (ABAG, 2008b). Earthquakes of this intensity may move heavy furniture and cause slight damage.

In accordance with City of Oakland requirements, the Project sponsor would be required to prepare a geotechnical report for the Project that includes generally accepted and appropriate engineering techniques for determining the susceptibility of the Project Site to various geologic and seismic hazards. The geotechnical report would include an analysis of ground shaking effects, liquefaction potential, and provide recommendations to reduce these hazards. Because the Project Site is within a Seismic Hazard Zone for liquefaction, recommendations for the mitigation and reduction of liquefaction would be prepared in accordance with CGS Guidelines for Evaluating and Mitigating Seismic Hazards (CDMG [now CGS], 1997). Geotechnical and seismic design criteria would conform to engineering recommendations consistent with the

⁸ Liquefaction is the process by which saturated, loose, fine-grained, granular, soil, like sand, behaves like a dense fluid when subjected to prolonged shaking during an earthquake.

seismic requirements set forth in the 2006 IBC and the 2007 California Building Code (Title 24) additions.

In addition to compliance with building standards set forth by the 2006 IBC, the Project sponsor would be required to submit an engineering analysis accompanied by detailed engineering drawings to the City of Oakland Building Services Division prior to excavation, grading, or construction activities on the Project Site. This is consistent with standard City of Oakland practices to ensure that all buildings are designed and built in conformance with the seismic requirements of the City of Oakland Building Code. An engineering analysis report and drawings and relevant grading or construction activities on a Project Site would be required to address constraints and incorporate recommendations identified in geotechnical investigations. These required submittals ensure that the buildings are designed and constructed in conformance with the requirements of all applicable building code regulations, pursuant to standard City procedures. SCA GEO-4 Geotechnical Report would ensure that the Project conforms to all applicable building code regulations.

Mitigation: None required.

Impact GEO-2: Redevelopment in the Project area could be subjected to geologic hazards, including expansive soils and differential settlement. (Less than Significant)

Soils containing a high percentage of clays are generally most susceptible to expansion. Expansive soils can damage foundations of above-ground structures, paved roads and streets, and concrete slabs. Expansive soils are common in low-lying alluvial valleys and along the shoreline of the San Francisco Bay. As previously discussed, the draft geotechnical evaluation conducted by Treadwell and Rollo (2008) has reported that the fill, creek bank, and shoreline deposits are likely not suitable for support of the proposed building loads because of their relatively low strength and high potential for compression and/or consolidation settlement. Also, isolated layers of the creek bank and shoreline deposits may be susceptible to soil liquefaction and associated ground failures. The draft geotechnical evaluation also identifies that potential hydrostatic uplift could occur due to the shallow groundwater table at the site.

Due to the fact that settlement will likely occur, the final structural design will be required to address the potential for expansive soils to increase structural damage (Treadwell and Rollo, 2008). The draft geotechnical evaluation identified various construction methods and building designs that would serve to overcome the expansive soils and differential settlement conditions at the site. These methods are listed below and are incorporated into SCA GEO-4 as specific to the Project:

- Structural foundation support may have to be obtained from the competent soil of the Temescal or San Antonio formation located approximately 10 to 20 feet below ground surface.
- Use a rigid mat foundation designed for both short-term elastic settlement during construction and long-term consolidation settlement of the deep clay underlying the site,

and/or the use of deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system.

- Use tiedown anchors to prevent buoyancy of the building if the proposed structures are not heavy enough to overcome the hydrostatic uplift pressure of the groundwater (Treadwell and Rollo, 2008).

The City of Oakland requires preparation of a geotechnical report, as well as compliance with and implementation of the geotechnical report recommendations. Compliance with the geotechnical report recommendations, required as part of SCA GEO-4 Geotechnical Report would reduce the potential for the Project to result in geological hazards such as soil expansion and differential settlement.

Mitigation: None required.

Cumulative Impacts

Impact GEO-3: The development proposed as part of the Proposed Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, would not result in significant cumulative impacts with respect to geology, soils or seismicity. (Less than Significant)

Geographic Context

Although the entire Bay Area is situated within a seismically active region with a wide range of geologic and soil conditions, these conditions can vary widely within a short distance, making the cumulative context for potential impacts resulting from exposing people and structures to related risks one that is more localized or even site-specific. Potential cumulative geology and seismic impacts do not extend far beyond a project's boundaries, since such geological impacts are typically confined to discrete spatial locations and do not combine to create an extensive cumulative impact. The exception to this generalization would occur where a large geologic feature (e.g., fault zone, massive landslide) might affect an extensive area, or where the development effects from the Project could affect the geology of an off-site location. These circumstances are not present on the Project Site, and do not apply to the Proposed Project. The Project Site is located near other development and has the opportunity to combine with structural damage from other past, present, and reasonably foreseeable future projects. These include but are not limited to projects listed in Table IV-1, List of Relevant Cumulative Projects from the City's Major Project List.

Impacts

During the early part of the 1900s, nonprofit organizations developed model building codes used throughout the United States. Although these regional code developments were effective and responsive to regulatory needs, the time came for a single set of codes. The International Code Council was established as a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes, now known as the Uniform Building Code. Within California, additional state requirements were added to the UBC to form

the California Model Building Codes (CBC). Localities, such as the City of Oakland, may adopt additional amendments to the CBC through local ordinance. The trend in building codes has been increased rigor in the design and implementation requirements for geotechnical and seismic safety. These requirements, as specified by state and local regulation with the adoption of the CBC and amendments, have progressively become more rigorous in requirements mandating a greater reduction of risk to life, health, and safety, and minimized seismic risk.

The cumulative analysis considers the Proposed Project combined with other past, present, existing, pending and reasonably foreseeable projects. Many existing buildings (i.e., past projects) in the surrounding area have been built in accordance with building code requirements for geotechnical and seismic safety in effect at the time of building construction. Present, pending and future projects within the proposed Project's geographic area are subject to these enhanced requirements and result in reduced geologic and seismic hazards. As present and future projects replace aging infrastructure and older structures with new, more rigorously regulated projects, the potential for cumulative seismic risks is incrementally reduced over time.

The SCAs discussed above, including appropriate grading requirements, and compliance with the Uniform Building Code as locally amended would reduce the potential for cumulative geologic and seismic effects from the Proposed Project Site and surrounding area. Therefore, implementation of the Project together with the impact of past, present, existing, pending and reasonably foreseeable future development would not result in any significant cumulative geologic and seismic impacts. Moreover, given that the Project will remove older structures and replace them with new structures that must comply with current and future building code requirements for geologic and seismic safety, the Project would not make any considerable contribution to any potential cumulative impact, because it will improve geologic and seismic safety on the Project Site. The impact would be less than significant.

Mitigation: None required.

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- United States Geological Survey (USGS), *The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2)*, Open File Report 2007-1437, <http://pubs.usgs.gov/of/2007/1437/>, 2008.

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F. Hazardous Materials

This section discusses the hazardous materials issues related to the existence of hazardous materials associated with the Project Site, Project construction, and Project operations. This section provides an overview of the regulatory setting that is applicable to health and safety regarding hazardous materials at the Project Site and identifies potential Project impacts and appropriate SCAs and/or mitigation measures, as necessary.

Introduction

Materials and waste may be considered hazardous if they are poisonous (toxicity), can be ignited by open flame (ignitability), corrode other materials (corrosivity), or react violently, explode or generate vapors when mixed with water (reactivity). The term “hazardous material” is defined in the State Health and Safety Code (Chapter 6.95, Section 25501[o]) as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment.

A hazardous waste, for the purpose of this EIR, is any hazardous material that is abandoned, discarded, or recycled, as defined in the State Health and Safety Code (Chapter 6.95, Section 25125). The transportation, use, and disposal of hazardous materials, as well as the potential releases of hazardous materials to the environment, are closely regulated through many state and federal laws.

Setting

Geology and Groundwater

Regional

The San Francisco Bay was created from a structural depression formed between the San Andreas and Hayward faults. Deposits along the bay margin include what is known as Bay Mud, a natural marine deposit that consists of generally uniform, soft, saturated clay and silt, organic material and some sand. The Project area is located in the East Bay plain, a broad alluvial terrace created from sediments transported from the East Bay hills towards San Francisco Bay. Near the bay margin, the alluvial materials of the East Bay transition into the bay mud estuarine deposits. These alluvial materials constitute the waterbearing units for the East Bay groundwater basin. Lake Merritt was originally a tidal estuary which was later dammed to increase water levels and create a more scenic lake. The lake is surrounded by deposits from former marine terraces.

Project Site – Historical Use

The Project Site was developed in its current state by 1959. Prior to that, the site was occupied by the Holy Sacred Heart Convent (EMG, 2005). From 1958 to 1991 a gasoline filling station associated with tenant operations was located at the site in the underground parking garage. In

1991 a total of six underground storage tanks (USTs) were removed from the site. Four of the tanks were located in the driveway area of the parking garage which were used as part of the filling station. One UST was located at the northeastern portion of the garage and the other along the eastern portion. The tanks were removed along with surrounding impacted soils and the groundwater was monitored until 1993. A closure letter from the Alameda County Health Care Services agency was issued on October 21, 1993 indicating that no further action was warranted at the site and there was no threat to human health or the environment.

Hazardous Materials Use

The Project Site currently includes various existing commercial uses which include a drug store, a bank branch, and a health club. In addition, the building contains a roof garden with large landscaped areas. Hazardous materials may be currently used in operations to some degree (such as chemicals that may be used for maintaining the linked pools in the roof garden) and as a consequence, the facility generates limited quantities of hazardous waste. Any hazardous material that is not consumed and can no longer be used is designated as a hazardous waste material. However, the aforementioned commercial uses do not typically use significant quantities of hazardous materials and as a result likely generate nominal volumes of hazardous waste.

Hazardous Building Materials Associated with Demolition

Implementation of the Project would include demolition of some portions of the existing structures on the Project Site. The Project Site was originally developed decades ago, and like many older buildings, may contain building materials that are considered to contain hazardous materials which can be hazardous to people and the environment once disturbed. These materials include lead-based paint, asbestos, and polychlorinated biphenyls (PCBs).

Prior to the EPA ban in 1978, lead-based paint was commonly used on interior and exterior surfaces of buildings. Through such disturbances as sanding and scraping activities, or renovation work, or gradual wear and tear, old peeling paint, or paint dust particulates have been found to contaminate surface soils or cause lead dust to migrate and affect indoor air quality. Exposure to residual lead can cause severe adverse health effects especially in children.

Asbestos is a naturally occurring fibrous material that was extensively used as a fireproofing and insulating agent in building construction materials before such uses were banned by the U.S. Environmental Protection Agency (USEPA) in the 1970s. Asbestos was commonly used for insulation of heating ducts as well as ceiling and floor tiles to name a few typical types of materials. Similar to lead-based paint, contained within the building materials asbestos fibers present no significant health risk, but once these tiny fibers are disturbed they become airborne and create potential exposure pathways. The fibers are very small and cannot be seen with the naked eye. Once they are inhaled they can become lodged into the lung potentially causing lung disease or other pulmonary complications.

PCBs are organic oils that were formerly used primarily as insulators in many types of electrical equipment including transformers and capacitors. After PCBs were determined to be a carcinogen

in the mid to late 1970s, the USEPA banned PCB use in most new equipment and began a program to phase out certain existing PCB-containing equipment. Fluorescent lighting ballasts manufactured after January 1, 1978, do not contain PCBs and are required to have a label clearly stating that PCBs are not present in the unit. Additional information about these materials is provided in the Regulatory Setting Section below.

Regulatory Context

The Proposed Project is subject to government health and safety regulations applicable to the transportation, use, and disposal of hazardous materials. This section provides an overview of the regulatory setting that is applicable to the health and safety at the Project Site.

Federal

Hazardous Materials Management

The primary federal agencies with responsibility for hazardous materials management include the USEPA, U.S. Department of Labor Occupational Safety and Health Administration (Fed/OSHA), and the U.S. Department of Transportation (DOT). Federal laws, regulations, and responsible agencies are summarized in **Table IV.F-1** and are discussed in detail in this section.

**TABLE IV.F-1
FEDERAL LAWS AND REGULATIONS RELATED TO
HAZARDOUS MATERIALS MANAGEMENT**

Classification	Law or Responsible Federal Agency	Description
Hazardous Materials Management	Community Right-to-Know Act of 1986 (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA))	Imposes requirements to ensure that hazardous materials are properly handled, used, stored, and disposed of and to prevent or mitigate injury to human health or the environment in the event that such materials are accidentally released.
Hazardous Waste Handling	Resource Conservation and Recovery Act of 1976 (RCRA)	Under RCRA, the EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste from "cradle to grave."
	Hazardous and Solid Waste Act	Amended RCRA in 1984, affirming and extending the "cradle to grave" system of regulating hazardous wastes. The amendments specifically prohibit the use of certain techniques for the disposal of some hazardous wastes.
Hazardous Materials Transportation	U.S. Department of Transportation (DOT)	Has the regulatory responsibility for the safe transportation of hazardous materials. The DOT regulations govern all means of transportation except packages shipped by mail (49 CFR).
	U.S. Postal Service (USPS)	USPS regulations govern the transportation of hazardous materials shipped by mail.
Occupational Safety	Occupational Safety and Health Act of 1970	Fed/OSHA sets standards for safe workplaces and work practices, including the reporting of accidents and occupational injuries (29 CFR).
Structural and Building Components (Lead-based paint, PCBs, and asbestos)	Toxic Substances Control Act (TSCA)	Regulates the use and management of PCBs in electrical equipment, and sets forth detailed safeguards to be followed during the disposal of such items.
	U.S. EPA	The EPA monitors and regulates hazardous materials used structural and building components and affects on human health.

State and local agencies often have either parallel or more stringent regulations than federal agencies. In most cases, state law mirrors or overlaps federal law and enforcement of these laws is the responsibility of the state or of a local agency to which enforcement powers are delegated. For these reasons, the requirements of the law and its enforcement are discussed under either the state or local agency section.

State

In January 1996, the California Environmental Protection Agency (Cal EPA) adopted regulations implementing a Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program). The program has six elements: hazardous waste generators and hazardous waste on-site treatment; underground storage tanks; aboveground storage tanks; hazardous materials release response plans and inventories; risk management and prevention programs; and Unified Fire Code hazardous materials management plans and inventories. The plan is implemented at the local level. The Certified Unified Program Agency (CUPA) is the local agency that is responsible for the implementation of the Unified Program. In Oakland, the Alameda County Department of Environmental Health (ACDEH) is the designated CUPA for all businesses.

Hazardous Materials Management

The California Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act) requires that any business that handles hazardous materials prepare a business plan, which must include the following:

- Details, including floor plans, of the facility and business conducted at the site;
- An inventory of hazardous materials that are handled or stored on site;
- An emergency response plan; and
- A safety and emergency response training program for new employees with annual refresher courses

Hazardous Waste Handling

The Cal EPA Department of Toxic Substances Control (DTSC) regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. State and federal laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of, and, in the event that such materials are accidentally released, to prevent or to mitigate injury to health or the environment. Laws and regulations require hazardous materials users to store these materials appropriately and to train employees to manage them safely.

Under the federal Resource Conservation and Recovery Act of 1976 (RCRA), whose responsibilities are described in Table IV.F-1, above, individual states may implement their own hazardous waste programs in lieu of RCRA, as long as the state program is at least as stringent as federal RCRA requirements. In California, the DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. The hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; prescribe management of

hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills.

Hazardous Materials Transportation

The State of California has adopted DOT regulations for the intrastate movement of hazardous materials. State regulations are contained in Title 26 of the California Code of Regulations (CCR). In addition, the State of California regulates the transportation of hazardous waste originating in the state and passing through the state (26 CCR). Both regulatory programs apply in California. The two state agencies that have primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies are the California Highway Patrol (CHP) and the California Department of Transportation (Caltrans).

Occupational Safety

The California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations (CFR). Cal/OSHA standards are generally more stringent than federal regulations.

Cal/OSHA regulations (8 CCR) concerning the use of hazardous materials in the workplace require employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal/OSHA enforces hazard communication program regulations, which contain training and information requirements, including procedures for identifying and labeling hazardous substances, and communicating hazard information relating to hazardous substances and their handling. The hazard communication program also requires that Materials Safety Data Sheets (MSDS) be available to employees, and that employee information and training programs be documented. These regulations also require preparation of emergency action plans (escape and evacuation procedures, rescue and medical duties, alarm systems, and training in emergency evacuation).

State laws, like federal laws, include special provisions for hazard communication to employees in research laboratories, including training in chemical work practices. Specific, more detailed training and monitoring is required for the use of carcinogens, ethylene oxide, lead, asbestos, and certain other chemicals listed in 29 CFR. Emergency equipment and supplies, such as fire extinguishers, safety showers, and eye washes, must also be provided and maintained in accessible places.

Cal/OSHA (8 CCR), like Fed/OSHA (29 CFR) includes extensive, detailed requirements for worker protection applicable to any activity that could disturb asbestos-containing materials, including maintenance, renovation, and demolition. These regulations are also designed to ensure that persons working near the maintenance, renovation, or demolition activity are not exposed to asbestos.

Emergency Response

California has developed an emergency response plan to coordinate emergency services provided by federal, state, and local government and private agencies. Responding to hazardous materials incidents is one part of this plan. The plan is administered by the State Office of Emergency Services (OES), which coordinates the responses of other agencies, including Cal EPA, CHP, CDFG, the San Francisco Bay Regional Water Quality Control Board (RWQCB), and the Alameda County Fire Department (ACFD). The ACFD provides first response capabilities, if needed, for hazardous materials emergencies within the Project area.

Structural and Building Components

Implementation of the Project would include demolition of structures which, due to their age, may contain asbestos, polychlorinated biphenyls (PCBs), or lead and lead-based paint. In addition, removal of existing aboveground or underground storage tanks may be required.

Asbestos. State laws and regulations prohibit emissions of asbestos from asbestos-related manufacturing, demolition, or construction activities; require medical examinations and monitoring of employees engaged in activities that could disturb asbestos; specify precautions and safe work practices that must be followed to minimize the potential for release of asbestos fibers; and require notice to federal and local governmental agencies prior to beginning renovation or demolition that could disturb asbestos. Asbestos represents a human health risk when asbestos fibers become airborne (friable) and are inhaled into the lungs.

The BAAQMD is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and is to be notified ten days in advance of any proposed demolition or abatement work. Cal/OSHA regulates asbestos removal to ensure the health and safety of workers removing asbestos containing materials and also must be notified of asbestos abatement activities.

Polychlorinated Biphenyls (PCBs). As previously discussed, PCBs are organic oils that were formerly placed in many types of electrical equipment and in fluorescent lighting ballasts. PCBs are highly persistent in the environment and are toxic. In 1979, the USEPA banned the use of PCBs in most new electrical equipment and began a program to phase out certain existing PCB-containing equipment. The use and management of PCBs in electrical equipment is regulated pursuant to the Toxic Substances Control Act (40 CFR). Fluorescent lighting ballasts that contain PCBs, regardless of size and quantity, are regulated as hazardous waste and must be transported and disposed of as hazardous waste.

Lead and Lead-Based Paint. The California Code of Regulations, Title 22, considers waste soil with concentrations of lead to be hazardous if it exceeds a total concentration of 1,000 parts per million (ppm) and a soluble¹ concentration of 5 ppm. Both the federal and California OSHAs regulate all worker exposure during construction activities that involve lead-based paint. The Interim Final Rule found in 29 CFR Part 1926.62 covers construction work where employees may be exposed to lead during such activities as demolition, removal, surface preparation for

¹ Capable of being dissolved, especially in water.

re-painting, renovation, clean up and routine maintenance. The OSHA-specified method of compliance includes respiratory protection, protective clothing, housekeeping, hygiene facilities, medical surveillance, training, etc.

Local

Soil and Groundwater Contamination

In Alameda County, remediation of contaminated sites is performed under the oversight of the ACDEH and the San Francisco Bay RWQCB. The ACDEH implements a local oversight program under contract with the SWRCB to provide regulatory oversight of the investigation and cleanup of soil and groundwater contamination from leaking petroleum USTs and ASTs. At sites where contamination is suspected or known to have occurred, the project sponsor is required to perform a site investigation and prepare a remediation plan, if necessary. For typical development projects, actual site remediation is completed either before or during the construction phase of the project. Future investigation and remediation of soil or groundwater contamination that is known, or has not yet been identified, would be subject to oversight by ACDEH.

Alameda County Hazardous Waste Management Program

Assembly Bill 2948 requires counties and cities either to adopt a county hazardous waste management plan as part of their general plan, or enact an ordinance requiring that all applicable zoning subdivision, conditional use permit, and variance decisions be consistent with the county hazardous waste management plan. Once each County had its Hazardous Waste Management Program approved by the State, each city had 180 days to either 1) adopt a City Hazardous Waste Management Plan containing specified elements consistent with the approved County Hazardous Waste Management Plan, 2) incorporate the applicable portions of the approved Plan, by reference, into the City's General Plan, or 3) enact an ordinance which requires that all applicable zoning, subdivision, conditional use permits, and variance decisions be consistent with the specified portions of the plan. Alameda County has adopted a Hazardous Waste Management Program that addresses procedures for hazardous materials incidents.

Under the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program, the ACDEH is certified by the DTSC to implement the following programs:

- Hazardous Materials Management Plan and Inventory (HMMP) and the Hazardous Materials Business Plan (HMBP)
- Risk Management program (RMP)
- Underground Storage tank (UST) program
- Spill Prevention, Control and Countermeasure (SPCC) Plan for ASTs
- Hazardous waste generators
- On-site hazardous waste treatment (tiered permit).

Submittal of updated HMMP and HMBP to the ACDEH in accordance with changes to hazardous materials storage and disposal locations and volumes in association with implementation of the

Project and future operation would be required. Potential removal or installation of USTs or ASTs under the Project would also be subject to oversight by ACDEH.

Local Plans and Policies

Discussion of the Project's overall consistency with the Oakland General Plan is provided in Section IV.H, *Land Use, Plans and Policies*, of this EIR. General Plan policies that are also significance criteria or contain a regulatory threshold which the Project must meet are addressed in this section.

City of Oakland Standard Conditions and Uniformly Applied Development Standards

The City of Oakland's SCAs relevant to reducing hazards and hazardous waste/materials impacts due to the proposed Project are listed below. If the Project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the proposed Project to help ensure less than significant impacts from hazards and hazardous wastes/materials. The SCA are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA HAZ-1 Hazards Best Management Practices**

Prior to commencement of demolition, grading, or construction. The project applicant and construction contractor shall ensure that construction of Best Management Practices (BMPs) are implemented as part of construction to minimize the potential negative effects to groundwater and soils. These shall include the following:

- a) Follow manufacturers recommendations on use, storage, and disposal of chemical products used in construction;
- b) Avoid overtopping construction equipment fuel gas tanks;
- c) During routine maintenance of construction equipment, properly contain and remove grease and oils;
- d) Properly dispose of discarded containers of fuels and other chemicals.
- e) Ensure that construction would not have a significant impact on the environment or pose a substantial health risk to construction workers and the occupants of the proposed development. Soil sampling and chemical analyses of samples shall be performed to determine the extent of potential contamination beneath all UST's, elevator shafts, clarifiers, and subsurface hydraulic lifts when on-site demolition, or construction activities would potentially affect a particular development or building.
- f) If soil, groundwater or other environmental medium with suspected contamination is encountered unexpectedly during construction activities (e.g., identified by odor or visual staining, or if any underground storage tanks, abandoned drums or other hazardous materials or wastes are encountered), the applicant shall cease work in the vicinity of the suspect material, the area shall be secured as necessary, and the applicant shall take all appropriate measures to protect human health and the environment. Appropriate measures shall include notification of regulatory agency(ies) and implementation of the actions described in the City's Standard

Conditions of Approval, as necessary, to identify the nature and extent of contamination. Work shall not resume in the area(s) affected until the measures have been implemented under the oversight of the City or regulatory agency, as appropriate.

- **SCA HAZ-2 Site Review by the Fire Services Division**

Prior to issuance of any demolition, grading or building permit. The project applicant shall submit plans for site review and approval to the Fire Prevention Bureau Hazardous Materials Unit. Property owner may be required to obtain or perform a Phase II hazard assessment.

- **SCA HAZ-3 Phase I and/or Phase II Reports**

Prior to issuance of demolition, grading, or building permits The project applicant shall submit to the Fire Prevention Bureau, Hazardous Materials Unit, a Phase I environmental site assessment report, and a Phase II report if warranted by the Phase I report for the project site. The reports shall make recommendations for remedial action, if appropriate, and should be signed by a Registered Environmental Assessor, Professional Geologist, or Professional Engineer.

- **SCA HAZ-4 Asbestos Removal in Structures**

Prior to issuance of a demolition permit. If asbestos-containing materials (ACM) are found to be present in building materials to be removed, demolition and disposal, the Project Applicant shall submit specifications signed by a certified asbestos consultant for the removal, encapsulation, or enclosure of the identified ACM in accordance with all applicable laws and regulations, including but not necessarily limited to: California Code of Regulations, Title 8; Business and Professions Code; Division 3; California Health & Safety Code 25915-25919.7; and Bay Area Air Quality Management District, Regulation 11, Rule 2, as may be amended.

- **SCA HAZ-5 Lead-Based Paint/Coatings, Asbestos, or PCB Occurrence Assessment**

Prior to issuance of any demolition, grading or building permit. The project applicant shall submit a comprehensive assessment report to the Fire Prevention Bureau, Hazardous Materials Unit, signed by a qualified environmental professional, documenting the presence or lack thereof of asbestos-containing materials (ACM), lead-based paint, and any other building materials or stored materials classified as hazardous waste by State or federal law.

- **SCA HAZ-6 Environmental Site Assessment Reports Remediation**

Prior to issuance of a demolition, grading, or building permit If the environmental site assessment reports recommend remedial action, the project applicant shall:

- a) Consult with the appropriate local, State, and federal environmental regulatory agencies to ensure sufficient minimization of risk to human health and environmental resources, both during and after construction, posed by soil contamination, groundwater contamination, or other surface hazards including, but not limited to, underground storage tanks, fuel distribution lines, waste pits and sumps.

- b) Obtain and submit written evidence of approval for any remedial action if required by a local, State, or federal environmental regulatory agency.

Submit a copy of all applicable documentation required by local, State, and federal environmental regulatory agencies, including but not limited to: permit applications, Phase I and II environmental site assessments, human health and ecological risk assessments, remedial action plans, risk management plans, soil management plans, and groundwater management plans.

- **SCA HAZ-7 Lead-based Paint Remediation**

Prior to issuance of any demolition, grading or building permit If lead-based paint is present, the project applicant shall submit specifications to the Fire Prevention Bureau, Hazardous Materials Unit signed by a certified Lead Supervisor, Project Monitor, or Project Designer for the stabilization and/or removal of the identified lead paint in accordance with all applicable laws and regulations, including but not necessarily limited to: Cal/OSHA's Construction Lead Standard, 8 CCR1532.1 and DHS regulation 17 CCR Sections 35001 through 36100, as may be amended.

- **SCA HAZ-8 Other Materials Classified as Hazardous Waste**

Prior to issuance of any demolition, grading or building permit. If other materials classified as hazardous waste by State or federal law are present, the Project Applicant shall submit written confirmation to Fire Prevention Bureau, Hazardous Materials Unit that all State and federal laws and regulations shall be followed when profiling, handling, treating, transporting and/or disposing of such materials.

- **SCA HAZ-9 Health and Safety Plan per Assessment**

Prior to issuance of any demolition, grading or building permit If the required lead-based paint/coatings, asbestos, or PCB assessment finds presence of such materials, the project applicant shall create and implement a health and safety plan to protect workers from risks associated with hazardous materials during demolition, renovation of affected structures, and transport and disposal.

- **SCA HAZ-10 Best Management Practices for Soil and Groundwater Hazards**

Ongoing throughout demolition, grading, and construction activities The project applicant shall implement all of the following Best Management Practices (BMPs) regarding potential soil and groundwater hazards.

- a) Soil generated by construction activities shall be stockpiled onsite in a secure and safe manner. All contaminated soils determined to be hazardous or non-hazardous waste must be adequately profiled (sampled) prior to acceptable reuse or disposal at an appropriate off-site facility. Specific sampling and handling and transport procedures for reuse or disposal shall be in accordance with applicable local, state and federal agencies laws, in particular, the Regional Water Quality Control Board (RWQCB) and/or the Alameda County Department of Environmental Health (ACDEH) and policies of the City of Oakland.
- b) Groundwater pumped from the subsurface shall be contained onsite in a secure and safe manner, prior to treatment and disposal, to ensure environmental and health

issues are resolved pursuant to applicable laws and policies of the City of Oakland, the RWQCB and/or the ACDEH. Engineering controls shall be utilized, which include impermeable barriers to prohibit groundwater and vapor intrusion into the building (pursuant to the SCA regarding Radon or Vapor Intrusion from Soil and Groundwater Sources

- c) Prior to issuance of any demolition, grading, or building permit, the applicant shall submit for review and approval by the City of Oakland, written verification that the appropriate federal, state or county oversight authorities, including but not limited to the RWQCB and/or the ACDEH, have granted all required clearances and confirmed that the all applicable standards, regulations and conditions for all previous contamination at the site. The applicant also shall provide evidence from the City's Fire Department, Office of Emergency Services, indicating compliance with the Standard Condition of Approval requiring a Site Review by the Fire Services Division pursuant to City Ordinance No. 12323, and compliance with the Standard Condition of Approval requiring a Phase I and/or Phase II Reports.

- **SCA HAZ-11 Hazardous Materials Business Plan**

Prior to issuance of a business license The project applicant shall submit a Hazardous Materials Business Plan for review and approval by Fire Prevention Bureau, Hazardous Materials Unit. Once approved this plan shall be kept on file with the City and will be updated as applicable. The purpose of the Hazardous Materials Business Plan is to ensure that employees are adequately trained to handle the materials and provides information to the Fire Services Division should emergency response be required. The Hazardous Materials Business Plan shall include the following:

- d) The types of hazardous materials or chemicals stored and/or used on site, such as petroleum fuel products, lubricants, solvents, and cleaning fluids.
- e) The location of such hazardous materials.
- f) An emergency response plan including employee training information
- g) A plan that describes the manner in which these materials are handled, transported and disposed.

Impacts and Mitigation Measures

Retail as well as office and commercial activities at the proposed Project Site would use hazardous chemicals common in these type of settings. These chemicals would include familiar materials, such as toners, paints, lubricants, kitchen and restroom cleaners, and other maintenance materials as well as chemicals used during operations and of the roof garden water features. These common consumer products would be used for the same purposes as in any office or support setting, including residences. Retail uses can also handle hazardous materials that are stored in containers provided by manufacturer. The amounts of hazardous materials that would be stored or handled cannot be determined at this time, however assumptions can be made that the amounts of hazardous materials and waste would not significantly change from existing conditions.

Significance Criteria

A project would have a significant impact on the environment related to hazardous materials if it would:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
2. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of acutely hazardous materials into the environment;
3. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
4. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
5. Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would result in a safety hazard for people residing or working in the project area;
6. Be located within the vicinity of a private airstrip, and would result in a safety hazard for people residing or working in the project area;
7. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
8. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Based on the characteristics of the Proposed Project and the existing conditions, the Proposed Project would not result in impacts related to hazardous emissions near an existing or proposed school, being located on a hazardous materials sites list, safety hazard associated with an airstrip or airport, or interfere with an adopted emergency response or evacuation plan. No impact discussion is provided for these topics for the following reasons:

- Emissions near School. There are a number of schools that are located within a quarter mile of the Project Site. However, the proposed Project consists of constructing two office towers that would not handle significant quantities of hazardous materials or wastes. The Project Site is located in the downtown Oakland area among many other office towers that likely handle similar quantities of hazardous materials and wastes. Therefore, the potential for hazardous emissions to affect any nearby schools is very low.
- Hazardous Sites List. The Project Site is not included on a hazardous materials site list according to databases maintained by the State Water Resources Control Board (Geotracker) and the Department of Toxic Substances Control (EnviroStor) (SWRCB, 2008 and DTSC, 2008). The nearest site to the Project Site found on these databases is a former Mobil auto service station located at 1975 Webster Street. The site was closed and no further action required in 1997. The Project Site itself, according to the Phase I investigation would have formerly been included on one of these databases, however, as discussed above, this site was also closed by the overseeing agency. Therefore, there is no impact to the public or environment from development at the proposed Project Site.

- *Interfere with Airstrip/Airport.* The proposed Project Site is located more than two miles from the nearest airstrip or airport and therefore would not interfere with any airport use plan or otherwise create a safety hazard related to any such facility. The Project is required to file FAA Form 7460-1, Notice of Proposed Construction or Alteration, because the Project involves construction and alterations exceeding 200 feet above ground level.
- *Emergency Response/Evacuation Plan.* Overall, the Project would not impede an emergency access route and would continue to maintain the existing city grid system. Additionally, the Project would not result in permanent road closures, and therefore, would not physically interfere with emergency response or evacuation plans. In addition, construction activities that would result in temporary road closures would include traffic control plans to ensure emergency vehicle access, as required by SCA TRANS-4 Construction Traffic and Parking (see Section IV.L, *Transportation and Circulation*), and therefore would not cause an impact.

Hazardous Materials Impacts

Construction-Related Impacts

Impact HAZ-1: Demolition of existing structures that contain hazardous building materials, such as lead-based paint, asbestos, and PCBs could expose workers, the public, or the environment to these hazardous materials and would generate hazardous waste. (Less than Significant)

Demolition of existing structures or portions thereof on the Project Site may expose construction workers, the public, or the environment to hazardous materials such as lead-based paint, asbestos, and PCBs. The level of potential impact is dependent upon the age, construction, and building materials in each area of the building. As discussed above, ACMs may be present at the site which, if disturbed, could expose workers and the public during demolition. Any remaining ACMs would need appropriate abatement of identified asbestos prior to demolition. ACMs are regulated both as a hazardous air pollutant under the Clean Air Act and as a potential worker safety hazard under the authority of Cal-OSHA. Cal-OSHA also regulates worker exposure to lead-based paint. Potential exposure to these hazardous building materials can be reduced through appropriate identification, removal and disposal according to applicable regulations.

Exposure to asbestos, and the resulting adverse health effects, is possible throughout the demolition and renovation phases if materials that contain asbestos are present. In structures slated for demolition under the Project, any asbestos-containing materials would be abated in accordance with state and federal regulations prior to the start of demolition or renovation activities.

Section 19827.5 of the California Health and Safety Code requires that local agencies not issue demolition or alteration permits until an applicant has demonstrated compliance with notification requirements under applicable federal regulations regarding hazardous air pollutants, including asbestos. The BAAQMD is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and is to be notified 10 days in advance of any proposed demolition or abatement work.

Notification includes the names and addresses of operations and persons responsible; description and location of the structure to be demolished/altered including size, age, and prior use, and the approximate amount of friable asbestos; scheduled starting and completion dates of demolition or abatement; nature of planned work and methods to be employed; procedures to be employed to meet Bay Area Air Quality Management District (BAAQMD) requirements; and the name and location of the waste disposal site to be used. The BAAQMD randomly inspects asbestos removal operations and will inspect any removal operation about which a complaint has been received.

Asbestos abatement contractors must follow state regulations contained in 8 CCR 1529 and 8 CCR 341.6 through 341.14 where there is asbestos-related work involving 100 square feet or more of asbestos-containing material. Asbestos removal contractors must be certified as such by the Contractors Licensing Board of the State of California. The owner of the property where abatement is to occur must have a hazardous waste generator number assigned by and registered with the DTSC in Sacramento. The site owner or responsible party and the transporter of the waste are required to file a hazardous waste manifest that details the transportation of the material from the site and its disposal.

Both the federal OSHA and Cal/OSHA regulate worker exposure during construction activities that disturb lead-based paint. The Interim Final Rule found in 29 CFR 1926.62 covers construction work in which employees may be exposed to lead during such activities as demolition, removal, surface preparation for repainting, renovation, cleanup, and routine maintenance. The OSHA-specified compliance includes respiratory protection, protective clothing, housekeeping, special high-efficiency filtered vacuums, hygiene facilities, medical surveillance, and training. No minimum level of lead is specified to activate the provisions of this regulation.

Fluorescent lighting ballasts manufactured prior to 1978, and electrical transformers, capacitors, and generators manufactured prior to 1977, may contain PCBs. In accordance with the Toxic Substances Control Act and other federal and state regulations, the Proposed Project would be required to properly handle and dispose of electrical equipment and lighting ballasts that contain PCBs would further ensure potential impacts are less than significant.

Compliance with these regulations and procedures, as well as SCA HAZ-4, SCA HAZ-5 and SCA HAZ-7, shown above, would ensure that any potential impacts due to asbestos and lead-based paint are less-than-significant.

Mitigation: None required.

Hazardous Materials Use, Storage, and Disposal

Impact HAZ-2: The Proposed Project would involve the transportation, use, and storage of hazardous chemicals, which could present public health and/or safety risks to facility workers, patients and visitors, and the surrounding area. (Less than Significant)

Activities at the Proposed Project Site are expected to continue to involve the use of chemical compounds and products that are considered hazardous materials. Exposure to hazardous chemicals could cause acute or chronic health effects to workers and visitors.

The Project would continue to implement the regulatory guidelines and procedures that are currently in use in the existing conditions. Flammable materials stored indoors would be kept in fire safety cabinets when not in use. Other hazardous materials would be stored according to manufacturers recommendations and according to the specifications within the Hazardous Materials Management Plan or Business Plan.

Handling and use of these hazardous materials and the disposal of the resulting hazardous wastes would be required to follow the applicable laws and regulations, as described in *Regulatory Setting* above. The net result of good compliance would be the reduction of risks and hazards to workers, the public, and the environment to levels that are considered acceptable, for all hazardous materials proposed for use on the Project Site.

Hazardous materials would typically be stored in their original containers prior to use. As required, the hazardous materials would be stored in locations according to compatibility and in storage enclosures (i.e., flammable material storage cabinets and biological safety cabinets) or in areas or rooms specially designed, protected, and contained for such storage, in accordance with applicable regulations. Hazardous materials would be handled and used in accordance with applicable regulations by personnel that have been trained in the handling and use of the material and that have received proper hazard-communication training. Hazardous materials reporting (i.e., California Hazardous Materials Business Planning, California Proposition 65 notification, and Emergency Planning and Community-Right-to-Know Act reporting) would be completed as required.

Hazardous Materials

Any hazardous material that is not consumed and can no longer be used would be designated as a hazardous waste material. Overall, the Proposed Project is expected to operate without significant change with respect to existing operations although the total increase in square footage would likely result in a minor increase of total hazardous materials stored.

Hazardous Materials and Hazardous Waste Transport

All hazardous materials would be transported to the site in accordance with applicable hazardous materials shipping regulations. Hazardous materials and waste would be delivered, stored, and handled in accordance with the Hazardous Materials Management Plan (HMMP). The HMMP would also provide details on appropriate personal protective equipment, disposal procedures, and spill response measures in the case of accidental upset conditions.

Required compliance with applicable regulatory requirements and SCA HAZ-1 through HAZ-6, and SCA HAZ-8 through HAZ-11 would minimize hazards to workers, visitors, the public, and the environment from waste products.

Mitigation: None required.

Impact HAZ-3: Hazardous materials used onsite during construction activities (i.e. solvents) could be spilled through improper handling or storage, potentially increasing public health and/or safety risks to Kaiser Center workers, patients and visitors, and the surrounding area. (Less than Significant)

Construction activities would require the use of certain hazardous materials such as fuels, oils, lubricants, solvents, and glues. Inadvertent release of large quantities of these materials into the environment could adversely impact soil, surface waters, or groundwater quality. The use of construction best management practices typically implemented as part of construction would minimize the potential adverse effects to groundwater and soils.

Construction projects, such as the one that would be undertaken for the Proposed Project, would require certain hazardous materials (fuels, adhesives, solvents), that, if improperly used and inadvertently released, could result in a temporary hazard to workers or the public. However, the hazardous materials typically used on a construction site are brought onto the site packaged in consumer quantities and used in accordance with manufacturer recommendations. The overall quantities of these materials on the site at one time does not result in large bulk amounts that, if spilled, could cause a significant adverse affects to human health. Spills of hazardous materials on construction sites are typically localized and are cleaned up in a timely manner. In most cases, the individual construction contractors are responsible for their hazardous materials and are required under their contract to properly store and dispose of these materials in compliance with state and federal laws. Given the quantities of hazardous materials typically needed for large construction projects and the use of best management practices as required by the individual construction contractors, the threat of exposure to the public or contamination to soil and groundwater from construction-related hazardous materials is considered a less than significant impact.

Compliance with these regulations and procedures, as well as SCA HAZ-1 through HAZ-10, shown above, would ensure that any potential impacts due to hazards from construction activities are less than significant.

Mitigation: None required.

Cumulative Impacts

Impact HAZ-4: Hazards at the Project Site could contribute to cumulative hazards in the vicinity of the Project Site. (Less than Significant)

Geographic Context

The geographic area considered for potential public health or hazards cumulative impacts consists of an area within one-quarter-mile of the Project Site, and the area along transportation routes used during demolition and construction activities associated with projects within this radius. Hazards and hazardous materials impacts are generally site-specific and/or have limited mobility, and would not be expected to have cumulatively considerable effects beyond this distance.

Impacts

Development activities in this area could increase the exposure of persons to hazardous materials, including contaminated soil, soil gas, groundwater, hazardous construction materials, and lead and asbestos. However, the use, storage, and disposal of hazardous materials has been increasingly regulated by local, State, and federal law and regulations. The historical trend within the regulatory community has been to strengthen the standards regarding the use, handling, and transport of hazardous materials, therefore minimizing the risk to public health, safety, and welfare. Many past projects have been, all present projects are, and all future projects, including the Proposed Project, will be subject to these more rigorous controls for site remediation and development. The current and future handling of hazardous materials within the geographic area will be subject to these escalating regulations and the City's SCAs and as a result the cumulative hazardous materials risks will not be significant. Moreover, it is unlikely that any potential hazardous materials exposure from the construction activities would combine with other surrounding activities that may involve hazardous material exposure because there is no evidence that other construction activities will be occurring in the immediate area surrounding the site at the time of Project construction that could potentially combine with the Project. Additionally, compliance with the strict regulatory requirements associated with handling of hazardous materials would reduce the potential for any cumulatively considerable contribution from the Project to any potential cumulative impact. Therefore, implementation of the Proposed Project together with the impact of past, present, pending and reasonably foreseeable development would not result in any significant cumulative public health or hazards impacts.

Mitigation: None required.

References – Hazardous Materials

Department of Toxic Substances Control (DTSC), *EnviroStor Database*, http://www.envirostor.dtsc.ca.gov/public/map.asp?global_id=&x=-119.1357421875&y=37.82280243352756&zl=5&ms=640,480&mt=m&findaddress=True&city=OAKLAND&zip=94612&county=&federal_superfund=true&state_response=true&voluntary_cleanup=true&school_cleanup=true&permit_site=true&ca_site=true&permit_and_ca_site=true, accessed July 22, 2008.

EMG, *Phase I Environmental Site Assessment of Kaiser Center, Oakland CA*, June 7, 2005.

State Water Resources Control Board (SWRCB), *Geotracker Database for Webster and 20th Streets, Oakland, CA*, <http://www.geotracker.swrcb.ca.gov/map/>, accessed July 22, 2008.

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G. Hydrology and Water Quality

This section describes existing hydrology and water quality conditions in the Kaiser Center Project vicinity and presents applicable regulations that pertain to groundwater, surface water, flooding, and water quality. This section also discusses the changes in hydrology and water quality that could result from construction and operation of the Project and identifies potential impacts and applicable City of Oakland's SCAs and/or mitigation measures, as necessary.

Setting

Hydrology

Regional Drainage Patterns

The Project area lies in the South Bay Hydrologic Basin within the San Francisco Bay hydrologic region. San Francisco Bay provides a topographic separation between the northern and southern coastal mountain ranges. The San Francisco Bay estuarine system conveys the waters of the San Joaquin and Sacramento rivers into the Pacific Ocean. These rivers enter the San Francisco Bay at the eastern end of Suisun Bay. The Project area is part of the Oakland Super-Planning Watershed in Alameda County, within the San Francisco Bay hydrologic region (California Department of Fish and Game, 2004).

Local Drainage Patterns

The drainage at the Project Site generally flows towards Lake Merritt, from northwest to southeast. Lake Merritt flows southward into the Lake Merritt Channel, Oakland Estuary, and subsequently into San Francisco Bay. North of the Project Site is the Glen Echo Creek watershed, which drains entirely into Lake Merritt.

Surface Water

The major surface water bodies in the Project area are Glen Echo Creek, Lake Merritt, the Oakland Estuary, and San Francisco Bay. A number of other creeks flow into Lake Merritt, which subsequently drains into the Lake Merritt Channel, Oakland Estuary, and San Francisco Bay. Runoff from the Project Site flows into Lake Merritt, southward of the confluence of the nearby creeks with the lake. Lake Merritt is a 140-acre tidal estuary that was formed thousands of years ago and has been extensively modified in the past 150 years (Lake Merritt Institute, 2009). The depth of Lake Merritt ranges from approximately eight to ten feet. The lake is flushed twice daily by tides and receives freshwater from 60 storm drains. Therefore, the lake has a mixture of freshwater and saltwater.

Water Quality

The Project Site lies in a predominantly urbanized area adjacent to San Francisco Bay. Central San Francisco Bay is classified as a 303(d)-listed impaired water body due to high levels of

numerous contaminants and exotic species (RWQCB, 2007a). Lake Merritt is classified as a 303(d)-listed impaired water body and Wildlife Refuge (Coastal Commission, 2006). More details about the 303(d) classification are in the *Federal Regulatory Setting* of this section. Lake Merritt is listed as an impaired water body due to organic enrichment/low dissolved oxygen and high levels of trash. The trash primarily enters the lake through urban runoff and storm sewers. In 2006, the Coastal Commission identified bacteria as another pollutant of concern (Coastal Commission, 2006). Low dissolved oxygen at Lake Merritt generally occurs due to decomposition of plant material, stratification, and restriction of tidal circulation (Lake Merritt Institute, 2003).

Flooding

Flooding is inundation of normally dry land as a result of rapid accumulation of stormwater runoff or rise in the level of surface waters (City of Oakland, 2004). Flooding becomes a hazard when the flow of water exposes people or structures to a significant risk of loss, injury, or death. Flooding generally occurs due to excess runoff due to heavy snowmelt or rainfall, but it can also result from the interaction with natural hazards, such as tsunamis, seiches, or failure of dams.

The Federal Emergency Management Agency (FEMA), through its Flood Insurance Rate Mapping (FIRM) program, designates areas where flooding could occur during a 1% annual chance or a 0.2% annual chance flood events. The Project Site is located in an area determined to be outside of the 0.2% annual chance flood, designated as Zone X on the FIRM Community-Panel Number 065048 0014 (FEMA, 1982).

Tsunamis are waves caused by an underwater earthquake, landslide, or volcanic eruption. Seiches are waves in a semi-enclosed or enclosed body of water such as a lake, reservoir, or harbor. Oakland does not have large rivers or open coastline that can result in devastating storm-induced flooding. Flooding from tsunamis would affect low-lying areas along the Oakland Estuary and San Francisco Bay, but the island of Alameda would shelter inland areas such as the Project Site. The occurrence of devastating seiches in Oakland is unlikely (City of Oakland, 2004).

Flooding could also occur due to dam failure. The California Department of Water Resources, Division of Safety of Dams (DSOD) oversees the construction of dams that are over 25 feet high and impound over 15 acre-feet of water, or those that are over 6 feet high and impound over 50 acre-feet of water. The DSOD requires dam owners to develop maps designating potential dam failure. ABAG compiled these maps into a central database for many bay area cities (ABAG, 1995). Based on these maps, the Project Site is not at risk for dam failure inundation.

Groundwater

A groundwater basin is a hydrogeologic unit containing several connected and interrelated aquifers or one large aquifer. The Project Site lies in the East Bay Plain Groundwater Basin (Basin No. 2-9-04), which extends from Richmond to Hayward. The basin is a northwest-trending alluvial plain bounded on the west by San Francisco Bay, on the north by San Pablo Bay, on the east by Franciscan Basement rock, and on the south by the Niles Cone Groundwater Basin

(DWR, 2004). The alluvial materials that extend westward from the East Bay hills to San Francisco Bay constitute the deep water-bearing strata for the groundwater basin (DWR, 2004). The basin is identified as a potential water source for agricultural, industrial, and municipal use (RWQCB, 2007b). Groundwater levels at the Project Site vary between 0 and 3 feet City of Oakland vertical datum elevation (Treadwell&Rollo, 2008). Groundwater levels should be expected to fluctuate between wet and dry seasons by approximately 1 to 2 feet, depending on the rainfall and the level of Lake Merritt (Treadwell&Rollo, 2008). Elevations at the Project Site vary between 18 feet vertical datum elevation at the northwest corner of the site to 6 feet vertical datum elevation at the southeast corner of the site.

Regulatory Setting

Federal, state, and local agencies regulate activities that could affect hydrological and water quality features in the Project area. This section describes the regulatory framework that would apply to the Proposed Project.

Federal

Clean Water Act

The CWA established the basic structure for regulating discharges of pollutants into the waters of the U.S. and gave the USEPA the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA sets water quality standards for all contaminants in surface waters. The statute employs a variety of regulatory and nonregulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. The Corps has jurisdiction over all waters of the U.S. including, but not limited to, perennial and intermittent streams, lakes, and ponds, as well as wetlands in marshes, wet meadows, and side hill seeps. Under Section 401 of the CWA every applicant for a federal permit or license for any activity which may result in a discharge to a water body must obtain State Water Quality Certification that the proposed activity will comply with state water quality standards.

The National Pollutant Discharge Elimination System (NPDES) permit program under the CWA controls water pollution by regulating point and nonpoint sources that discharge pollutants into “waters of the U.S.” California has an approved state NPDES program. The USEPA has delegated authority for NPDES permitting to the California State Water Resources Control Board (SWRCB), which has nine regional boards. The San Francisco Bay Regional Water Quality Control Board (RWQCB) regulates water quality in the Project area.

Section 303(d) of the CWA requires that each state identify water bodies or segments of water bodies that are “impaired” (i.e., not meeting one or more of the water quality standards established by the state). These waters are identified in the Section 303(d) list as waters that are polluted and need further attention to support their beneficial uses. Once the water body or segment is listed, the state is required to establish Total Maximum Daily Load (TMDL) for the

pollutant causing the conditions of impairment. TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. Generally, TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The intent of the Section 303(d) list is to identify water bodies that require future development of a TMDL to maintain water quality.

In accordance with Section 303(d), the San Francisco Bay RWQCB has identified impaired water bodies within its jurisdiction, along with the pollutant or stressor responsible for impairing the water quality (RWQCB, 2007b). In the San Francisco Bay region, the RWQCB has designated the South Basin of San Francisco Bay as an impaired water body. Pollutants that contribute to this impairment are chlordane, DDT, diazinon, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, polychlorinated biphenyls, and selenium (RWQCB, 2007a). Lake Merritt is listed as an impaired water body for organic enrichment/low dissolved oxygen, bacteria, and trash (Coastal Commission, 2006).

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act, Division 7 of the California Water Code, allows the SWRCB to adopt statewide water quality control plans. The purpose of the plans is to establish water quality objectives for specific water bodies. The act also authorizes the NPDES program under the CWA, which establishes water quality requirements for discharges to waters of the state. Most of the implementation of SWRCB's responsibilities is delegated to nine regional boards. The San Francisco Bay RWQCB has established permit requirements for stormwater runoff for the Project area (see *Regional Regulatory Setting* below).

California Toxics Rule

Under the California Toxic Rule, the USEPA has proposed water quality criteria for priority toxic pollutants for inland surface waters, enclosed bays, and estuaries. These federally promulgated criteria create water quality standards for California waters. The California Toxic Rule satisfies CWA requirements and protects public health and the environment. The USEPA and the SWRCB have the authority to enforce these standards. However, the Proposed Project would not discharge toxic pollutants directly into the inland surface waters, such as Lake Merritt, or San Francisco Bay, therefore the California Toxic Rule would not apply.

Regional

Regional Water Quality Control Board

The San Francisco Bay RWQCB is responsible for the protection of beneficial uses and the water quality of water resources within the San Francisco Bay region. The San Francisco Bay RWQCB administers the NPDES stormwater permitting program and regulates stormwater in the San Francisco Bay region. The City of Oakland is a permittee under the NPDES Municipal Stormwater Permit for the Alameda Countywide Clean Water Program (see below for detailed

discussion). Project Applicants are required to apply for a NPDES General Permit for discharges associated with project construction activities of greater than one acre.

General Permit

Stormwater discharges from construction activities on one acre or more are regulated by the RWQCB and are subject to the permitting requirements of the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (General Construction Permit). The Proposed Project Site includes a 2.2-acre area that will be altered. The RWQCB established the General Construction Permit program to reduce surface water impacts from construction activities. The Proposed Project would be required to comply with the current NPDES permit requirements to control stormwater discharges from the construction site. (See *Alameda County Regulations* below). The General Construction Permit requires the preparation and implementation of a stormwater pollution prevention plan (SWPPP) for construction activities. The SWPPP must be prepared before the construction begins, and in certain cases, before demolition begins. The SWPPP must include specifications for best management practices (BMPs) that would need to be implemented during project construction. BMPs are measures that are undertaken to control degradation of surface water by preventing soil erosion or the discharge of pollutants from the construction area. The SWPPP must describe measures to prevent or control runoff after construction is complete and identify procedures for inspecting and maintaining facilities or other project elements. Required elements of a SWPPP include:

1. Site description addressing the elements and characteristics specific to the site
2. Descriptions of BMPs for erosion and sediment controls;
3. BMPs for construction waste handling and disposal;
4. Implementation of approved local plans;
5. Proposed post-construction controls; and
6. Non-stormwater management.

Examples of typical construction BMPs include scheduling or limiting activities to certain times of year, installing sediment barriers such as silt fence and fiber rolls, maintaining equipment and vehicles used for construction, tracking controls such as stabilizing entrances to the construction site, and developing and implementing a spill prevention and cleanup plan. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing and fueling. The California Stormwater Quality Association (CASQA) established BMPs for the State of California in the *California Storm Water Best Management Practice Handbook* (CASQA, 2003).

Dewatering Permit

Excavation and trenching activities in areas with shallow groundwater requires dewatering (the removal of groundwater by pumping), which is subject to the RWQCB construction dewatering permit requirements. Dewatering operations are regulated under state requirements for stormwater pollution prevention and control. Discharge of non-stormwater from a trench or excavation that contains sediments or other pollutants to sanitary sewer, storm drain systems,

creek beds (even if dry), or receiving waters is prohibited. Discharge of uncontaminated groundwater from dewatering is a conditionally exempted discharge by the RWQCB. However, the removed water could potentially be contaminated with chemicals released from construction equipment or sediments from excavation. Therefore, disposal of dewatering discharge would require permits either from the RWQCB for discharge to surface creeks and groundwater or from local agencies for discharge to storm or sanitary sewers. The discharge of water resulting from dewatering operations would require an NPDES Permit, or a waiver (exemption) from the RWQCB, which would establish discharge limitations for any specific chemicals known to existing in the dewatering flows.

Regional Water Quality Control Plan

The San Francisco Bay RWQCB prepared the *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan) for San Francisco Bay (RWQCB, 2007b). The Basin Plan contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the region and describes beneficial uses of major surface waters and their tributaries. The Basin Plan lists following beneficial uses for the South Basin of San Francisco Bay:

- Ocean, Commercial, and Sport Fishing
- Estuarine Habitat
- Industrial Service Supply
- Fish Migration
- Navigation
- Preservation of Rare and Endangered Species
- Water Contact Recreation
- Noncontact Recreation
- Shellfish Harvesting
- Wildlife Habitat

The Basin Plan identifies the following beneficial uses for Lake Merritt:

- Water Contact Recreation
- Noncontact Recreation
- Fish Spawning
- Wildlife Habitat

For this project, the RWQCB is responsible for regulating construction activities to ensure the protection of the above beneficial uses.

Alameda County Regulations

The Alameda County Flood Control & Water Conservation District (ACFCWCD) and the City of Oakland Public Works Agency share responsibility for maintaining drainage facilities in Oakland. The Project Site lies within the jurisdiction of Zone 12 of the ACFCWCD (ACFCWCD, 2009).

The project sponsor would comply with the requirements of these agencies during construction and operation of the project.

Alameda Countywide Clean Water Program

The Alameda Countywide Clean Water Program (ACCWP) includes 17 member agencies that work together to protect creeks, wetlands and San Francisco Bay (ACCWP, 2009). The City of Oakland and ACFCWCD are two of the agencies that participate in the ACCWP. The member agencies have developed performance standards to clarify the requirements of the stormwater pollution prevention program, adopted stormwater management ordinances, conducted extensive education and training programs, and reduced stormwater pollutants from industrial areas and construction sites (ACCWP, 2009). In the project area, the ACCWP administers the stormwater program to meet CWA requirements by controlling pollution in the local storm drain sewer systems.

NPDES Permit

On October 14, 2009, the San Francisco Bay Regional Water Quality Control Board adopted the Municipal Regional Stormwater Permit (MRP) (NPDES No. CAS612008; Order No. R2-2009-0074). This permit includes ACCWP members (including the City of Oakland) as well as 59 other Phase 1 municipal stormwater permittees in the Bay Area.

Oakland has jurisdiction over and/or maintenance responsibility for its municipal separate storm drain systems and/or watercourses in the city. Construction activities associated with the Proposed Project would be subject to the MRP requirements for stormwater management and discharges. The permit also incorporates updated state and federal requirements related to the quantity and quality of post-construction stormwater discharges from new development and redevelopment projects. The MRP serves as a framework for identification and implementation of control measures or BMPs.

The MRP includes Provision C.3 that governs storm drain systems and regulates post construction stormwater runoff. The provision requires new development and redevelopment projects to incorporate post-construction treatment measures and other appropriate source control and site design features to reduce the pollutant load in stormwater discharges and to manage runoff flows. "Redevelopment" is defined as a project on a previously developed site that results in the addition or replacement of impervious surface. For projects that create and/or replace 10,000 square feet or more of impervious surface and would result in an increase of, or replacement of, more than 50 percent of the impervious surface of a previously existing development, and the existing development was not subject to stormwater treatment measures, the entire project must be included in a treatment system design. Projects that meet this definition, site design must incorporate low impact development (LID) source control measures, and stormwater treatment onsite or at a joint stormwater treatment facility. Site design must minimize impervious surfaces, and incorporate means for infiltration, evapotranspiration, or biotreatment of stormwater. MRP provision C.3 also requires that projects which would create and/or replace one acre or more of impervious surface, and would increase impervious surface area over the pre-project condition must meet the Hydromodification Management Standard. In

compliance with this standard, the increases in runoff flow and volume associated with a project must be managed so that post-project runoff will not exceed estimated pre-project rates and durations if the increased runoff is likely to increase erosion of creeks, increase the generation of silt, or cause other adverse impacts. The applicant shall comply with the applicable provisions of the MRP.

Local

City of Oakland's Municipal Code

The City of Oakland Municipal Code implements the following regulations to protect water quality and water resources:

Creek Protection, Stormwater Management, and Discharge Control Ordinance (part of Chapter 13 of the Oakland Municipal Code). This ordinance prohibits activities that would result in the discharge of pollutants to Oakland's waterways or in damage to creeks, creek functions, or habitat. The ordinance requires the use of standard BMPs to prevent pollution or erosion to creeks and/or storm drains. Additionally, a creek protection permit is required for any construction work on creekside properties. The ordinance establishes comprehensive guidelines for the regulation of discharges to the city's storm drain system and the protection of surface water quality. The ordinance identifies BMPs and other protective measures for development projects. Under the ordinance, the City of Oakland Public Works Agency issues permits for storm drainage facilities that would be connected to existing city drainage facilities. In 1997, the ordinance was amended to include the requirement for a creek protection permit for any construction or related activity on creekside property. The ordinance includes enforcement provisions to provide more effective methods to deter and reduce the discharge of pollutants to the storm drain system, local creeks, and San Francisco Bay. The provisions also list clear guidelines for creekside residents to protect the creek and habitat.

Grading Ordinance (part of Chapter 15 of the Oakland Municipal Code). The Grading Ordinance requires a permit for grading activities on private or public property for projects that exceed certain criteria, such as amount of proposed excavation and degree of site slope. During project construction, the volume of the excavated fill material could exceed 50 cubic yards and could result in a 20 percent slope onsite, or the depth of excavation could exceed five feet at any location. Therefore, the project sponsor would be required to apply for the grading permit and prepare a grading plan, erosion and sedimentation control plan, and drainage plan.

City of Oakland's General Plan

The following objectives, policies, and actions from City of Oakland's General Plan are applicable to the Proposed Project:

Open Space, Conservation and Recreation (OSCAR), Chapter 3-Conservation, Water Resources, Objective CO-5: Water Quality (City of Oakland, 1996): To minimize the adverse effects of urbanization on Oakland's groundwater, creeks, lakes, and nearshore waters.

Safety Element, Chapter 6-Flooding Hazards, Policy FL-1 (City of Oakland, 2004):

Enforce and update local ordinance, and comply with regional orders, that would reduce the risk of storm-induced flooding

Action FL-1.4: Continue to enforce the grading, erosion, and sedimentation ordinance by prohibiting the discharge of concentrated stormwater flows by other than approved methods.

City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards

The City of Oakland's SCAs relevant to reducing hydrology and water quality impacts due to the Proposed Project are listed below. If the project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to hydrology and water quality. The SCA are incorporated and required as part of the project, so they are not listed as mitigation measures.

- **SCA HYD-1 Erosion and Sedimentation Control Plan**

Prior to any grading activities.

- 1) The project applicant shall obtain a grading permit if required by the Oakland Grading Regulations pursuant to Section 15.04.780 of the Oakland Municipal Code. The grading permit application shall include an erosion and sedimentation control plan for review and approval by the Building Services Division. The erosion and sedimentation control plan shall include all necessary measures to be taken to prevent excessive stormwater runoff or carrying by stormwater runoff of solid materials on to lands of adjacent property owners, public streets, or to creeks as a result of conditions created by grading operations. The plan shall include, but not be limited to, such measures as short-term erosion control planting, waterproof slope covering, check dams, interceptor ditches, benches, storm drains, dissipation structures, diversion dikes, retarding berms and barriers, devices to trap, store and filter out sediment, and stormwater retention basins. Off-site work by the project applicant may be necessary. The project applicant shall obtain permission or easements necessary for off-site work. There shall be a clear notation that the plan is subject to changes as changing conditions occur. Calculations of anticipated stormwater runoff and sediment volumes shall be included, if required by the Director of Development or designee. The plan shall specify that, after construction is complete, the project applicant shall ensure that the storm drain system shall be inspected and that the project applicant shall clear the system of any debris or sediment.

Ongoing throughout grading and construction activities.

- 2) The project applicant shall implement the approved erosion and sedimentation plan. No grading shall occur during the wet weather season (October 15 through April 15) unless specifically authorized in writing by the Building Services Division.

- **SCA HYD-2 Stormwater Pollution Prevention Plan**

Prior to and ongoing throughout demolition, grading, and/or construction activities The project applicant must obtain coverage under the General Construction Activity Storm Water Permit (General Construction Permit) issued by the State Water Resources Control Board (SWRCB). The project applicant must file a notice of intent (NOI) with the

SWRCB. The project applicant will be required to prepare a stormwater pollution prevention plan (SWPPP) and submit the plan for review and approval by the Planning and Zoning Division and the Building Services Division. At a minimum, the SWPPP shall include a description of construction materials, practices, and equipment storage and maintenance; a list of pollutants likely to contact stormwater; site-specific erosion and sedimentation control practices; a list of provisions to eliminate or reduce discharge of materials to stormwater; Best Management Practices (BMPs), and an inspection and monitoring program. Prior to the issuance of any construction-related permits, the project applicant shall submit a copy of the SWPPP and evidence of approval of the SWPPP by the SWRCB to the Building Services Division. Implementation of the SWPPP shall start with the commencement of construction and continue through the completion of the project. After construction is completed, the project applicant shall submit a notice of termination to the SWRCB.

- **SCA HYD-3 Post-construction Stormwater Pollution Management Plan**

Prior to issuance of building permit (or other construction-related permit). The applicant shall comply with the requirements of Provision C.3 of the National Pollutant Discharge Elimination System (NPDES) permit issued to the Alameda Countywide Clean Water Program. The applicant shall submit with the application for a building permit (or other construction-related permit) a completed Stormwater Supplemental Form for the Building Services Division. The project drawings submitted for the building permit (or other construction-related permit) shall contain a stormwater pollution management plan, for review and approval by the City, to limit the discharge of pollutants in stormwater after construction of the project to the maximum extent practicable.

- 1) The post-construction stormwater pollution management plan shall include and identify the following:
 - a. All proposed impervious surface on the site;
 - b. Anticipated directional flows of on-site stormwater runoff; and
 - c. Site design measures to reduce the amount of impervious surface area and directly connected impervious surfaces; and
 - d. Source control measures to limit the potential for stormwater pollution; and
 - e. Stormwater treatment measures to remove pollutants from stormwater runoff.
- 2) The following additional information shall be submitted with the post-construction stormwater pollution management plan:
 - a. Detailed hydraulic sizing calculations for each stormwater treatment measure proposed; and
 - b. Pollutant removal information demonstrating that any proposed manufactured/mechanical (i.e., non-landscape-based) stormwater treatment measure, when not used in combination with a landscape-based treatment measure, is capable of removing the range of pollutants typically removed by landscape-based treatment measures.

All proposed stormwater treatment measures shall incorporate appropriate planting materials for stormwater treatment (for landscape-based treatment measures) and shall be designed with considerations for vector/mosquito control. Proposed planting materials for all proposed landscape-based stormwater treatment measures shall be included on the landscape and irrigation plan for the project. The applicant is not required to include on-site

stormwater treatment measures in the post-construction stormwater pollution management plan if he or she secures approval from Planning and Zoning of a proposal that demonstrates compliance with the requirements of the City's Alternative Compliance Program.

Prior to final permit inspection. The applicant shall implement the approved stormwater pollution management plan.

- **SCA HYD-4 Maintenance Agreement for Stormwater Treatment Measures**

Prior to final zoning inspection. For projects incorporating stormwater treatment measures, the applicant shall enter into the "Standard City of Oakland Stormwater Treatment Measures Maintenance Agreement," in accordance with Provision C.3.e of the NPDES permit, which provides, in part, for the following:

- 1) The applicant accepting responsibility for the adequate installation/construction, operation, maintenance, inspection, and reporting of any on-site stormwater treatment measures being incorporated into the project until the responsibility is legally transferred to another entity; and
- 2) Legal access to the on-site stormwater treatment measures for representatives of the City, the local vector control district, and staff of the Regional Water Quality Control Board, San Francisco Region, for the purpose of verifying the implementation, operation, and maintenance of the on-site stormwater treatment measures and to take corrective action if necessary. The agreement shall be recorded at the County Recorder's Office at the applicant's expense.

Impacts and Mitigation Measures

Significance Criteria

A hydrology or water quality impact would be considered significant if it would meet any of the following significance criteria. The significance criteria are listed within the general categories used to organize the impact discussion that follows.

Water Quality

The Project would have a significant water quality impact if it would:

1. Violate any water quality standards or waste discharge requirements;
2. Result in substantial erosion or siltation onsite or offsite that would affect the quality of receiving waters;
3. Create or contribute substantial runoff that would be an additional source of polluted runoff;
4. Otherwise substantially degrade water quality;
5. Substantially alter the existing drainage pattern of the site or area (including through the alteration of the course or by increasing the rate or amount of flow of a creek, river, or stream) in a manner that would result in substantial erosion, siltation, or flooding, both on or off the site; or

Groundwater Resources

The Project would have a significant groundwater resources impact if it would:

1. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or proposed uses for which permits have been granted).

Flooding

The Project would have a significant flooding impact if it would:

1. Result in substantial flooding onsite or offsite;
2. Create or contribute substantial runoff that would exceed the capacity of existing or planned stormwater drainage systems;
3. Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, that would impede or redirect flood flows;
4. Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
5. Expose people or structures to a substantial risk of loss, injury, or death involving flooding; or
6. Result in inundation by seiche, tsunami, or mudflow.

Hydrology and Water Quality Impacts

Construction Impacts on Flooding Conditions and Water Quality

Impact HYD-1: Project construction would involve activities (excavation, soil stockpiling, and grading) that could generate loose, erodable soils that could violate water quality standards or waste discharge requirements, result in substantial erosion or siltation, create or constitute substantial polluted runoff, or otherwise substantially degrade water quality. (Less than Significant)

The construction would include excavation, soil stockpiling, and grading. These activities could result in temporary erosion and transportation of sediments into the storm drainage system, especially during flood events. The use of hazardous chemicals, such as petroleum and oil, during construction could generate chemical wastes that, if not properly managed, could flow into the storm drain system. Overall Project construction activities could induce construction-related onsite soil erosion, and cause increased sediment in surface water runoff that could accumulate in downstream drainage facilities and interfere with flow and aggravate downstream flooding conditions that may exist and potentially increase sediment in Lake Merritt and ultimately San Francisco Bay.

As would be required for all development projects in Oakland, the Project is required to comply with City of Oakland's SCAs, Municipal Code, and General Plan. The requirements of these

policies include preparation of a Grading Plan, Erosion and Sedimentation Control Plan, and Drainage Plan, NPDES Permit, and SWPPP, that would reduce Impact HYD-1 to a less-than-significant level. SCA HYD-1 and SCA HYD-2 would be applicable to the Project for protecting water quality during construction. The implementation of these plans, and adherence to the Standard Conditions of Approval SCAs and General Plan Policies would reduce the impact to water quality during construction to a less than significant level.

Mitigation: None required.

Construction Impacts on Groundwater Resources

Impact HYD-2: Project excavation activities would not deplete groundwater supplies nor substantially interfere with groundwater recharge or cause contaminated groundwater discharge to surface water. (Less than Significant)

Excavation and construction of structures with subsurface foundations or open trenches, such as building foundations or pipelines, can often intercept shallow groundwater and require dewatering (removal of groundwater by pumping) to lower groundwater levels and drying the area for construction. Groundwater could flow into excavations that extend below the groundwater table. Groundwater is located 3 to 18 feet below the ground surface in the Project area. The groundwater levels fluctuate based on the season by 1 to 2 feet. Construction activities will include pile driving and excavation work at the site. Onsite storage tanks will be provided as necessary to contain stormwater and groundwater. There are no groundwater supply wells at the Project Site. The groundwater beneath the Project Site is not a source for agricultural or municipal uses. Dewatering would not deplete the groundwater supplies from the deeper recharge areas. Therefore, the Project would have a less-than-significant impact on groundwater resources. The SWPPP prepared for construction would include measures to prevent contamination of groundwater that could occur from chemicals associated with construction.

In the event that subsurface groundwater is encountered during construction, common practices employed include either dewatering the excavation or shoring the sides of the excavation to reduce groundwater inflow. If dewatering methods are used, groundwater would be pumped out of the excavation to the surface and discharged, usually to either a sanitary sewer or storm drain. Water extracted during dewatering could contain contaminants, either from existing sources or construction equipment, or could become sediment laden from construction activities. The Project sponsor would comply with the groundwater discharge regulations and Standards Conditions of Approval and the RWQCB to prevent contaminated dewater groundwater into the sewer or storm drain that could contaminate Lake Merritt, Oakland Estuary, and San Francisco Bay. Therefore, the impact to groundwater resources would be less than significant.

Mitigation: None required.

Operational Impacts on Flooding Conditions and Water Quality

Impact HYD-3: The Proposed Project would result in new development that could substantially alter existing drainage pattern of the Project Site or the surrounding area (Less than Significant)

The Proposed Project would include the demolition of 74,900 square feet of existing building footprint and build 80,168 square feet of new building footprint. The additional 5,268 square feet of building would be added on existing developed and impervious surfaces. Although the new building footprint would be larger, the Project would result in no net change in the amount of impervious surfaces at the Project Site. The Proposed Project development would replace an existing building footprint and impervious area and no new storm drain or sewer main facilities would be needed (BKF, 2008).

The Proposed Project includes 127,170 square feet of roof garden area; the existing roof garden area is 122,606 square feet. The Project would relocate the northwestern portion of the existing roof garden to the southern portion of the site and create new roof garden. Therefore, the Project would result in a net increase of roof garden area of approximately 4,564 square feet. Therefore, the Project would not substantially alter the existing drainage pattern on the Project Site or surrounding area and operational impacts on drainage patterns would be less than significant.

Mitigation: None required.

Impact HYD-4: The Proposed Project would not result in a net increase in impervious surfaces and would not cause an increase in the volume of stormwater runoff. The Project would not violate any waste discharge requirements that would create substantial runoff and result in substantial flooding onsite or offsite. The Project would not exceed the capacity of the stormwater drainage system. (Less than Significant)

Runoff on the impervious surfaces of the Project Site consists primarily of sheet flow towards the sidewalk and subsequently to storm drains. The existing Project Site is primarily developed with buildings, paved areas, and 122,606 square feet of garden area. The Proposed Project would add approximately 4,564 square feet of garden area, and include the redevelopment of 80,168 square feet of buildings and paved areas, both onsite and Project-related offsite (i.e., sidewalks, etc). The garden area would provide pervious surfaces and an opportunity for storm water treatment options such as rain gardens, tree well filter type treatment structures, and flow through plants (BKF, 2008). Due to the increase in roof garden area and no net increase in impervious surfaces, the Project would result in a net increase in pervious area.

The C.3 Provision of the NPDES permit governs storm drain systems and regulates post-construction stormwater runoff (see Regulatory Setting, above). The Proposed Project, as required by NPDES permitting process, would be required to manage flows from the Project area. The Proposed Project consists of moderate density infill that maximizes the use of existing infrastructure and streets, with minimal impact to the environment. The roof garden offers

opportunity for landscaped based treatment options and detention of stormwater runoff. The Project would limit the amount of connected impervious area within the Project area, including water efficient landscaping, and would treat stormwater onsite through use of the roof garden.

The Proposed Project would be required to comply with RWQCB post-construction storm water quality standards. A SWPPP, Stormwater Quality Plan, and the SCAs would be prepared for the Project. SCA HYD-3 and SCA HYD-4 would be applicable for protecting water quality and reducing stormwater runoff post-construction. The Proposed Project would have a less than-significant-impact to water quality and stormwater runoff post-construction due to the implementation of the required plans and SCAs.

Mitigation: None required.

Impact HYD-5: The Proposed Project would not result in flooding due to its proximity to a 100-year flood hazard area, or expose people or structures to other substantial risk related to flooding, seiche, tsunami, or mudflow. (Less than Significant)

The Project Site is located in an area designated as Flood Hazard Area Zone X. Flood Hazard Area Zone X designates an area determined to be outside of the 1 percent annual chance flood and the 0.2 percent annual chance flood (i.e. 100-year flood and 500-year flood) (FEMA, 1982). The chance of flooding in the Project area from tsunamis, seiches, and mudflows is low. Flood from tsunamis would likely affect low-lying areas along the Oakland Estuary and San Francisco Bay, but the island of Alameda would shelter the Project Site. In addition, the likelihood of large-scale devastation in Oakland resulting from seiches appears to be minuscule (City of Oakland, 2004). The area is not adjacent to steep slopes where mudflows are likely to occur. Additionally, based on the ABAG maps, the Project Site is not at risk for dam failure inundation (ABAG, 1995). Therefore, the Project would not expose people or structures to the risk of loss due to flooding.

Mitigation: None required.

Cumulative Impacts

Impact HYD-6: The increased construction activity and new development resulting from the Proposed Project, in conjunction with past, present, pending and reasonably foreseeable projects in the city, would not result in cumulatively considerable impacts on hydrology and water quality conditions. (Less than Significant)

Geographic Context

The geographic area considered for the hydrology and water quality cumulative analysis is the East Bay Plain of the San Francisco Bay Basin. The East Bay Plain context includes, but is not

limited to, the projects listed in the City of Oakland's Active Major Development Projects list (see Section IV Introduction, Table IV-1 List of Relevant Cumulative Projects from the City's Major Project List).

Impacts

Stormwater runoff entering the storm sewers within the project's geographic area discharge to the San Francisco Bay. The stormwater contains urban-type pollutants from past, present and existing projects in the sewered area, which have contributed to impairment of the quality of the San Francisco Bay. Applicable stormwater regulations have become progressively more rigorous since the adoption of the Federal Clean Water Act in 1977, with the derivative requirements imposed and enforced by the State Water Resources Control Board and Regional Water Boards through the NPDES permitting process. Stormwater runoff from past, present and existing development is treated in accordance with NPDES requirements. These requirements have resulted in policies and regulations, incrementally strengthened by a series of amendments and adopted by Water Board Orders, mandating greater levels of protection to water quality for past, present, existing and current projects.

Recently approved, currently pending and future projects, including the Proposed Project, would continue to discharge stormwater during construction and operation of these projects. However, all future projects would be subject to current and any subsequent NPDES permitting requirements, which are periodically updated and amended to further reduce pollutant loading in the stormwater runoff. Therefore, no significant adverse impacts are expected from cumulative conditions because stormwater runoff quality would be expected to cumulatively improve.

Mitigation: None required.

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H. Land Use, Plans and Policies

This section describes the existing land uses, adopted General Plan land use classifications, and zoning designations on and around the Kaiser Center Project Site. This section also describes the applicable plans and policies that guide development in the project area and evaluates the project's consistency with these plans and policies and other existing land use regulations.

Following the discussion of the project's relationship to various plans and policies, this section identifies any potentially significant land use impacts and, if necessary, appropriate mitigation measures SCAs. Pursuant to the City's recent amendment to the Oakland General Plan (City of Oakland, 2005, as well as Section 15358(b) of the CEQA Guidelines), mitigation measures are proposed only to address physical impacts that may result for the project.

Introduction

Land Use Classifications and Zoning

The Project Site is located in the City of Oakland, less than one mile northeast of downtown (see **Figure III-1** in Section III, Project Description). The Project Site is within the Central Business District land use designation identified in the Oakland General Plan (see Figure III-2 in Section III of this EIR). Areas to the north and east of the Project Site lie within the *Community Commercial*, *Urban Residential*, *Neighborhood Center Mixed Use*, and *Resource Conservation Area* classifications.

Figure III-2 delineates the current zoning designations that apply to the Project Site and surrounding area. The zoning on the Project Site at the time the project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone.

The Project Site is comprised of two three-story buildings, primarily used as commercial office space. Retail and other services occupy the ground level. A roof garden is behind the curved 29-story Kaiser Center tower that sits on the eastern portion of the project area. Landscaped walkways and sitting areas are distributed throughout the garden and three small shallow manmade pools provide additional decoration.

Setting

Site Vicinity Land Uses

The Project Site is generally near the intersection of two major transportation corridors: Grand Avenue and Broadway. Within a 1-mile radius, Broadway leads to Interstate 580 (I-580) and Highway 24 north of the Project Site, and Grand Avenue leads to I-980 and I-880 west of the Project Site. The project vicinity (generally one-half mile around the Project Site) contains a mix of commercial and urban residential uses, as well as a designated resource conservation area

along Lake Merritt, which is adjacent to and east of the Project Site (see Figure III-4 in Chapter III, *Project Description*).

These major corridors provide access to a variety of commercial activities and urban residential neighborhoods that have a mix of housing types and densities. Access to and from the 19th Street Oakland BART Station is approximately one-quarter mile west at 20th Street and Broadway.

West of the Project Site

Broadway, the main north-south route, is less than one-quarter mile west of the Project Site. Uses along this major business corridor include local retail, restaurants, and commercial office buildings and apartments ranging from three stories to more than ten stories in height. Along Broadway, between Grand Avenue and 42nd Street, is Oakland's Broadway Auto Row, a two-mile stretch of used and new car dealer facilities. This stretch also includes low to high rise office buildings, commercial and retail units, multi-family residences, single-resident occupancy facilities, and institutional facilities (churches and schools). As noted above, downtown Oakland is south and southwest of the Project Site. Uses in the downtown district include movie theaters, galleries, libraries, commercial retail and museums. Outdoor venues and activities include farmers' markets, performance venues and public art.

South of the Project Site

Land uses directly south of the Project Site consist primarily of interspersed commercial office buildings, ranging in heights of two stories to more than twenty stories. Further south, uses include high-density, but largely distributed, residential complexes. Directly south of the Project Site across 20th Street is the 4.2-acre Snow Park, a manicured park which includes a putting green.

East of the Project Site

Directly east of the Project Site is the 3.4-acre Lake Merritt and surrounding Lakeside Park, an area providing open space and recreational facilities. Recreational uses around the lake include a walking promenade around the perimeter of the lake, tennis facilities, and a local boating center, where visitors can rent kayaks and other non-motorized boats. Land uses east of Lake Merritt include primarily residential neighborhoods comprised of multifamily and single-family residences.

North of the Project Site

Uses north of the Project Site include a variety of commercial and institutional services and interspersed office buildings. Northeast of the Project Site, along Grand Avenue and facing Lake Merritt, uses include a number of high-density apartment/ condominium developments, and residential neighborhoods of primarily one- and two-unit dwelling units with low-rise apartment buildings in a dense development pattern.

Directly northeast of the project across 21st Street is the Cathedral of Christ the Light, an architecturally distinguished Catholic church for the Diocese of Oakland.

Project Site Land Use

The Project Site is bound by 21st¹ Avenue on the north, Webster Street on the east, 20th Street on the south, and Harrison Street on the east. Land uses on the existing property consist primarily of commercial office and retail space. The Project Site contains existing commercial structures that range from approximately 25 to 35 feet tall and include a retail drug store and retail bank at 20th and Webster streets (known as the “20th Street Mall”) and a retail fitness center/health club at Webster and 21st streets (known as the “Webster Street Mall”).

City Plans, Policies and Regulations

Applicable plans and major policies and regulations that pertain to the Kaiser Center EIR project are presented below, followed by a discussion of the project’s overall consistency (or inconsistency) with each regulatory document.

As noted above, conflicts with a General Plan do not inherently result in a significant effect on the environment within the context of CEQA. As stated in Section 15358(b) of the CEQA Guidelines, “[e]ffects analyzed under CEQA must be related to a physical change.” Section 15125(d) of the Guidelines states that EIRs shall discuss any inconsistencies between the Proposed Project and applicable General Plans in the Setting section of the document (not under Impacts).

Further, Appendix G of the Guidelines (Environmental Checklist Form) makes explicit the focus on *environmental* policies and plans, asking if the project would “conflict with any applicable land use plan, policy, or regulation . . . *adopted for the purpose of avoiding or mitigating an environmental effect*” (emphasis added). Even a response in the affirmative, however, does not necessarily indicate the project would have a significant effect, unless a physical change would occur. To the extent that physical impacts may result from such conflicts, such physical impacts are analyzed elsewhere in this EIR.

City of Oakland General Plan

The Oakland General Plan establishes comprehensive, long-term land use policies for the City. Consistent with state law, the General Plan includes the *Land Use and Transportation Element*; the *Estuary Policy Plan*; the *Historic Preservation Element*; the *Open Space, Conservation, and Recreation Element*; the *Safety Element*; the *Housing Element*; the *Noise Element*; the *Bicycle Master Plan*; the *Pedestrian Master Plan*; and the *Scenic Highways Element*. Each of the General Plan elements is discussed below, except for the *Housing Element*, and *Estuary Policy Plan*, since the project:

- would not demolish any housing units, and
- is not located in proximity to the Oakland waterfront.

Land Use and Transportation Element

The City adopted the Land Use and Transportation Element (LUTE) of the General Plan on March 24, 1998. The LUTE identifies policies for utilizing Oakland's land as change takes place and sets forth an action program to implement the land use policy through development controls and other strategies. The LUTE shows the Project Site within the *Central Business District* classification (see **Figure III-2**). The intent and desired character of this classification are described below.

Central Business District: The intent of the *Central Business District* is "to encourage, support and enhance the downtown area as a high density, mixed use urban center of regional importance and a primary hub for business, communications, office, government, high technology, retail, entertainment, and transportation..." The desired character and uses include "...a mix of large-scale offices, commercial, urban (high-rise) residential, institutional, open space, cultural, educational, arts, entertainment, service, community facilities, and visitor uses." The maximum floor-area ratio (FAR)¹ is 20.0, and the maximum allowable residential density is 300 units per gross acre. Different FARs may be encouraged for different areas. For example, for the Broadway spine, the highest FAR may be encouraged, and for areas close to Lake Merritt and Old Oakland, lower FARs may be appropriate.

LUTE objectives and policies that apply to the Project are listed and discussed below:²

- Existing businesses and jobs within Oakland which are consistent with the long range acceptance of this Plan should, whenever possible, be retained. (*Policy IC1.2, Retaining Existing Buildings*)
- Adequate cultural, social and support amenities designed to serve the needs of workers in Oakland should be provided within close proximity of employment centers. (*Policy IC1.8 Providing Support Amenities Near Employment Centers*)
- Adequate public infrastructure should be ensured within existing and proposed industrial and commercial areas to retain viable existing uses, improve marketability of existing vacant or underutilized sites, and encourage future use and development of these areas with activities consistent with the goals of this Plan. (*Policy IC1.9 Locating Industrial and Commercial Area Infrastructure*)
- Retain and enhance clusters of similar types of commercial enterprises as the nucleus of distinctive business districts, such as the existing and new automobile sales and related uses through urban design and business retention efforts. (*Policy IC3.2 Enhancing Business Districts*)
- New large-scale community, governmental, and institutional uses should be located outside of areas that are predominantly residential. Preferably, they should be located among major thoroughfares with easy access to freeways and public transit or in the Downtown. (*LUTE Policy N2.4, Locating Services along Major Streets*)
- The characteristics that make downtown Oakland unique, including its strong core area; proximity to destinations such as the Jack London waterfront, Lake Merritt, historic areas, cultural, arts, and entertainment activities; housing stock, should be enhanced and

¹ Floor-area ratio (FAR) is gross floor area of a building divided by total site area, excluding parking.

² The LUTE includes objectives and policies that pertain to five policy areas: Industry and Commerce (I/C), Transportation and Transit-Oriented Development (T), Downtown (D), Waterfront (W), and Neighborhoods (N). The alpha designators indicate the appropriate LUTE objectives and policies.

used to strengthen the downtown as a local and regional asset (*LUTE Policy D1.1 Defining Characteristics of Downtown*).

- The downtown should be viewed as the compilation of a series of distinct districts, including but not limited to City Center, Chinatown, Old Oakland, the Broadway Corridor, Gateway, Kaiser Center, Gold Coast, the Channel Park area south of Lake Merritt, and the Jack London Waterfront. A distinct identity for these downtown districts should be supported and enhanced. (*LUTE D1.2 Identify District Districts*)
- The Kaiser Center finance and office area should be strongly linked with the Broadway/ 19th Street office core, and sensitive to pedestrian-friendly open space amenities associated with Lake Merritt and Snow Park (*LUTE D1.6 Planning for Kaiser Center*).
- Downtown development should be visually interesting, harmonize with its surroundings, respect and enhance important views in and of the downtown, respect the character, history, and pedestrian-orientation of the downtown, and contribute to an attractive skyline (*LUTE D2.1 Enhancing the Downtown*).
- Pedestrian-friendly commercial areas should be promoted. (*LUTE D.3.1 Promoting Pedestrians*)
- Development activities should be supported through infrastructure improvements in the downtown. (*LUTE D4.1 Supporting Development*)
- A positive business climate which encourages attraction of new businesses and retention and expansion of existing businesses in downtown Oakland should be fostered, promoting Oakland's locational (transportation) advantages and other amenities. (*LUTE D4.2 Fostering a Positive Business Climate*)
- Economic sectors that promote employment, are likely to grow, or will diversify the economic base should be attracted to the downtown. (*LUTE D4.3 Attracting Employment to the Downtown*)
- Downtown Oakland's advantages for regional office development, including its position as the hub for regional transportation, should be advocated at State and regional planning levels. (*LUTE D7.1 Advocating for Downtown*)
- New large-scale office development should be located primarily along the Broadway corridor south of Grand Avenue, with concentrations at the 12th Street and 19th Street BART stations. The height of office development should respect the Lake Merritt edge. Small-scale offices should be allowed throughout the downtown, including in the downtown neighborhoods, when compatible with the character of surrounding development (*LUTE D8.1 Locating Office Development*).
- While office development should be allowed in commercial areas in the neighborhoods, the City should encourage major office development to locate in the downtown. (*LUTE N1.9 Locating Major Office Development*)
- Identify locations of interest and historic significance by markers, signs, public art, landscape, installations, or by other means. (*LUTE N9.5 Making Significant Sites*)
- The City will require new development, rebuilding, or retrofit to incorporate design features in their projects that encourage use of alternative modes of transportation such as transit, bicycling, and walking. (*Policy T4.1, Incorporating Design Features for Alternative Travel*)

- The City should make efforts to improve the visual quality of streetscapes. Design of the streetscape, particularly in neighborhoods and commercial centers, should be pedestrian oriented, including lighting, directional signs, trees, benches, and other support facilities. (*LUTE Policy T6.2, Improving Streetscapes*)
- New large-scale office development should be primarily located along the Broadway corridor south of Grand Avenue, with concentrations at the 12th Street and 19th Street BART stations. The height of office development should respect the Lake Merritt edge. Small-scale offices should be allowed throughout the downtown, including in the downtown neighborhoods, when compatible with the character of surrounding development. (*Policy D8.1 Locating Office Development*)
- Future office development on Harrison Street opposite Lakeside Park and Snow Park should provide ground level landscaped open space to soften the edge between public parkland and the office core. This space should be clearly accessible to office workers and the public. (*Policy D8.2 Respecting Public Parks*)
- New parking facilities for cars and bicycles should be incorporated into the design of any project in a manner that encourages and promotes safe pedestrian activity. (*LUTE Policy D3.2, Incorporating Parking Facilities*)

Project Consistency with LUTE Policies. The Project would be consistent with the various LUTE policies that support the continued existence and expansion of the Kaiser Center business complex and seek to promote the City's overarching LUTE policies.

The Project would redevelop the retail areas of the Project Site along 20th and Webster Streets, and construct two new office towers. The Project would enhance the current Kaiser Center commercial properties with approximately 1.47million square feet (msf) of new and well-designed office, commercial, ground-floor retail, parking, and enhanced open space, which is in support of the City's policies to strengthen and preserve the vitality of existing community commercial areas.

The Project would relocate the northwest portion of an existing roof garden to the southern portion of the site, which would result in a net increase of public open space by approximately 4,500 square feet. A new "grand stairway" would provide access to the roof garden from 20th Street. Although the garden is not currently ground level, public access would be clearly accessible to office workers and visitors to the Kaiser Center, which is consistent with LUTE policies for downtown projects and public access to public open spaces.

Historic Preservation Element (HPE)

The City adopted the Historic Preservation Element (HPE) on March 8, 1994, and amended it on July 21, 1998. The Preservation Element provides a strategy for preserving historically significant resources throughout the city. HPE objectives and policies that apply to the Project are listed and discussed below:

- *Avoid or Minimize Adverse Historic Preservation Impacts Related to Discretionary City Actions.* The City will make all reasonable efforts to avoid or minimize adverse effects on the Character-Defining Elements of existing or Potential Designated Historic Properties, which could result from private or public projects requiring discretionary City actions. (HPE Policy 3.1)
- *Historic Preservation and Discretionary Permit Approvals.* For additions or alterations to Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design matches or is compatible with, but not necessarily identical, to the property's existing or historical design; or (2) the proposed design comprehensively modifies and is at least equal in quality to the existing design and is compatible with the character of the neighborhood; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood.
 - For any project involving complete demolition of Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design quality of the proposed project is at least equal to that of the original structure and is compatible with the character of the neighborhood; or (2) the public benefits of the proposed project outweigh the benefit of retaining the original structure; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood. (HPE Policy 3.5)
- *Property Relocation Rather than Demolition.* As a condition of approval for all discretionary projects involving demolition of existing or Potential Designated Historic Properties, the City will normally require that reasonable efforts be made to relocate the properties to an acceptable site. (HPE Policy 3.7)

Project Consistency with HPE Policies. The above policies from the Historic Preservation Element generally encourage, but do not mandate, the preservation of Oakland's historic resources, within the context of and consistent with other General Plan goals, objectives, and policies. So, for example, the admonition in HPE Historic Preservation Goal 2 against "the unnecessary destruction" of historic buildings and HPE Policy 3.1's direction to employ "all reasonable efforts to avoid or minimize adverse effects" on historic resources are reviewed against the Proposed Project's provision of additional office space in Downtown Oakland. Although this Draft EIR conservatively deems demolition of the mall buildings and new construction to be a significant and unavoidable impact (see Section IV.D, *Cultural Resources*), the Proposed Project is generally consistent with HPE policies.

Open Space, Conservation and Recreation Element (OSCAR)

The City adopted the Open Space, Conservation and Recreation Element (OSCAR) on June 11, 1996. The OSCAR addresses the management of open land, natural resources, and parks in Oakland. Many of the policies directly relate to significance criteria, and where applicable, the Project's consistency with those policies are summarized here and referenced to the appropriate

impact analysis section in this EIR. OSCAR policies that apply to the Project are listed and discussed below³:

- Conserve privately owned areas with important natural resource values through a combination of land acquisition and development controls. (*Policy OS-1.2*)
- Particular attention should be paid to (a) views of the Oakland Hills from the flatlands; (b) views of downtown and Lake Merritt; (c) views of the shoreline; and (d) panoramic views from Skyline Boulevard. (*Policy OS-10.1*)
- New development should minimize adverse visual impacts and take advantage of opportunities for new vistas and scenic enhancement. (*Policy OS-10.2*)
- Discourage the removal of large trees on already developed sites unless removal is required for biological, public safety, or public works reasons. (*Policy CO-7.4, Tree Removal*)
- Regulate new development in a manner that protects soil from degradation and misuse or other activities, which significantly reduce its ability to support plant and animal life. Design all construction activities to ensure that soil is well secured so that unnecessary erosion, siltation of streams, and sedimentation of water bodies does not occur. (*Policy CO-1.1, Soil Loss in New Development.*)
- Minimize hazards associated with soil contamination through the appropriate storage and disposal of toxic substances, monitoring of dredging activities, and clean up of contaminated soils. In this regard, require soil testing for development of any site (or dedication of any parkland or community garden) where contamination is suspected due to prior activities on the site. (*Policy CO-1.2, Soil Contamination Hazards*)
- Emphasize water conservation and recycling strategies in efforts to meet future demand. (*Policy CO-4.1, Water Conservation*)
- Require use of drought-tolerant plants to the greatest extent possible and encourage the use of irrigation systems, which minimize water consumption. (*Policy CO-4.2, Drought-Tolerant Landscaping*)
- Encourage groundwater recharge by protecting large open space areas, maintaining setbacks along creeks and other recharge features, limiting impervious surface where appropriate, and retaining natural drainage patterns within newly developing areas. (*Policy CO-5.1, Protection of Groundwater Recharge*)
- Employ a broad range of strategies, compatible with the ACCWP, to: (a) reduce water pollution associated with stormwater runoff; (b) reduce water pollution associated with hazardous spills, runoff from hazardous material areas, improper disposal of household hazardous wastes, illicit dumping, and marina “live-aboards”; and (c) improve water quality in Lake Merritt to enhance the lake’s aesthetic, recreational, and ecological functions. Actions are pretreatment of runoff, storm drain maintenance, litter and debris removal, street sweeping improvements, mitigation of road construction and dredging impacts, hazardous spills prevention, cleanup of estuary hot spots, litter law enforcement, public education of urban runoff hazards, Lake Merritt catch basins and trash receptacles, improved sewage collection and treatment, and intergovernmental coordination. (*Policy CO-5.3, Control of Urban Runoff*)

³ The OSCAR policies that pertain to the project address Open Space (OS) and Conservation C), and are indicated by these alpha designators.

- Promote land use patterns and densities which help improve regional air quality conditions by: a) minimizing dependence on single passenger autos; b) promoting projects which minimize quick auto starts and stops, such as live-work development, and office development with ground-floor retail space; c) separating land uses which are sensitive to pollution from the sources of air pollution; and d) supporting telecommuting, flexible work hours, and behavioral changes which reduce the percentage of people in Oakland who must drive to work on a daily basis. (*Policy CO-12.1, Land Use Patterns which Promote Air Quality*)
- Require that development projects be designed in a manner that reduces potential adverse air quality impacts. This may include: a) the use of vegetation and landscaping to absorb carbon monoxide and to buffer sensitive receptors; b) the use of low –polluting energy sources and energy conservation measures; c) designs which encourage transit use and facilitate bicycle and pedestrian travel. (*Policy CO-12.4, Design of Development to Minimize Air Quality Impacts*)
- Encourage the use of energy-efficient construction and building materials. Encourage site plans for new development that maximize energy efficiency (*Policy CO-13.3, Construction Methods and Materials*).

Project Consistency with OSCAR Element Policies. The Kaiser Center property is an approximately 7.2-acre developed area, with buildings that accommodate retail and office uses. As discussed previously, the Proposed Project would redevelop approximately 2.2 acres of the 7.2-acre Kaiser Center Project Site, resulting in the construction of two towers, 34 and 42 stories that would be primarily for office uses. This new construction would result in about 1.47 million square feet (msf) of additional office, commercial, ground-floor retail, and parking space. In addition, the Project would relocate the northwest portion of the existing roof garden to the southern portion of the site, which would result in a net increase of open space on the site by approximately 4,500 square feet. Access to the enhanced roof garden by visitors to the Kaiser Center will also be improved from entrances on 20th Street, Webster Street, along the inner drive, through the parking garage, and through the Amenity Floors of the two new towers.

The roof garden provides habitat for migrating birds and supports natural stormwater management with landscaped vegetation and surrounding ponds. The relocation and enhancement of the roof garden would be consistent with the OSCAR policies that encourage groundwater recharge, water and conservation strategies, and reduce water pollution associated with stormwater runoff.

Oakland Safety Element

The City adopted the Safety Element of the Oakland General Plan in November 2004. The Safety Element includes goals that address the effects that safety hazards can pose to the health and safety of Oakland's populations, Oakland's economic welfare, and Oakland's natural resources. Specific policies and detailed actions are identified to address public safety, geologic hazards, fire hazards, hazardous materials, and flooding hazards. Given the topics that are addressed in the Safety Element, most of its policies generally apply citywide. However, Safety Element policies that apply to the Project are listed and discussed below:

- Continue, enhance or develop regulations and programs designed to minimize seismically related structural hazards from new and existing buildings. (*Policy GE-3*)

- Continue, enhance or implement programs that seek to reduce the risk of structural fires. (*Policy FI-2*)
- Maintain and enhance the city's capacity to prepare for, mitigate, respond to, and recover from disasters and emergencies. (*Policy PS-1*)
- Minimize the potential risk to human and environmental health and safety associated with the past and present use, handling, storage and disposal of hazardous materials. (*Policy HM-1*)
- Reduce the public's exposure to toxic air contaminants through appropriate land use and transportation strategies. (*Policy HM-2*)
- Continue to strengthen city programs that seek to minimize the storm-induced flooding hazards. (*Policy FL-2*)

Project Consistency with Safety Element Policies. The Project would not conflict with any of the above Safety Element policies. The EIR addresses the Project's specific effects regarding subjecting people and property to hazardous conditions (Section IV.F, *Hazardous Materials*; Section IV.G, *Hydrology and Water Quality*), all of which are less than significant or reduced to less than significant after implementation of mitigation measures or SCAs.

Noise Element

The City adopted Oakland's Noise Element on June 21, 2005. The Noise Element analyzes and quantifies current and projected noise levels from various sources that contribute to the community noise environment. These noise levels are depicted on noise contour maps that are used to guide land use decisions to reduce noise impacts, especially on sensitive receptors. The Noise Element also includes a land use-noise compatibility matrix that illustrates the degree of acceptability of exposing various sensitive land uses to noise. The Noise Element contains policies and actions that direct the City's (or other appropriate agencies') efforts to carry out the noise policies. However, the overall Noise Element policy that applies to the Project is the following:

- Ensure the compatibility of existing and, especially, of proposed development projects, not only with neighboring land uses, but also with their surrounding noise environment. (*Policy 1*)

Project Consistency with Noise Element Policies. The Project Site is generally located in a noise environment along major transportation corridors, including Interstate 580 (I-580), Interstate 880 (I-880), Interstate 980 (I-980) and State Route 24 (SR 24). The noise analysis provided in Section IV.I, *Noise*, of this EIR finds that increased noise resulting from the Project (traffic related and operational) would result in a less-than-significant impact. Consistent with the City's Noise Ordinance and the Oakland Noise Element, SCAs and Project mitigation measures that would be implemented to the extent feasible, and that would reduce temporary construction impacts to less than significant levels.

Bicycle Master Plan and Pedestrian Master Plan

In December 2007, the City Council adopted the Oakland Bicycle Master Plan (BMP) and in November 2002, the City Council adopted the Pedestrian Master Plan as part of the LUTE. The City of Oakland Bicycle Master Plan (December 2007) calls for the implementation of the following bikeway network improvements (Figure IV.L-8):

- Class 2 / 3 facilities on Lakeside Drive / Harrison Street, extending south of I-880 and north of Grand Avenue;
- Class 2 / 3 facilities on 20th Street between Lakeside Drive and San Pablo Avenue;
- Class 2 / 3 facilities on Webster Street / Franklin Street between 8th Street and Broadway;
- Class 2 / 3 facilities on 14th Street extending east and west from Downtown Oakland;
- Class 2 / 3 facilities on 8th Street / 9th Street between Lakeside Drive and Martin Luther King, Jr. Way; and,
- Class 2 / 3 facilities on 27th Street between Grand Avenue and San Pablo Avenue.

The Pedestrian Master Plan identifies policies and implementation measures for achieving LUTE policies that promote a walkable city. The Plan designates a Pedestrian Route Network throughout Oakland and identifies a “City Route” on Broadway north of MacArthur Boulevard, and a “District Route” on Piedmont Avenue.

The Proposed Project would be consistent with the Bicycle Master Plan and Pedestrian Master Plan, as it will comply with City of Oakland’s SCAs that ensures the submittal, approval and implementation of plans to the City to impermanent bicycle storage and parking facilities to accommodate the bicycle parking spaces required for the Project and implement measures and SCA to ensure pedestrian safety, as discussed in detail in Section IV. L, *Transportation and Circulation*.

Scenic Highways Element

In September 1974, the City adopted the Scenic Highways Element, which sets a framework for designated and potential scenic highways and routes throughout the City and policies for establishing and preserving such routes.

Project Consistency with Scenic Highways Policies. The Project Site is not located within a scenic corridor, nor does it obstruct panoramic vistas or interesting views currently available to a motorist. The nearest designated scenic highway is the Oakland segment of I-580, located approximately 1 mile east-northeast of the Project Site. Therefore, the Project would be consistent with the City’s Scenic Highways Element.

Oakland “Transit First” Policy

The “Transit First” resolution, passed by the City Council on October 29, 1996, recognizes the importance of striking a balance between economic development opportunities and the mobility needs of those who travel by means other than the private automobile. The policy favors modes that have the potential to provide the greatest mobility for people, rather than vehicles.

Project Consistency with Oakland’s “Transit First” Policy. New employees and visitors of the redeveloped Kaiser Center property generated by the Project would increase the demand for transit service in the area. As discussed in Section IV.L, *Traffic and Circulation*, the Project will enhance existing pedestrian and bicycle access facilities such as improved access to the public roof garden, widening of sidewalks, and increased access to BART and public transit, ultimately resulting in a transit oriented development.

Oakland Zoning Code

The zoning on the Project Site at the time the Project application was deemed complete was C-55, Central Core Commercial Zone, which is combined with the S-17, Downtown Residential Open Space Combining Zone and the S-4, Design Review Combining Zone. Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C, Central Business District Commercial. The Proposed Project, pursuant to Section 6 of the rezoning ordinance, is “grandfathered” under the C-55, S-17 and S-4 zones. Relevant land use and development standards of the prior (grandfathered) zoning and the current zoning are shown below, as is the Proposed Project’s consistency with each (although consistency with the CBD-C Zone is not required).

Project Consistency with Oakland Zoning. The proposed land uses are consistent with both zoning in existence at the time the Project application was deemed complete (C-55, S-17 and S-4 zones) and new zoning (CBD-C zone). The Project is also consistent with the zoning in existence at the time the Project application was deemed complete, and generally consistent with the new zoning.

The Project Site is also located within the Lake Merritt Historic District (see Section IV.D Cultural Resources, for more detail).

**TABLE IV.H-1
PROJECT CONSISTENCY WITH BASIC ZONING REGULATIONS REGARDING USE
AND BUILDING DEVELOPMENT**

	Previous C-55 Zone (Grandfathered Project)	Project Compliance (Y/N)	Current CBD-C Zone	Project Compliance (Y/N)
Maximum Building Base Height	NA	NA	120 feet	No Base
Maximum Total Height	NA	NA	No Limit	Y
Minimum Total Height of Principal Buildings	NA	NA	45 feet	Y
Maximum Setbacks	No minimum	NA	0 to 5 feet	N
Maximum FAR	No minimum	NA	20.0	Y 17.7 ^a
Maximum Average Floor Plate Area	NA	NA	No Limit	Y
Maximum Building Length	NA	NA	No Limit	Y
Minimum Distance Between Towers on Same Lot	NA	NA	No Limit	Y
Ground floor commercial facade transparency	NA	NA	60 percent	^b
Minimum Height of the Ground Floor	NA	NA	15 feet	Y
Commercial General Retail Use ^{a, b}	Permitted	Permitted	Permitted	Permitted
Commercial Administrative Use ^{a, b}	Permitted	Permitted	Permitted	Permitted

a Total building area without parking and usable roof area (1,698,542 square feet) divided by site area (2.2 acres or 95,832 square feet).

b No detailed design drawings developed at time of DEIR publication.

c Requires Conditional Use Permit if exceeds 7,500 square feet.

d These activities may only be located on or below the ground floor of a building with the following exceptions:

- 1) If the floor area devoted to the activity is less than 2,000 square feet or less and the activity takes place in a Local Register property then the activity is permitted above the ground floor upon the granting of a Conditional Use Permit (see Chapter 17.134 for the CUP process).
- 2) An activity located on the ground floor may extend to the second floor of a building if each: 1) the floor area devoted to nonresidential activities in the building is less than the floor area devoted to residential activities; 2) the activity on the second floor is the same as, or accessory to, the ground floor activity and part of the same business or establishment; and 3) there is a direct internal connection between the ground floor and the second story activities.

SOURCE: Oakland Planning Code, Section 17.58 (CBD-C Zone) and Section 17.62 (C-55 Zone), June 9, 2009

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

There are no City of Oakland SCAs specific to land use.

Impacts and Mitigation Measures

Significance Criteria

The Project would result in a significant impact related to land use and plans if it would:

1. Physically divide an established community;
2. Fundamentally conflict with any applicable land use plan, policy or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect and result in a physical change in the environment; or
3. Fundamentally conflict with any applicable habitat conservation plan or natural community conservation plan

As previously indicated (under *OSCAR Policies*), the Project is not located in or near an area guided by a Habitat Conservation Plan or Natural Community Conservation Plan.

Approach to Analysis

This EIR analysis evaluates the Project's compatibility with applicable plans and policies in order to determine the potential for significant environmental impacts. As discussed in the *Setting* section of this chapter, the General Plan has determined that the "the fact that a specific project does not meet all General Plan goals, policies, and objectives does not inherently result in a significant effect on the environment within the context of [CEQA]" (City of Oakland, 2005a). In addition, the Project Site and its proposed uses were evaluated in terms of their compatibility with existing land uses adjacent and in proximity to the Project Site.

Physical Division of an Established Community

Impact LU-1: The Proposed Project would redevelop buildings at the Kaiser Center property on the northwest corner of Webster and 20th Streets in Downtown Oakland, but would not result in the physical division of an existing community. (Less than Significant)

The Project would create two new office towers, which would replace the existing "20th Street Mall" and "Webster Mall" retail/office facilities. The sites where the new office towers would be located are currently occupied with commercial and office uses that would be demolished for the Project. The Project Site is in proximity to existing neighborhoods, primarily northeast of the Project Site, north of Grand Avenue. Some multi-story residential units are also distributed south of the Project Site and surrounding Lake Merritt.

Overall, the Project would result in substantially taller and larger structures than currently exists on the Project Site and would include various additional commercial uses on the east side of Broadway between Grand Avenue and 20th Street. The Project area respects the existing "edges" of their respective adjacent neighborhoods and the implementation of the Proposed Project would not result in their division. Further, the Project specifically proposes publicly accessible gathering spaces (like the roof garden) and pathways intended partly to facilitate pedestrian access to the Lake Merritt and Snow Park recreational areas, east and south of the Project Site, respectively.

Because the Lake Merritt area is an established community, as are several subareas of smaller neighborhoods within this region of Oakland, no aspect of the Proposed Project would result in a physical division, physically or perceptually.

Mitigation: None required.

Land Use Compatibility / Change in Environment

Impact LU-2: The Proposed Project would not conflict with applicable land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effects. (Less than Significant)

Conflicts between a Project and applicable policies do not constitute significant physical environmental impacts in and of themselves. A policy inconsistency is considered a significant adverse environmental impact only when it is related to a policy adopted for the purpose of avoiding or mitigating an environmental effect and it is anticipated that the inconsistency would result in a significant adverse physical impact based on the established significance criteria. The Proposed Project would not conflict with any land use policies adopted for the purpose of avoiding or mitigating an environmental effect. As a result, no significant land use impacts related to the Project's consistency with land use policies would occur.

The land uses proposed by the Project are consistent with the General Plan designations and applicable zoning on the Project Site. Moreover, the existing maximum development intensity allowed by the existing General Plan classifications would accommodate that proposed by the Project. Actual development would be restricted by the limits, standards, and guidelines (building height, setbacks, etc.) prescribed by the current applicable zoning designation and at the discretion of the City through the discretionary review of the Project.

Mitigation: None required.

Habitat and Natural Community Conservation Plans

Impact LU-3: The Proposed Project would not result in a fundamental conflict between adjacent and nearby land uses, particularly with respect to any applicable habitat conservation plan or natural community conservation plan. (Less than Significant)

The proposed development of two office towers and ground floor retail is consistent with the existing land uses on the Kaiser Center site and in the surrounding high-rise commercial buildings in the area. Further, the Project Site is not located within or near an area guided by a Habitat Conservation Plan or Natural Community Conservation Plan (as determined in the analysis in Section IV.C, *Biological Resources*, of this EIR, specifically Impact BIO-5). Therefore, the

Project would not conflict with nearby land uses, and no conservation land use addressed by a plan exists in the immediate vicinity.

Mitigation: None required.

Cumulative Impacts

Impact LU-4: The Proposed Project would not result in a significant cumulative land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect from past, present, pending and reasonably foreseeable development. (Less than Significant)

Geographic Context

The geographic area considered for the land use cumulative analysis includes the area in close proximity to the Project Site including Downtown/Oakland Central, Lake Merritt, Broadway corridor, and south of I-580 to Grand Avenue. This area was defined because it includes the Project Site, the immediately surrounding neighborhoods, and the larger City context for the Project. This area encompasses the cumulative major projects identified in **Table IV-1**, List of Relevant Cumulative Projects from the City's Major Project List.

Impacts

As analyzed throughout this section, the Proposed Project would not result in a significant land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect. The Project is not located in or near an area guided by a habitat conservation plan or natural community conservation plan. The Proposed Project is consistent with the City's General Plan Land Use designation for the site. Thus, the Proposed Project would not, combined with, or add to, any potential adverse land use impacts that may be associated with other cumulative development. A review of cumulative development in the defined geographic area, including past, present, existing, pending and reasonably foreseeable future development does not reveal any significant adverse cumulative impacts in the area. Cumulative development in the area consists of residential, commercial, transit and other typical urban uses.

Cumulative development, in combination with the Proposed Project, has and would continue to result in the development and redevelopment of infill or vacant sites throughout the area. Infill projects in urban areas allow for the capitalization of existing transit system and infrastructure, and minimize impacts to sensitive resources that would likely be degraded in a development on a greenfield site. Additionally, the Project's location near transit and a mix of urban uses reduce vehicle miles traveled. The Proposed Project would contribute to a higher density in the area, which is anticipated by the General Plan and Redevelopment Plan. The Project is generally

consistent with adopted plans and the overall vision for the area. Based on the information in this land use section and for the reasons summarized above, the Project would not contribute to any significant adverse cumulative land use impacts when considered together with past, present, pending and reasonably foreseeable development.

Mitigation: None required.

References – Land Use, Plans and Policies

- City of Oakland, *Scenic Highways, An Element of the Oakland Comprehensive (General) Plan*, adopted September, 1974.
- City of Oakland, *Open Space, Conservation and Recreation (OSCAR), An Element of the Oakland General Plan*, adopted June 11, 1996.
- City of Oakland, *Historic Preservation: An Element of the Oakland General Plan*, adopted March 8, 1994 as amended July 21, 1998a.
- City of Oakland, *Envision Oakland, City of Oakland General Plan, Land Use and Transportation Element (LUTE)*, March 24, 1998b.
- City of Oakland, *Pedestrian Master Plan, Part of the Land Use and Transportation Element of the City of Oakland's General Plan*, Adopted November 2003.
- City of Oakland, *Protect Oakland, City of Oakland General Plan, Safety Element*, adopted November 2004.
- City of Oakland, *Noise Element, City of Oakland Oakland General Plan*, adopted June, 2005.
- City of Oakland, *Bicycle Master Plan, Part of the Land Use and Transportation Element of the Oakland General Plan*, adopted December 2007.

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I. Noise

This section analyzes potential impacts on the ambient noise environment caused by construction and operation of the proposed Kaiser Center Office Project. It also analyzes the compatibility of proposed noise-sensitive uses, such as public open spaces and commercial areas, with the existing noise environment. The section describes the environmental and regulatory setting of the Project as well as basics of environmental acoustics, including definitions of terms commonly used in noise analysis. Potential impacts are discussed and evaluated, and appropriate SCAs and/or mitigation measures are identified, as necessary.

Setting

Technical Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the “loudness” of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear’s decreased sensitivity to low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of decibels (dBA).¹ Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements.

Some representative noise sources and their corresponding A-weighted noise levels are shown in **Table IV.I-1**.

¹ All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

**TABLE IV.I-1
TYPICAL NOISE LEVELS**

Noise Level (dBA)	Outdoor Activity	Indoor Activity
90+	Gas lawn mower at 3 feet, jet flyover at 1,000 feet	Rock Band
80-90	Diesel truck at 50 feet	Loud television at 3 feet
70-80	Gas lawn mower at 100 feet, noisy urban area	Garbage disposal at 3 feet, vacuum cleaner at 10 feet
60-70	Commercial area	Normal speech at 3 feet
40-60	Quiet urban daytime, traffic at 300 feet	Large business office, dishwasher next room
20-40	Quiet rural, suburban nighttime	Concert hall (background), library, bedroom at night
10-20		Broadcast / recording studio
0	Lowest threshold of human hearing	Lowest threshold of human hearing

SOURCE: Modified from Caltrans, 1998a

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Table IV.I-1 represent noise measured at a given instant in time; however, noise levels rarely persist consistently over a long period of time. Rather, community noise varies continuously over time because of the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and wind. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment varies the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to accurately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

Leq: The equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level, which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

Lmax: The instantaneous maximum noise level for a specified period of time.

L50: The noise level that is equaled or exceeded 50 percent of the specified time. This is the median noise level during the specified time.

L90: The noise level that is equaled or exceeded 90 percent of the specified time. The L90 is often considered the background noise level averaged over the specified time.

DNL: The Day/Night Average Sound Level is the 24-hour day and night A-weighted noise exposure level, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night. Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance from nighttime noise. (Also referred to as “Ldn.”)

CNEL: Similar to the DNL, the Community Noise Equivalent Level (CNEL) adds a 5-dBA “penalty” for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants generally experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual’s past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so called “ambient noise” level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Under controlled conditions in an acoustics laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dBA;
- Outside these controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise;
- It is widely accepted that the average healthy ear, however, can barely perceive changes in the noise level of 3 dBA;
- A change in level of 5 dBA is a readily perceptible increase in noise level; and
- A 10 dBA change is recognized as twice as loud as the original source (Caltrans, 1998b).

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on the topography of the area and environmental conditions (i.e., atmospheric conditions and noise barriers, either vegetative or manufactured, etc.). Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles (known as a “line” source), would typically attenuate at a lower rate, approximately 3 to 4.5 dBA each time the distance doubles from the source, which also depends on environmental conditions (Caltrans, 1998b). Noise from large construction sites will exhibit characteristics of both “point” and “line” sources, and attenuation will therefore generally range between 4.5 and 7.5 dBA each time the distance doubles.

Existing Noise Sources and Levels

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in the urban environment. Along major transportation corridors, noise levels can reach 80 DNL, while along arterial streets, noise levels typically range from 65 to 70 DNL. However, noise levels on roadways, like all areas, can be affected by intervening development, topography, or landscaping. Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities.

Primary noise sources in the Project Site vicinity include traffic on the network of streets surrounding the Project Site. No major stationary or industrial noise sources are located in close proximity.

Two long-term (48-hour) and three short-term (5-minute) noise measurements were collected to characterize ambient noise conditions in the Project vicinity. The noise measurement locations are described in **Table IV.I-2**. Metrosonics Model db308 sound level meters were used to measure current ambient noise levels. The meters were calibrated before the measurements to ensure their accuracy. The meters were programmed to record the maximum (Lmax), average (Leq), L10, and L90 noise levels.

Figures IV.I-1 through IV.I-4 show the hour-by-hour noise measurements over the 2-day period of October 23 to 24, 2008 (Thursday through Friday) for Long-Term Measurements #1 (roof garden, corner of building at 21st and Webster Streets) and #2 (21st and Harrison Streets). These figures show over the 2-day period, the lowest ambient sound levels occurred at night (between 12 a.m. and 4 a.m.) and the highest levels occurred during typical working hours (between 7 a.m. and 7 p.m.).

For Long-Term Measurement #1, the 24-hour Ldn over the 2-day period ranged from 56 to 57 dBA, and the hourly average noise levels (Leqs) ranged from 47 to 55 dBA. For Long-Term Measurement #2, the 24-hour Ldn over the 2-day period ranged from 67 to 68 dBA, and the

**TABLE IV.I-2
EXISTING NOISE ENVIRONMENTS AT PROJECT LOCATION**

Location	Time Period	Leq (dBA)	Noise Sources
Long-term Measurement 1: roof garden, corner of building at 21st and Webster Streets.	10/23/08 – 10/25/08 24-hour Ldn measurements were: Thursday: 56 dBA Friday: 57 dBA	Hourly Leq's ranged from: 47 – 55 Lmax: 84	Unattended noise measurements do not specifically identify noise sources.
Long-term Measurement 2: 21st and Harrison Streets, 50 feet from Harrison, attached to a tree.	10/23/08 – 10/25/08 24-hour Ldn measurements were: Thursday: 67 dBA Friday: 68 dBA	Hourly Leq's ranged from: 58 – 70 Lmax: 103	Unattended noise measurements do not specifically identify noise sources.
Short-term Measurement 1: roof garden, corner of building at 21st and Webster.	10/22/08 5:33 – 5:38 PM	5-minute Leq 57 dBA Lmax: 66	HVAC approximately 300 feet away. Traffic
Short-term Measurement 2: 20th and Webster Streets, 20 feet from the center of the roadway.	10/22/08 6:07 – 6:12 PM	5-minute Leq 70 dBA Lmax: 84	Motorcycle: 83 dBA Traffic: 58 – 67 dBA Pedestrian: 73 dBA
Short-term Measurement 3: 21st and Harrison Streets, 50 feet from intersection by jogging path.	10/22/08 6:24 – 6:29 PM	5-minute Leq 62 dBA Lmax: 70	Traffic: 53 – 66 dBA

SOURCE: ESA, 2008.

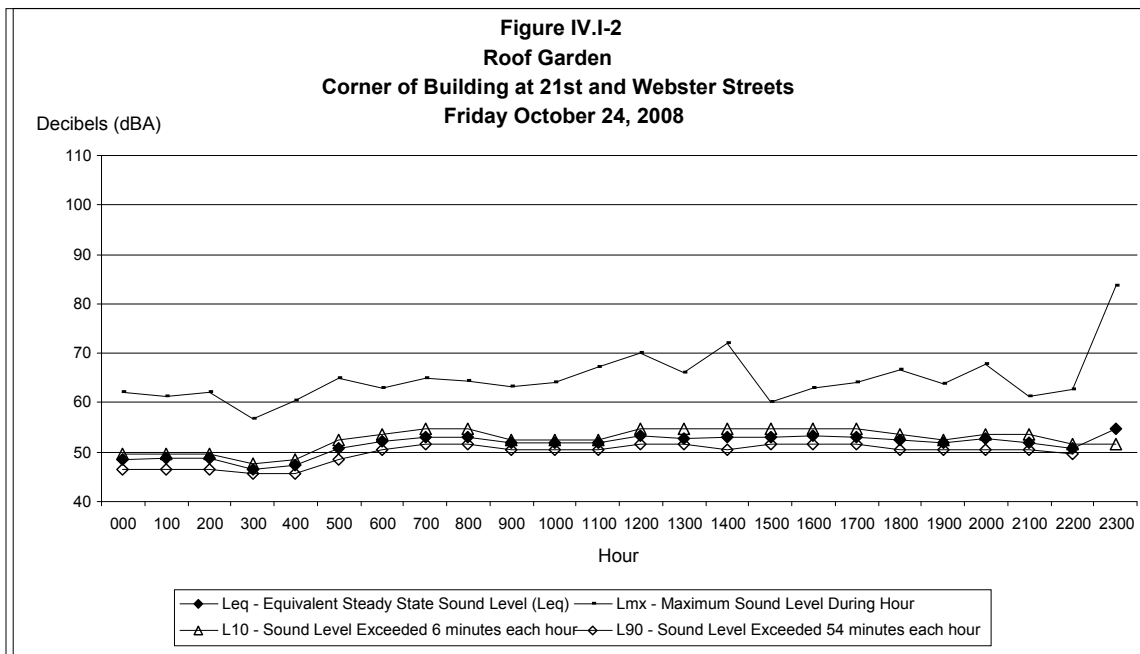
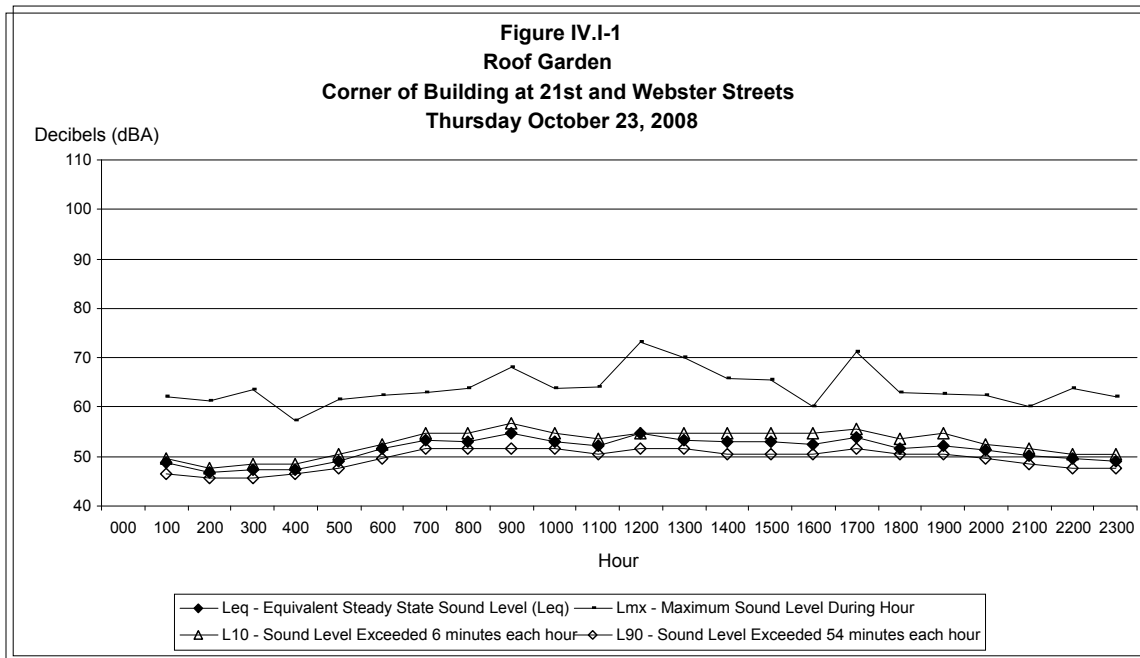
hourly average noise levels (Leqs) ranged from 58 to 70 dBA. By comparison, the City of Oakland's normally acceptable maximum community noise exposure for neighborhood parks and office buildings is 70 Ldn (see section discussing Regulatory Context below).

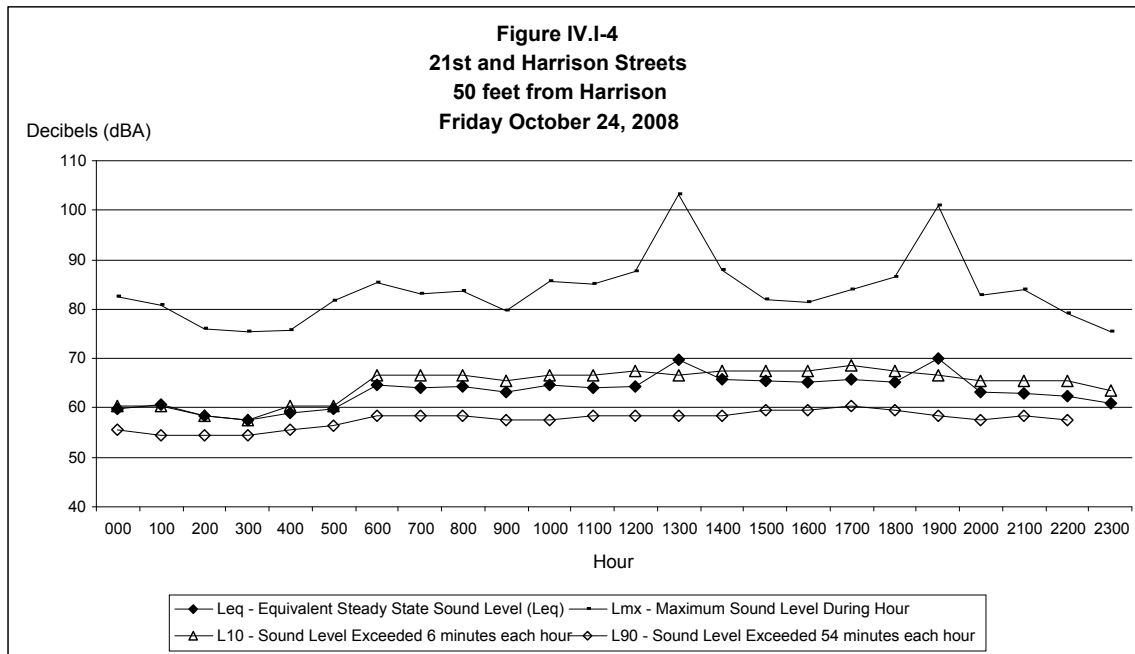
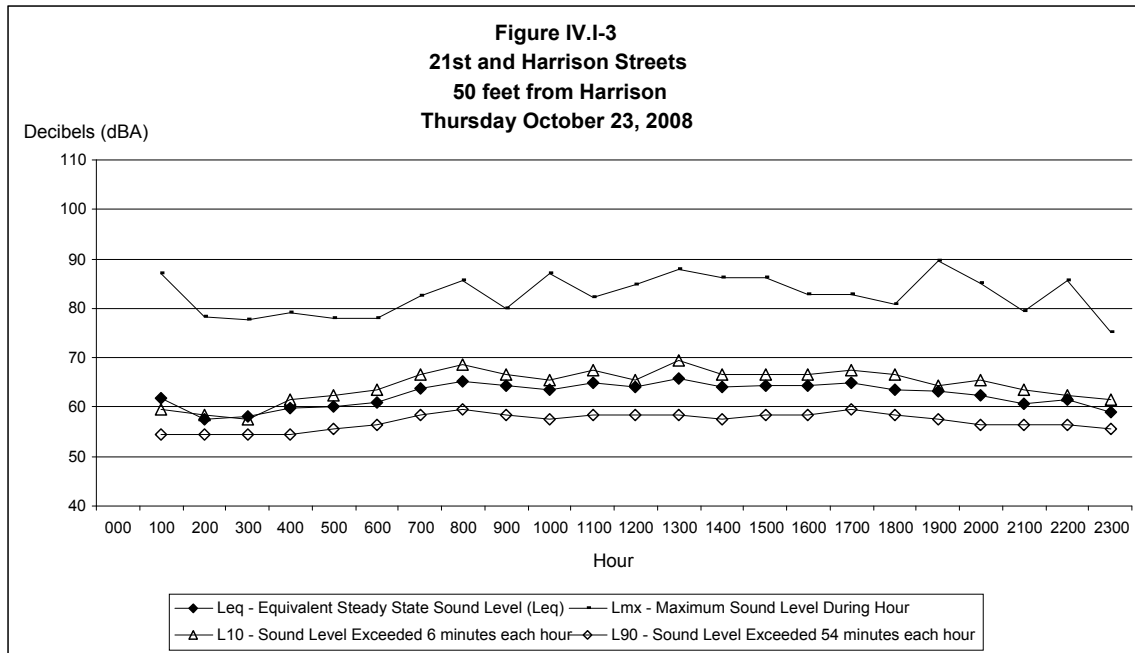
Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure, in terms of both duration and insulation from noise, and the types of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, and parks and other outdoor recreation areas generally are more sensitive to noise than are commercial and industrial land uses. The Proposed Project consists of retail, office, and open space accessible to occupants and visitors of Kaiser Center.

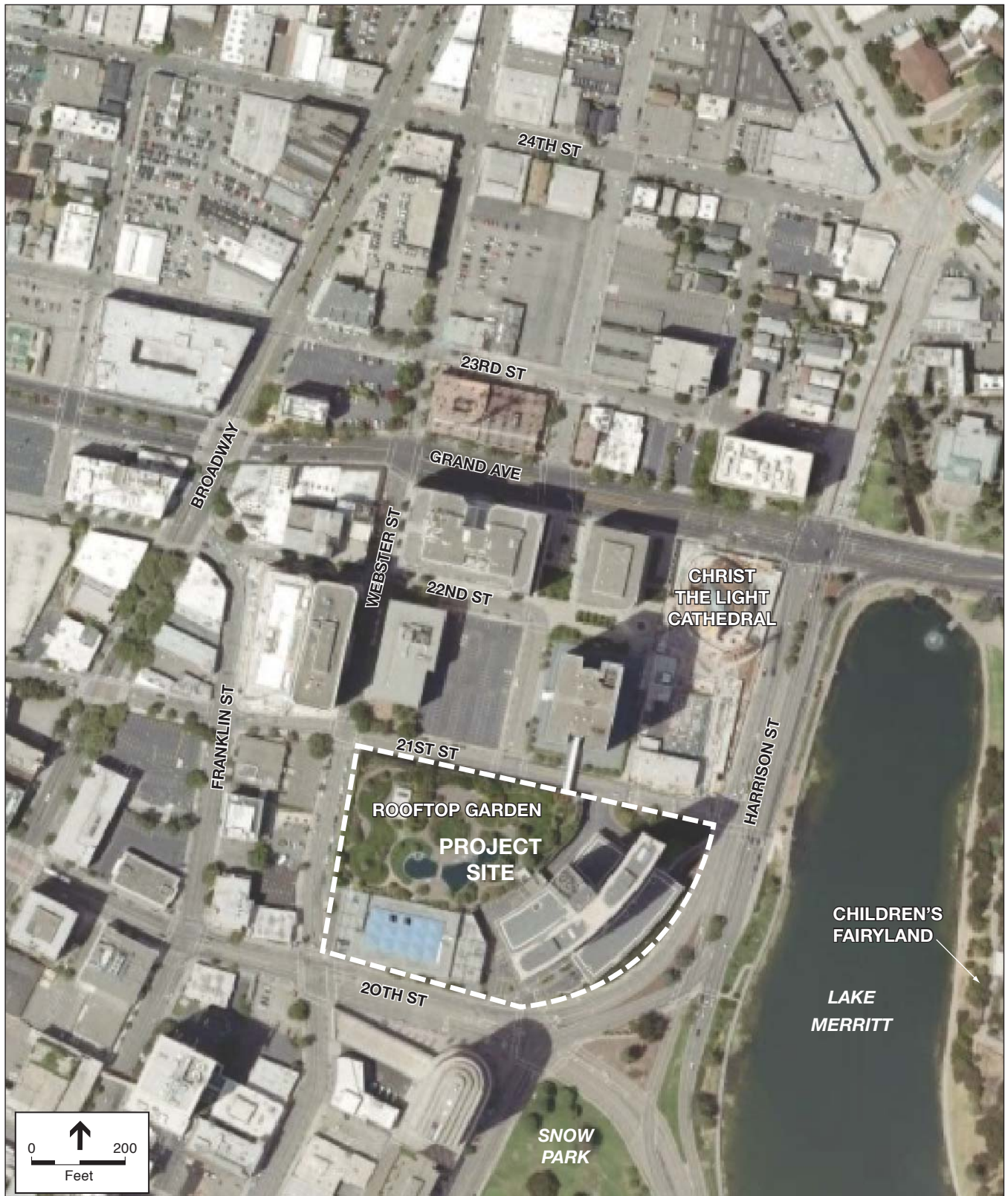
A residential senior community facility is located approximately 700 feet southeast of the Project Site. Lake Merritt Lakeside Park is located approximately 500 feet east of the Project Site. Snow Park is approximately 250 feet east of Phase 1 and approximately 500 feet southeast of Phase 2. A church is located 600 feet to the northeast at the corner of Harrison and 21st Streets. The Kaiser Center outdoor roof garden is located within the Project Site (6th Floor).

(See **Figure IV.I-5**). The other land uses surrounding the Project Site are commercial businesses.





SOURCE: ESA, 2008



SOURCE: ESA

Kaiser Oakland . 206213

Figure IV.I-5
Sensitive Noise Receptors in the Project Area

Regulatory Context

Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans; local noise ordinances establish standards and procedures for addressing specific noise sources and activities.

Federal

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under Title 40 Code of Federal Regulations (CFR) Part 205, Subpart B. The federal truck pass-by noise standard is 80 dB at 15 meters from the centerline of the vehicle pathway. These standards are implemented through regulatory controls on truck manufacturers.

State of California

The State of California establishes noise limits for vehicles licensed to operate on public roads. The pass-by standard for heavy trucks is consistent with the federal limit of 80 dB. The pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dB at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanctions on vehicle operators by state and local law enforcement officials.

City of Oakland Local Plans, Policies and Regulations

General Plan Noise Element

The Oakland General Plan contains guidelines for determining the compatibility of various land uses with different outdoor noise environments (City of Oakland, 2005). The Noise Element recognizes that some land uses are more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. The City uses state noise guidelines for judging the compatibility between various land uses and their noise environments, which are summarized in **Table IV.I-3** for various common land uses.

The Oakland General Plan Noise Element also identifies maximum interior noise levels generally considered acceptable for various common land uses (with windows closed). Relevant to the Proposed Project, 50 dB is the maximum level acceptable for professional offices, research and development, auditoria, meeting halls, and 55 dB is the maximum level acceptable for retail, banks, restaurants, and sports clubs. The Noise Element contains the following applicable goals and policies:

- **Goal 1:** To protect Oakland's quality of life and the physical and mental well-being of residents and others in the City by reducing the community's exposure to noise; and

Land Use Category	Community Noise Exposure in Decibels (Ldn or CNEL, dB)					
	55	60	65	70	75	80
Residential						
Transient Lodging – Motels, Hotels						
Schools, Libraries, Churches, Hospitals, Nursing Homes						
Auditoriums, Concert Halls, Amphitheaters						
Sports Arena, Outdoor Spectator Sports						
Playgrounds, Neighborhood Parks						
Golf Courses, Riding Stables, Water Recreation, Cemeteries						
Office Buildings, Business Commercial and Professional						
Industrial, Manufacturing, Utilities, Agriculture						

NORMALLY ACCEPTABLE

Development may occur without an analysis of potential noise impacts *to the proposed development* (though it might still be necessary to analyze noise impacts that the project might have *on its surroundings*).

CONDITIONALLY ACCEPTABLE

Development should be undertaken only after an analysis of noise-reduction requirements is conducted, and if necessary noise-mitigating features are included in the design. Conventional construction will usually suffice as long as it incorporates air conditioning or forced-air-supply systems, though it will likely require that project occupants maintain their windows closed.

NORMALLY UNACCEPTABLE

Development should generally be discouraged; it may be undertaken only if a detailed analysis of the noise-reduction requirements is conducted, and if highly effective noise insulation, mitigation or abatement features are included in the design.

CLEARLY UNACCEPTABLE

Development should not be undertaken.

SOURCE: Oakland, City of, 2005. City of Oakland General Plan, Noise Element, Figure 6. June.

Kaiser Oakland . 206213

Table IV.I-3
Noise Land Use Compatibility Matrix

- **Goal 2:** To safeguard Oakland's economic welfare by mitigating noise incompatibilities among commercial, industrial and residential land uses.
- **Policy 1:** Ensure the compatibility of existing and, especially, of proposed development projects not only with neighboring land uses but also with their surrounding noise environment.
- **Policy 2:** Protect the noise environment by controlling the generation of noise by both stationary and mobile noise sources.
- **Policy 3:** Reduce the community's exposure to noise by minimizing the noise levels that are *received* by Oakland residents and others in the City. (This policy addresses the *reception* of noise whereas Policy 2 addresses the *generation* of noise.)

Oakland Noise Ordinance

The City of Oakland also regulates noise through enforcement of its noise ordinance, which is found in Sections 8.18 and 17.120 of the Oakland Municipal Code. Per Chapter 8.18.020, the persistent maintenance or emission of any noise or sound produced by human, animal or mechanical means, between the hours of 9:00 p.m. and 7:00 a.m. which shall disturb the peace or comfort, or be injurious to the health of any person shall constitute a nuisance. Failure to comply with the following provisions shall constitute a nuisance.

- A. All construction equipment powered by internal combustion engines shall be properly muffled and maintained.
- B. Unnecessary idling of internal combustion engines is prohibited.
- C. All stationery noise-generating construction equipment such as tree grinders and air compressors are to be located as far as is practical from existing residences.
- D. Quiet construction equipment, particularly air compressors, are to be selected whenever possible.
- E. Use of pile drivers and jack hammers shall be prohibited on Sundays and holidays, except for emergencies and as approved in advance by the Building Official.

Whenever the existence of any such nuisance shall come to the attention of the Health Officer, it shall be his or her duty to notify in writing the occupant of the premises upon which such nuisance exists, specifying the measures necessary to abate such nuisance, and unless the same is abated within forty-eight (48) hours thereafter, the occupant so notified shall be guilty of an infraction, and the Health Officer shall summarily abate such nuisance. (Prior code § 3-1.02)

Chapter 17.120.050 of the Oakland Planning Code regulates only operational noise from stationary sources, as cities and counties do not have regulatory authority over noise from mobile sources (transportation noise). As mentioned above, transportation noise is regulated at the state and federal level by noise limits placed on vehicle manufacturers. **Table IV.I-4** (Table 1 of the City of Oakland's CEQA Thresholds/Criteria of Significance Guidelines) presents maximum allowable receiving noise standards applicable to long-term exposure for residential

**TABLE IV.I-4
CITY OF OAKLAND OPERATIONAL NOISE STANDARDS AT RECEIVING PROPERTY LINE, DBA¹
(from stationary sources)**

Receiving Land Use	Cumulative Number of Minutes in a 1-Hour Time Period ²	Maximum Allowable Noise Level Standards (dBA)	
		Daytime 7:00 a.m. to 10:00 p.m.	Nighttime 10:00 p.m. to 7:00 a.m.
Residential and Civic ³	20 (L ₃₃)	60	45
	10 (L _{16.7})	65	50
	5 (L _{8.3})	70	55
	1 (L _{1.7})	75	60
	0 (L _{max})	80	65
Anytime			
Commercial	20 (L ₃₃)	65	
	10 (L _{16.7})	70	
	5 (L _{8.3})	75	
	1 (L _{1.7})	80	
	0 (L _{max})	85	
Anytime			
Manufacturing, Mining, and Quarrying	20 (L ₃₃)	70	
	10 (L _{16.7})	75	
	5 (L _{8.3})	80	
	1 (L _{1.7})	85	
	0 (L _{max})	90	

¹ These standards are reduced 5 dBA for simple tone noise, noise consisting primarily of speech or music, or recurring impact noise. If the ambient noise level exceeds these standards, the standard shall be adjusted to equal the ambient noise level.

² Lx represents the noise level that is exceeded X percent of a given period. Lmax is the maximum instantaneous noise level.

³ Legal residences, schools and childcare facilities, health care or nursing home, public open space, or similarly sensitive land uses

SOURCE: City of Oakland, 2008

and civic land uses, for noise from stationary noise sources (not transportation noise). Once constructed, noise from a stationary source would be limited by the standards in Table IV.I-4. For example, between 7:00 a.m. and 10:00 p.m., residential and civic land uses, including public open spaces, may only be exposed to noises up to 60 dBA for a period of 20 cumulative minutes in a one-hour time period and a maximum of 80 dBA. The noise ordinance states that if the measured ambient noise level exceeds the applicable noise level standard in any category, then the stated applicable noise level shall be adjusted so as to equal the ambient noise level. In other words, if existing noise is measured to be louder than the maximum allowed (i.e., the “applicable noise level standard”), the existing noise level shall be considered the maximum allowed. Based on the noise measurements shown in Table IV.I-2, noise levels (hourly Leq’s) at the roof garden ranged from 49-53 dBA, well within the City’s operational noise standards for public open space. Commercial uses, between 7:00 a.m. and 10:00 p.m., may only be exposed to noises up to 65dBA for a period of 20 cumulative minutes in a one-hour time period and a maximum of 85 dBA. Based on the noise measurements shown in Table IV.I-2, noise levels (hourly Leq’s) at 21st and Harrison Streets ranged from 60-67 dBA, also within the City’s operation noise standards for commercial land uses.

Table IV.I-5 (Table 2 of the City of Oakland's CEQA Thresholds/Criteria of Significance Guidelines) presents noise level standards from the noise ordinance that applies to temporary exposure to short- and long-term construction noise. In this context, short-term refers to construction activity lasting less than 10 days at a time while long-term refers to construction activities lasting greater than 10 days at a time.

**TABLE IV.I-5
CITY OF OAKLAND CONSTRUCTION NOISE STANDARDS AT
RECEIVING PROPERTY LINE, DBA**

Receiving Land Use	Daily 7:00 a.m. to 7:00 p.m.	Weekends 9:00 a.m. to 8:00 p.m.
Short-Term Operation (less than 10 days)		
Residential	80	65
Commercial, Industrial	85	70
Long-Term Operation (more than 10 days)		
Residential	65	55
Commercial, Industrial	70	60

During the hours of 7 p.m. to 7 a.m. on weekdays and 8 p.m. to 9 a.m. on weekends and federal holidays, noise levels received by any land use from construction or demolition shall not exceed the applicable nighttime operational noise level standard (see Table IV.D-4)

If the ambient noise level exceeds these standards, the standard shall be adjusted to equal the ambient noise level.

SOURCE: City of Oakland, 2008

Per Chapter 17.120.060 of the Oakland Planning Code, all activities, except those located within the M-40 zone, or in the M-30 zone more than four hundred (400) feet from any legal residentially occupied property, shall be so operated as not to create a vibration which is perceptible without instruments by the average person at or beyond any lot line of the lot containing such activities. Ground vibration caused by motor vehicles, trains, and temporary construction or demolition work is exempted from this standard. (Ord. 11895 § 8, 1996: prior planning code § 7711).

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

The City of Oakland's SCAs relevant to reducing noise and vibration impacts due to the Proposed Project are listed below. If the Project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts from noise and vibration. The SCA are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA NOI-1. Days/Hours of Construction Operation**

Ongoing throughout demolition, grading, and/or construction. The project applicant shall require construction contractors to limit standard construction activities as follows:

- a) Construction activities are limited to between 7:00 AM and 7:00 PM Monday through Friday, except that pile driving and/or other extreme noise generating

activities greater than 90 dBA shall be limited to between 8:00 a.m. and 4:00 p.m. Monday through Friday.

- b) Any construction activity proposed to occur outside of the standard hours of 7:00 am to 7:00 pm Monday through Friday for special activities (such as concrete pouring which may require more continuous amounts of time) shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened and such construction activities shall only be allowed with the prior written authorization of the Building Services Division.
- c) Construction activity shall not occur on Saturdays, with the following possible exceptions:
 - i. Prior to the building being enclosed, requests for Saturday construction for special activities (such as concrete pouring which may require more continuous amounts of time), shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened. Such construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division.
 - ii. After the building is enclosed, requests for Saturday construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division, and only then within the interior of the building with the doors and windows closed.
- d) No extreme noise generating activities (greater than 90 dBA) shall be allowed on Saturdays, with no exceptions.
- e) No construction activity shall take place on Sundays or Federal holidays.
- f) Construction activities include but are not limited to: truck idling, moving equipment (including trucks, elevators, etc) or materials, deliveries, and construction meetings held on-site in a non-enclosed area.
- g) Applicant shall use temporary power poles instead of generators where feasible.

- **SCA NOI-2. Noise Control**

Ongoing throughout demolition, grading, and/or construction. To reduce noise impacts due to construction, the project applicant shall require construction contractors to implement a site-specific noise reduction program, subject to the Planning and Zoning Division and the Building Services Division review and approval, which includes the following measures:

- a) Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible).
- b) Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools.

However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.

- c) Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or other measures to the extent feasible.
- d) If feasible, the noisiest phases of construction shall be limited to less than 10 days at a time.

- **SCA NOI-3. Noise Complaint Procedures**

Ongoing throughout demolition, grading, and/or construction. Prior to the issuance of each building permit, along with the submission of construction documents, the project applicant shall submit to the Building Services Division a list of measures to respond to and track complaints pertaining to construction noise. These measures shall include:

- a) A procedure and phone numbers for notifying the Building Services Division staff and Oakland Police Department; (during regular construction hours and off-hours);
- b) A sign posted on-site pertaining with permitted construction days and hours and complaint procedures and who to notify in the event of a problem. The sign shall also include a listing of both the City and construction contractor's telephone numbers (during regular construction hours and off-hours);
- c) The designation of an on-site construction complaint and enforcement manager for the project;
- d) Notification of neighbors and occupants within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities about the estimated duration of the activity; and
- e) A preconstruction meeting shall be held with the job inspectors and the general contractor/on-site project manager to confirm that noise measures and practices (including construction hours, neighborhood notification, posted signs, etc.) are completed.

- **SCA NOI-4. Interior Noise**

Prior to issuance of a building permit. If necessary to comply with the interior noise requirements of the City of Oakland's General Plan Noise Element and achieve an acceptable interior noise level, noise reduction in the form of sound-rated assemblies (i.e., windows, exterior doors, and walls) shall be incorporated into project building design, based upon recommendations of a qualified acoustical engineer and submitted to the Building Services Division for review and approval. Final recommendations for sound-rated assemblies will depend on the specific building designs and layout of buildings on the site and shall be determined during the design phase.

- **SCA NOI-5. Pile Driving and Other Extreme Noise Generators**

Ongoing throughout demolition, grading, and/or construction. To further reduce potential pier drilling, pile driving and/or other extreme noise generating construction impacts greater than 90dBA, a set of site-specific noise attenuation measures shall be completed under the supervision of a qualified acoustical consultant. Prior to commencing construction, a plan for such measures shall be submitted for review and approval by the Planning and Zoning Division and the Building Services Division to ensure that maximum feasible noise attenuation will be achieved. This plan shall be based on the final design of the project. A third-party peer review, paid for by the project applicant, may be required to assist the City in evaluating the feasibility and effectiveness of the noise reduction plan submitted by the project applicant. A special inspection deposit is required to ensure compliance with the noise reduction plan. The amount of the deposit shall be determined by the Building Official, and the deposit shall be submitted by the project applicant concurrent with submittal of the noise reduction plan. The noise reduction plan shall include, but not be limited to, an evaluation of the following measures. These attenuation measures shall include as many of the following control strategies as feasible:

- Erect temporary plywood noise barriers around the construction site, particularly along on sites adjacent to residential buildings;
- Implement “quiet” pile driving technology (such as pre-drilling of piles, the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions;
- Utilize noise control blankets on the building structure as the building is erected to reduce noise emission from the site;
- Evaluate the feasibility of noise control at the receivers by temporarily improving the noise reduction capability of adjacent buildings by the use of sound blankets for example; and
- Monitor the effectiveness of noise attenuation measures by taking noise measurements.

- **SCA NOI-6 (same as SCA GEO-2 and SCA CUL-5): Vibrations Adjacent Historic Structures**

Prior to issuance of a demolition, grading or building permit. The project applicant shall retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could damage the Kaiser Center Tower building or other nearby historic structures (as described in Section IV.D *Cultural Resources*), and design means and methods of construction that shall be utilized to not exceed the thresholds. The engineer’s analysis shall be submitted to the City of Oakland for review and approval. The applicant shall implement the approved plan.

Impacts and Mitigation Measures

Significance Criteria

The Proposed Project would have a significant noise impact if it would:

1. Expose persons to or generate noise levels in excess of standards established in the Oakland General Plan or applicable standards of other agencies (e.g., OSHA);
2. Violate the City of Oakland Noise Ordinance (Oakland Planning Code Section 17.120.050) regarding operational noise per Table IV.I-4;
3. Violate the City of Oakland Noise Ordinance (Oakland Planning Code Section 17.120.050) regarding construction noise per **Table IV.I-5**, except if an acoustical analysis is performed;
4. Violate the City of Oakland Noise Ordinance (Oakland Municipal Code Section 8.18.020) regarding nuisance of persistent construction-related noise;
5. Create a vibration not associated with motor vehicles, trains, or temporary construction or demolition work which is perceptible without instruments by the average person at or beyond any lot line containing the vibration-causing activity, except vibration-causing activities located in the M-40 zone or in the M-30 zone more than 400 feet from any legally occupied residential property (Oakland Planning Code Section 17.120.060) (See criterion 6 for the threshold for rail-related vibration);
6. Expose persons to or generate rail-related groundborne vibration in excess of standards established by the Federal Transit Administration (FTA);
7. Generate interior Ldn or CNEL greater than 45 dBA for multi-family dwellings, hotels, motels, dormitories and long-term care facilities (and may be extended by local legislative action to include single family dwellings) per California Noise Insulation Standards (CCR Part 2, Title 24);
8. Result in a 5dBA permanent increase in ambient noise levels in the project vicinity above levels existing without the project. If the cumulative increase in noise results in a 5 dBA permanent increase in ambient noise levels in the project vicinity above existing levels without the project (i.e., cumulative conditions including the proposed project compared to existing conditions), the project's contribution to the cumulative increase would be cumulative considerable and significant if it results in a 3dBA permanent increase attributable to the project (i.e., cumulative conditions including the proposed project compared to cumulative conditions without the proposed project).
9. Conflict with land use compatibility guidelines for all specified land uses for determination of acceptability of noise (see Table IV.I-3) after incorporation of all applicable Standard Conditions of Approval;
10. Be located within an airport land use plan and would expose people residing or working in the project area to excessive noise levels; or
11. Be located within the vicinity of a private airstrip, and would expose people residing or working in the project area to excessive noise levels.

Since the Proposed Project would not include any vibration-causing activity aside from that associated with construction and motor vehicles, it can be assumed that no impact would occur with regard to criterion 6. Also, the Proposed Project is not located within the vicinity of a private airstrip nor is it located within the land use plan area for Oakland Airport or any other airport. Therefore, impacts associated with criteria 10 and 11 are not discussed further in this EIR.

Impacts and Mitigation Measures

Impact NOI-1: Construction activities associated with the Proposed Project would temporarily generate noise levels that could conflict with standards established in the City noise ordinance. (Less than Significant)

Construction Equipment, Activities and Noise Levels

Project construction would occur over two phases and is estimated to last for approximately seven years (site work and interior building work). Each phase would last for approximately 3.5 to four years.

Construction activity noise levels at and near the Project area would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. **Table IV.I-6** shows typical noise levels produced by various types of construction equipment.

**TABLE IV.I-6
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT**

Construction Equipment	Noise Level (dBA Leq at 50 ft)
Dump Truck	88
Portable Air Compressor	81
Concrete Mixer (Truck)	85
Scraper	88
Jack Hammer	88
Dozer	87
Roller	74
Paver	89
Generator	76
Crane, Mobile	83
Pile Driver	101
Compactor	82
Backhoe	85

dBA = A-weighted decibel; Leq = equivalent sound level

SOURCE: FTA, 2006, Layne Christiansen 2004.

Construction of the Project would generate an amount of noise corresponding to the appropriate phase of building construction and the noise generating equipment used during construction. **Table IV.I-7** presents a preliminary summary of proposed construction activity.

**TABLE IV.I-7
PRELIMINARY CONSTRUCTION ACTIVITY SUMMARY**

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Construction Vehicle Type/Number of Trips		
Off Haul Trucks (excavation materials)	3,100 truck loads	100 truck loads
Debris Box Trucking	260 truck loads	300 truck loads
Delivery Trucks	5,500 truck loads	6,000 truck loads
Passenger Vehicles (incl. construction employees)	140 cars per day average, 250 cars peak	140 cars per day average, 250 cars peak
Mobile Cranes	Intermittent use	Intermittent use
Construction Traffic Routes		
Interstate 580	To Harrison St to job site	To Harrison St to job site
Interstate 880	To Harrison St job site	To Harrison St job site
Interstate 980	To 27th St to Harrison St to job site	To 27th St to Harrison St to job site
Staging Areas/Lane or Street Closures		
Street	Close one lane (no parking) of 20th St and one lane (parking) of Webster St.	Close one lane (parking) of Webster St and one lane (parking) of 21st St
Sidewalk	Close 20th St and Webster St sidewalks (adjacent to Project Site)	Close sidewalks on Webster and 21 st streets (adjacent to Project Site)
Construction Workers/Day		
Average number of workers	212	212
Peak	380	380
Parking	Existing onsite garage or surface lots in the vicinity	Existing onsite garage or surface lots in the vicinity
Estimated Cut/Fill; Mass Excavation	31,000 cubic yards	Minimal (existing building demolition)
Number of Truck Trips (Off Haul) (subset of Construction Vehicle Type/Number of Trips, above)		
Demolition Debris	800 truck loads	1,000 truck loads
Excavated Material	3,100 truck loads	100 truck loads
Pile Driving		
Number, location, duration	525 piles; 20 piles per day = approx. 6 weeks.	525 piles; 20 piles per day = approx. 6 weeks.
Solider pile shoring	28,000 sq ft; approx. 6 weeks duration	28,000 sq ft; approx. 6 weeks duration

SOURCE: Turner Construction, 2009.

Noise from Demolition Phase

Although a detailed construction schedule by phase has not been developed for the Project (which is only conceptually designed), approximately four to six months of demolition activity is estimated to occur prior to the construction of each tower in each phase. Demolition activities would involve operation of backhoes and/or bulldozers, jackhammers, loaders and trucks. Noise levels at 50 feet from the Project Site could vary widely depending on the combination and duration of equipment uses. Noise would be intermittent over the demolition period and involve noise levels associated with these equipment, shown in Table IV.I-6.

Noise from Pile Driving

Duration of noise from pile driving depends on the duration of this phase of construction which cannot be precisely estimated at this time. Construction of the entirety of the substructure for each phase would likely occur over a 12 week period: 6 weeks for shoring and 6 weeks for driving. Approximately 20 piles would be handled per day over the 6 weeks, and an estimated 525 piles are needed for each phase..

Construction Activity (non-pile driving)

Noise from general construction activities would be more intermittent and less intensive as those described above for demolition and drilling. It would include a myriad of equipment shown in Table IV.I-6.

Noise from Construction Trucks

Noise would also be generated by temporary and intermittent construction truck trips and, to a lesser degree, construction worker vehicle trips to and from the Project Site. Trucks would primarily use Harrison and 27th Streets to access Interstates 580, 880 and 980 to and from the Project Site, as shown in Table IV.I-7. Based on the estimated truck trips for each phase shown in the table, an average of approximately 7 daily truck trips would occur during Phase 1, and an average of approximately 5 daily truck trips would occur during Phase 2.² Existing high daily volumes on Harrison and 27th Streets are shown in Figures IV.L-4a through IV.L-d, Existing Traffic Volumes AM(PM) Peak Hour (in Section IV.L, Transportation and Circulation). It is reasonable to estimate that the increased noise that would result from the addition of 7 daily truck trips to these primary roadways would not result in an substantial or noticeable increase in roadway noise levels and not be considered a significant contribution to local noise levels.

Surrounding Land Uses and Sensitive Land Uses

No sensitive land uses are located within 200 feet of the Project Site property line, except the existing Kaiser Center roof garden proposed for expansion on the 6th level of the Proposed Project towers. (All distances measured perpendicular from edge of Project Site.) The closest land uses are commercial and retail uses to the north, south and west, including the existing Kaiser Building at the easternmost end of the Project Site. As previously discussed under *Sensitive Receptors*, noise sensitive land uses would include Snow Park approximately 250 southeast and Lakeside Park around Lake Merritt approximately 500 feet east

Other uses that may be noise sensitive include a hotel and residential senior community facility located approximately 700 feet southeast and high-density apartments located approximately 600 feet north, at Grand Avenue, the recreational area of Lake Merritt/Children's Fairyland located approximately 1,200 feet east, and a church located approximately 600 feet northeast. Other land uses in the Project vicinity located at further distances from the Project Site would be exposed to construction noise at incrementally lower levels. Access and use of the roof garden during demolition and construction activities would be restricted and prohibited for safety reasons during

² This assumes truck trips would occur for the duration of each Phase. Truck activity would vary depending on the specific construction activity.

earthwork and building erection when the majority of high-noise generating equipment would be operating

Effects of Extreme Noise Activities and Vibration

Noise from construction activities generally attenuates at a rate of 6.0 to 7.5 dBA per doubling of distance. As discussed above, the nearest sensitive uses would be the public open space at Snow Park and around Lake Merritt, approximately 200 feet from the Project Site (the open space around Lake Merritt is approximately 500 feet the actual construction area of the Project Site).

Conservatively assuming an attenuation rate of 6.0 dBA per doubling of distance, these areas would temporarily and intermittently experience maximum noise levels of up to 89 dBA with pile driving, typically the loudest source of construction noise.³ Impacts from pile driving can result from both elevated single-event or “impact” noise levels and from vibration. Pile driving could produce elevated noise levels, even when feasible noise reduction methods are used.

Implementation of SCAs NOI-1 Days/Hours of Construction Operation, NOI-2 Noise Control, NOI-3 Noise Complaint Procedures, and NOI-5, Pile Driving and Other Extreme Noise Generators, would reduce construction noise levels by limiting hours of construction activities, requiring best available noise control technology, and by requiring the Project applicant and/or its contractors notify any local residents (if any) of construction activities and to track and respond to noise complaints. To specifically address impacts from pile drilling and other extreme noise generating construction activities that may expose sensitive receptors to noise levels greater than 90 dBA, Lmax, part of SCA NOI-5, requires the Project applicant to develop and submit for review and approval by the City a Site-specific Construction Noise Reduction Plan that would ensure that maximum feasible noise attenuation will be achieved. The applicant will submit this plan for review and approval. The estimated noise level associated with pile driving for the Project would not exceed the 90 dBA, Lmax, threshold given the distance of Snow Park from the Project Site.

Depending on the construction equipment used, groundborne vibrations can be perceptible within 30 to 100 feet of a source. Structural damage from pile driving typically does not occur in buildings more than 50 feet from the location of the activity (Caltrans, 2004). However, these vibrations could result in cosmetic or structural damage to within 50 feet of the Project Site and construction area, which would include the existing roof garden and Kaiser Center Building. The Project incorporates SCA NOI-6, Vibrations Adjacent Historic Structures, to address the potentially effects of groundborne vibration effects. SCA NOI-6 requires that the Project applicant retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could affect portions of Kaiser Center that are not proposed to be demolished as part of the Project and design means and methods of construction that shall be utilized to avoid potential impacts.

³ Pile driving 101 dBA at 50 feet from construction activity, per Table IV.I-7, reduced 6.0 dBA at 100 feet, and 6.0 dBA at 200 feet

Implementation of SCAs NOI-1 NOI-2, NOI-3, NOI-5 and NOI-6 would reduce impacts from construction noise and vibration. These measures would reduce temporary noise and vibration impacts associated with construction to a less-than-significant level.

Mitigation Measures: None required.

Impact NOI-2: Project operations would increase noise levels in the Project vicinity that could result in the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. (Less than Significant)

Chapter 17.120.050 of the City of Oakland Planning Code specifies the maximum sound level received at public open spaces and commercial land uses. The maximum sound level (L_{max}) received by public open spaces cannot exceed 80 dBA and commercial land uses cannot exceed 85 dBA. Per Table IV.D-4, public open spaces must not exceed 60 dBA and commercial land uses cannot exceed 65 dBA during daytime hours as measured at the property line over a 20 minutes in a one-hour time period. However, per the City of Oakland, if existing noise is measured to be louder than the applicable noise level standard, the existing noise level shall be considered the maximum allowed, which in this case is 67 dBA at 21st and Harrison Streets (**Table IV.I-2**).

The office towers would generate some noise from heating, ventilating, and air conditioning mechanical equipment. Since the mechanical equipment would be typical for office buildings, the equipment's noise generation would not be expected to exceed 56 dBA at a distance of 50 feet. This amount may increase the average noise level of 49 to 53 dBA Leq on the roof garden but would not exceed the City's established threshold of 60 dBA for public open space. Noise from the mechanical equipment would not increase the average noise level of 60 to 67 dBA Leq at the street level of the Project Site nor would it exceed the City's established threshold of 67 dBA. Therefore, noise impacts from the Project related stationary sources would be less than significant.

Mitigation: None required.

Impact NOI-3: Project traffic could substantially increase traffic noise levels in the Project area. (Less than Significant)

After construction is complete and the office towers begin its operations, the additional vehicles traveling to the site would increase noise levels adjacent to nearby roads. Based on the City of Oakland's CEQA Thresholds, a project would be considered to generate a significant impact if it resulted in a 5 dBA permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project. Noise levels were determined using the Federal Highway

Administration (FHWA) Traffic Noise Prediction Model and the turning movements in the traffic section for Existing (2007), Existing Plus Project, Near Term (2015), and Near Term Plus Project (2015) conditions (see Appendix F). The Near Term Plus Project scenario includes Project traffic plus traffic from other approved or pending projects for the year 2015 (assumed build-out year of all projects).

As reported in the traffic section of this EIR, the Project would generate a net increase of 1,187 morning peak hour vehicle trips and 1,144 late afternoon peak hour vehicle trips. These trips would be distributed over the local street network and would affect roadside noise levels. Peak hour (morning) intersection turning data from the traffic study were analyzed to evaluate Project increases and resulting traffic-generated noise increases on roadway links most affected by Project-related traffic and nearest the Project Site. Noise levels at other times would be lower. The segments analyzed and the results of the noise increases resulting from modeling are shown in **Table IV.I-8**.

The increase in traffic noise from the Existing Plus Project (2007) scenario compared to the Existing (2007) scenario would increase peak hour noise levels by less than 5 dBA at all studied roadway segments. The increase in traffic noise from the Near Term Plus Project (2015) scenario compared to the Existing (2007) scenario would increase peak hour noise levels by less than 5 dBA at most roadway segments, except at the roadway segment 21st Street west of Webster Street, where the increase is 5.0 dBA. This is a significant impact. However, the Project's contribution to the 2015 roadway noise increase along the impacted roadway segment is estimated by comparing Near Term Plus Project (2015) with Near Term Without Project, which Table IV.I-8 shows is 4.1 dBA. Because this exceeds the significance threshold of 3dBA (to determine Project contribution), this is still considered a significant Project impact in 2015.

SCA TRANS-1 Transportation Demand Management, discussed in Section IV.L Transportation and Circulation, would apply to Impact NOI-3 and reduce the Project's contribution to 2015 roadway noise along all roadways by reducing vehicle trips associated with the Project. Although the specific TDM Program has not yet been developed, assuming a preliminary 10 percent reduction in Project traffic (consistent with the preliminary TDM assumption applied in the greenhouse gases [GHG] analysis in Section IV.B), a 0.3 dBA reduction would result at 21st Street west of Webster Street, which would reduce the 2015 roadway noise impacts to less than 5.0 dBA, which is a less than significant level.

Mitigation: None required.

**TABLE IV.I-8
PEAK-HOUR TRAFFIC NOISE LEVELS IN THE PROJECT VICINITY
EXISTING (2007) VERSUS NEAR TERM PLUS PROJECT (2015)**

A.M. Peak Hour Noise Levels, dBA, Leq ^a							
Roadway Segment	(A) Existing	(B) Existing Plus Project	(B-A) Difference between Existing Plus Project and Existing	(C) Near Term Without Project (2015)	(D) Near Term Plus Project (2015)	(D-A) Difference between Near Term Plus Project and Existing ^d	(D-C) Difference between Near Term Plus Project and Near Term Without Project (2015) ^e
Harrison Street north of Grand Avenue ^{b,c}	65.0	65.8	0.8	65.8	66.5	1.5	NA
Harrison Street south of Grand Avenue ^{b,c}	66.4	67.0	0.6	67.2	67.7	1.3	NA
Grand Avenue east of Harrison Street ^{b,c}	64.7	64.7	0.0	65.5	65.5	0.8	NA
Grand Avenue west of Harrison Street ^{b,c}	62.8	62.8	0.0	63.9	63.9	1.1	NA
Harrison Street north of 21st Street ^{b,c}	66.5	67.1	0.6	67.2	67.7	1.2	NA
Harrison Street south of 21st Street ^{b,c}	66.0	66.4	0.4	66.7	67.1	1.1	NA
21st Street east of Harrison Street ^{b,c}	NA			NA	NA	NA	NA
21st Street west of Harrison Street ^{b,c}	59.7	62.9	3.2	60.4	63.3	3.6	NA
Webster Street north of 21st Street ^{b,c}	60.1	61.2	1.1	61.0	61.9	1.8	NA
Webster Street south of 21st Street ^{b,c}	59.4	59.6	0.2	60.4	60.5	1.1	NA
21st Street east of Webster Street ^{b,c}	58.9	63.4	4.6	59.8	63.8	4.9	NA
21st Street west of Webster Street ^{b,c}	57.6	62.3	4.7	58.5	62.6	5.0	4.1
Franklin Street north of 20th Street ^{b,c}	57.2	60.1	2.9	58.2	60.7	3.5	NA
Franklin Street south of 20th Street ^{b,c}	57.4	60.0	2.6	58.3	60.5	3.1	NA
20th Street east of Franklin Street ^{b,c}	60.9	61.3	0.4	61.9	62.2	1.3	NA
20th Street west of Franklin Street ^{b,c}	60.1	60.8	0.6	61.1	62.3	2.2	NA

^a Considered significant if the incremental increase in noise from traffic is greater than the existing ambient noise level by 5 dBA Leq, per City of Oakland, CEQA Thresholds/Criteria of Significance Guidelines. Violations are in **bolded** text.

^b Road center to receptor distance is 15 meters (approximately 50 feet) for all roadway segments. Noise levels were determined using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model.

^c The analysis considered the vehicle mix based on – cars 97 percent, medium trucks 2 percent, and heavy trucks 1 percent. Traffic speeds for all vehicle classes were set at 25 mph.

^d Considered significant if the incremental increase in noise is greater than 5 dBA.

^e If Near Term Project related noise increase is considered significant (greater than 5 dBA), the impact is considered significant if the incremental increase in roadway noise from the Near Term With Project compared to Near Term Without Project is greater than 3 dBA.

SOURCE: ESA, 2009

Cumulative Noise Impacts

Impact NOI-4: Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. (Potentially Significant)

Geographic Context

The geographic area considered for cumulative noise analysis includes areas within close proximity to the Project Site and roadways examined in the transportation analysis in Section IV.L, *Transportation and Circulation*. These include areas of Oakland that encompass the projects included in the City of Oakland's Major Projects List, as well as area projects incorporated into the regional travel demand model.

Impacts

Longer-term noise from cumulative development, which is the Proposed Project combined with past, present, pending, and reasonably foreseeable development in the area, would primarily occur from motor vehicle traffic. When considered alone, the Proposed Project would generate noise mainly by adding more traffic to the area. Other anticipated projects would contribute to noise in the area due to increased traffic volumes. Notably, any project that would individually have a significant project level noise impact would also be considered to have a significant cumulative noise impact.

As noted in Impact NOI-3 and based on the City of Oakland's CEQA Thresholds, a project would be considered to generate a significant impact if it resulted in a 5 dBA permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project. As for Impact NOI-3, noise levels were determined for using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model and the turning movements in the traffic section for, Cumulative Without Project (2030), and Cumulative Plus Project (2030) conditions (see Appendix F). The segments analyzed and the results of the noise increases resulting from modeling are shown in **Table IV.I-9** for Cumulative Plus Project traffic, which includes Project traffic combined with traffic from other approved or pending projects for the year 2030 (assumed build-out year of all projects).

Table IV.I-9 shows the increase in traffic from between the Cumulative Plus Project (2030) scenario and Existing (2007) would increase peak hour noise levels by less than 5 dBA at most roadway segments, except at the roadway segments 21st Street west of Webster Street, where the increase is 5.3 dBA, and 21st Street east of Webster Street, where the increase is 5.2 dBA. The Project's contribution to the 2030 cumulative roadway noise increase (Existing compared to Cumulative Plus Project) is 3.6 dBA along 21st Street west of Webster Street, and 3.5 dBA along 21st Street east of Webster Street, and because these exceed the significance threshold of 3dBA, this is still considered a considerable contribution to the cumulative impact in 2030 and significant.

**TABLE IV.I-9
PEAK-HOUR TRAFFIC NOISE LEVELS IN THE PROJECT VICINITY
EXISTING (2007) VERSUS CUMULATIVE PLUS PROJECT (2030)**

Roadway Segment	(A) Existing	(B) Cumulative Without Project (2030)	(C) Cumulative Plus Project (2030)	(C-A) Difference between Cumulative Plus Project and Existing ^d (2030)	(C-B) Difference between Cumulative Plus Project and Cumulative Without Project ^e (2030)
Harrison Street north of Grand Avenue ^{b,c}	65.0	67.8	68.3	3.3	NA
Harrison Street south of Grand Avenue ^{b,c}	66.4	68.9	69.2	2.8	NA
Grand Avenue east of Harrison Street ^{b,c}	64.7	66.9	66.9	2.2	NA
Grand Avenue west of Harrison Street ^{b,c}	62.8	66.1	66.1	3.3	NA
Harrison Street north of 21st Street ^{b,c}	66.5	67.8	68.2	1.7	NA
Harrison Street south of 21st Street ^{b,c}	66.0	67.3	67.6	1.6	NA
21st Street east of Harrison Street ^{b,c}	NA	NA	NA	1.6	NA
21st Street west of Harrison Street ^{b,c}	59.7	61.0	63.6	3.9	NA
Webster Street north of 21st Street ^{b,c}	60.1	61.8	62.6	2.5	NA
Webster Street south of 21st Street ^{b,c}	59.4	61.2	61.2	1.8	NA
21st Street east of Webster Street ^{b,c}	58.9	60.6	64.1	5.2	3.5
21st Street west of Webster Street ^{b,c}	57.6	59.3	62.9	5.3	3.6
Franklin Street north of 20th Street ^{b,c}	57.2	58.9	61.1	3.9	NA
Franklin Street south of 20th Street ^{b,c}	57.4	59.1	61.0	3.6	NA
20th Street east of Franklin Street ^{b,c}	60.9	62.6	62.9	2.0	NA
20th Street west of Franklin Street ^{b,c}	60.1	61.8	62.3	2.2	NA

^a Considered significant if the incremental increase in noise from traffic is greater than the existing ambient noise level by 5 dBA Leq, per City of Oakland, CEQA Thresholds/Criteria of Significance Guidelines. Violations are in **bolded** text.

^b Road center to receptor distance is 15 meters (approximately 50 feet) for all roadway segments. Noise levels were determined using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model.

^c The analysis considered the vehicle mix based on – cars 97 percent, medium trucks 2 percent, and heavy trucks 1 percent. Traffic speeds for all vehicle classes were set at 25 mph.

^d Considered significant if the incremental increase in noise is greater than 5 dBA.

^e If Near Term Project related noise increase is considered significant (greater than 5 dBA), the impact is considered significant if the incremental increase in roadway noise from the Near Term With Project compared to Near Term Without Project is greater than 3 dBA.

SOURCE: ESA, 2008

As discussed for NOI-3, SCA TRANS-1 Transportation Demand Management, would apply to Impact NOI-4 and reduce the Project's contribution to 2030 roadway noise along all roadways by reducing vehicle trips associated with the Project.

Even assuming a preliminary 10 percent reduction in Project-generated traffic volumes associated with the TDM (consistent with the preliminary TDM assumption applied in the greenhouse gases [GHG] analysis in Section IV.B), roadway noise would be reduced by 0.2 dBA. Cumulative noise impacts would remain significant along 21st Street. Thus, the impact would be significant and unavoidable.

Mitigation: Not feasible because none is available.

Significance after Implementation of Standard Conditions: Significant and Unavoidable.

References – Noise

California Department of Transportation (Caltrans), *Technical Noise Supplement: A Technical Supplement to the Traffic Noise Analysis Protocol*, October 1998a.

California Department of Transportation (Caltrans), *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects*, October 1998b.

California Department of Transportation (Caltrans), *Transportation- and Construction-Induced Vibration Guidance Manual*, June 2004.

City of Oakland, *Noise Element, City of Oakland General Plan*, June 21, 2005.

City of Oakland, “CEQA Thresholds/Criteria of Significance Guidelines,” 2010.

Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06)*, May 2006.

Layne-Christiansen, Safety and Environmental Health Sciences Department, *Noise Evaluation: Ingersoll-Rand TH-75E Reverse Circulation Air Rotary Drilling Rig*, 2004.

Turner Construction, “Kaiser Towers DEIR: Construction Impact Summary Data Matrix,” February 23, 2009, revised February 26, 2009.

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J. Population, Employment and Housing

This section addresses existing conditions, trends, and impacts of the Proposed Project related to population, business activity, employment, and housing. Project employment is quantified and described along with the Project's contributions to citywide growth, providing the context for considering and understanding potential physical environmental impacts analyzed in this and other sections of the EIR. The impact assessment focuses on displacement of housing, people, businesses, and jobs, and on the inducement of population growth. The discussion also addresses potential effects of the Proposed Project on housing demand and the relationship between jobs and housing.

Setting

The following setting identifies existing conditions and trends for the Project Site and the City of Oakland. The citywide and regional context for population, employment, and housing is also presented, along with identification of the relationship between jobs and housing.

Project Site

Business Activity and Employment

The Project Site is currently occupied by a three story parking structure with 1,340 parking stalls and numerous retail and other service businesses. There are approximately 38,190 square feet of retail uses currently operating along Webster Street ("Webster Street Mall"). Current businesses leasing space within the Webster Street Mall areas include a fitness center, drugstore, bank and several restaurants. All these businesses primarily serve the neighboring offices within the Kaiser Center Complex. The Kaiser roof garden covers most of the parking facility.

Table IV.J-1 presents the estimates of existing employment at the Project Site at the various retail and service tenants.

The majority of employees within the mall buildings are office and retail/commercial workers.

Population and Housing

There are no housing units or residential population currently living on the Project Site.

City of Oakland and the Region

Oakland is the third largest city in the Bay Area region and the largest city in the East Bay. Housing, population, and employment growth are occurring in Oakland and projected to continue in the future, bolstering Oakland's role as a centrally-located place of residence and employment center within the large Bay Area region.

**TABLE IV.J-1
EXISTING EMPLOYMENT ON THE KAISER CENTER PROJECT SITE, 2008**

	Size / Square Footage	Employment Density Factor Estimate
Proposed Project		
20th Street Mall		
Retail / Commercial Services	21,275 350 sq.ft. / employee ^a	61
Restaurant	12,500 350 sq.ft. / employee ^a	36
Office	64,955 400 sq.ft. / employee ^b	81
Total – 20th Street Mall	98,730	178
Webster Street Mall		
Fitness Center	30,000 reported	25
Parking Facility	1,340 reported	8
Total – Webster Mall	30,000	33
Total Project	128,730	211

The employment figures shown reflect setting conditions as of late 2008 when the EIR employment and population analysis was performed.

^a Employment estimates based on Bay Area average employment densities estimated by Keyser Marston.

^b Currently approximately 50% of the office space is untenanted and consequently employment estimates adjusted accordingly.

SOURCE: Keyser Marston, 2006; McCray, 2008; Lam, 2008.

Business Activity and Employment

The greater Downtown/Oakland CBD area is approximately bounded by I-980 to the west, I-580 to the north, Lake Merritt and the Channel to the east, and the Oakland Estuary to the south. It includes the central parts of downtown (Uptown District, Kaiser Center area, City Center area, Old Oakland, Chinatown) as well as the auto-related, medical/hospital, and residential areas north of Grand Avenue, and the Jack London District to the south of I-880. Downtown Oakland is the major employment center in Oakland and second only to downtown San Francisco, it has the largest concentration of business activity and employment in the Bay Area.

The Oakland CBD includes a mix of uses predominantly consisting of offices and supporting commercial uses such as medical offices, banks, health clubs as well as restaurant and retail establishments. There are also several older apartment buildings and numerous larger new residential projects interspersed throughout many areas of Downtown Oakland.

The Upper Broadway neighborhood is located north of the Project Site and the Oakland CBD. The neighborhood includes a mix of low-, mid-, and high-rise buildings interspersed with multi-level parking structures and surface parking. Land uses within the Upper Broadway neighborhood include offices with limited ground floor retail, industrial uses (such as auto repair shops), civic facilities (such as churches, schools and senior centers). The Upper Broadway area has a high concentration of low-rise automotive-related and other businesses along with residential areas mostly located in the southern areas off of Broadway's central commercial corridor. There are

also major clusters of medical facilities and businesses within the Alta Bates Summit Hill and Kaiser Permanente areas near Broadway's intersection with MacArthur Boulevard.

The Lake Merritt area is located east of the Project Site. Lake Merritt is an important residential and recreational area for Oakland. The area include Lakeside Park which besides providing open space and jogging routes for local residents offers numerous other recreational amenities including Garden Center, Children's Fairyland, Sailboat Club and Rotary Science Center. In the hills above Lakeside Park, the Adam's Point neighborhood is a major residential neighborhood with mid-rise apartment buildings and two- or three-story single family homes. In addition, Grand Avenue is an important neighborhood serving commercial corridor with extensive retail and other commercial businesses to the east of Lake Merritt.

Employment in Oakland was estimated at 199,470 in 2000, representing about five percent of all employment in the Bay Area region (see **Table IV.J-2**). Business activity and employment had grown substantially in Oakland in the late 1990s, reflecting strong economic trends throughout the region and an enhanced market position for Oakland, particularly within the region's office market. While regional trends favored growth in the suburbs in prior decades, recent trends "back to the center" are now recognizing the value of Oakland's central location, its good transportation/transit accessibility, and its relative affordability as a business location. These factors are anticipated to become increasingly important in the future, enabling Oakland to retain and enhance its competitive position as a business center for the region.

Since 2000, employment in Oakland has remained relatively stable with job growth occurring locally in some sectors despite the subsequent downturn in the region's economy. During this period, employment declined substantially in other parts of the region, particularly in the South Bay and in San Francisco, due primarily to declines in the region's high technology industries. The diversity of Oakland's economy has lessened the effects of the region's economic downturn and helped maintain relatively high occupancy rates for the city's office, commercial, and industrial space markets.

As the region's economy rebounds from its recent slowdown, economic growth is forecast for the future. Projections for Oakland show growth of about 71,000 jobs from 2005 to 2030 (see Table IV.J-2). That growth represents about a 31 percent increase in employment in Oakland, and a rate of growth relatively similar to those forecast for the Inner East Bay and the region overall. Downtown Oakland is anticipated to remain strong and to grow as a major office business center. Growth is anticipated in the transportation-related sectors centered on the city's growing airport and seaport, and in medical and health services, in retail, restaurant, and entertainment activities, and in professional and personal services. Activities in existing and new neighborhood commercial districts are anticipated to grow, supported by the growth of housing and population in the city.

TABLE IV.J-2
EMPLOYMENT, HOUSEHOLDS, AND POPULATION FOR OAKLAND, THE EAST BAY, AND BAY AREA REGION: 1990, 2000, 2005 AND 2030

	1990	2000	2005	2030	1990 – 2005		2005 – 2030		
					Change	Annual Rate	Change	Percent	Annual Rate
Employment									
Oakland	173,270	199,470	202,570	273,600	29,300	1.05%	71,030	31%	1.21%
Inner East Bay ^a	353,640	376,710	373,650	499,210	20,010	0.37%	125,560	30%	1.17%
Total East Bay ^b	953,580	1,121,470	1,109,030	1,589,260	155,450	1.01%	479,960	36%	1.45%
Total Bay Area	3,201,010	3,753,460	3,449,640	4,921,680	248,630	0.50%	1,472,040	32%	1.43%
Households									
Oakland	144,520	150,790	154,580	197,390	10,060	0.45%	42,810	22%	0.98%
Inner East Bay ^a	260,350	271,400	278,100	338,300	17,750	0.44%	60,200	18%	0.79%
Total East Bay ^b	779,810	867,500	912,100	1,138,130	132,290	1.05%	226,030	20%	0.89%
Total Bay Area	2,245,870	2,466,020	2,583,080	3,177,440	337,210	0.94%	594,360	19%	0.83%
Total Population									
Oakland	372,240	399,480	410,600	517,300	38,360	0.66%	106,700	21%	0.93%
Inner East Bay ^a	649,840	688,220	706,800	858,100	56,960	0.56%	151,300	18%	0.78%
Total East Bay ^b	2,080,430	2,392,560	2,528,700	3,114,100	448,270	1.31%	585,400	19%	0.84%
Total Bay Area	6,020,150	6,783,760	7,096,100	8,712,800	763,610	1.10%	1,616,700	19%	0.82%

^a Inner East Bay includes Oakland and nearby cities of Albany, Berkeley, Emeryville, Piedmont, Alameda, and San Leandro.

^b Total East Bay includes all of Alameda and Contra Costa counties, and total Bay Area includes all nine Bay Area counties.

SOURCES: U.S. Census; ABAG *Projections 2007*.

Population and Housing

Existing Conditions and Trends

The 2000 Census identified 399,480 people living in Oakland which represents about six percent of the Bay Area's total population (see Table IV.J-2). In 2005, the total Oakland population was estimated to be 410,600. There were 154,580 households in Oakland in 2005 and an average household size of 2.66 persons per household. The 2000 census also identified 157,508 housing units in Oakland (see **Table IV.J-3**). Of the occupied housing units (150,790), 59 percent were renter-occupied and 41 percent owner-occupied. From 1990 to 2000, Oakland's housing stock increased by 2,771 units. However, the number of households in the city grew by 6,270 during the 1990s, reflecting increased occupancy of the existing housing stock, as the overall housing vacancy rate declined from 6.6 percent in 1990 to 4.3 percent in 2000 (see Table IV.J-3). The city's population increased by 27,240 residents during that period as a result of housing production, occupancy of vacant units, and an increase in the population in existing households.

TABLE IV.J-3
CHANGES IN HOUSING STOCK IN OAKLAND, 1990-2000

	1990		2000		Change
Total Housing Units	154,737		157,508		2,771
Occupied Housing Units	144,521	93.4%	150,790	95.7%	6,269
Vacant Housing Units	10,216	6.6%	6,718	4.3%	(3,498)
Owner-occupied Housing	60,153	41.6%	62,489	41.4%	2,336
Renter-occupied Housing	84,368	58.4%	88,301	58.6%	3,933

SOURCE: U.S. Census, 1990 and 2000.

New Housing Development in Oakland

In the 1970s and 1980s, housing development bypassed Oakland and other inner city areas in favor of the suburbs. However, in the 1990s, regional trends began to change. Household and population growth occurred in Oakland existing housing stock as the vacancy rate declined and average persons per household increased. Most of the 2,771 units added in Oakland during the 1990s were built in the latter part of the decade as the region's housing market began to rediscover Oakland. Strong regional housing demand, fewer remaining locations for development in the suburbs, renewed interest in center city living particularly in proximity to employment centers, and a relatively affordable land supply for such a central Bay Area location were all factors favoring renewed housing development in Oakland.

In addition, new housing development has been encouraged in Oakland by regional and local Smart Growth land use policies and by other local efforts such as Mayor Jerry Brown's 10K Initiative to attract new housing development to downtown Oakland and bring 10,000 additional

residents downtown. Since 2000, the city's housing supply has increased substantially. The most recent Oakland Housing element (2007-2014) anticipated the development of over 14,000 new housing units within Oakland by the end of 2014 in order to meet its fair share of the State's housing need (see **Table IV.J-4**).

**TABLE IV.J-4
HOUSING GROWTH IN OAKLAND**

	Additional Housing Units	Annual Average
1990 – 2000 ^a	2,771	277
2000 – 2005 ^b	5,000	1,000
2006 – 2025 ^c	21,360	1,068
2007-2014 ^d	14,629	1,951

^a 2000 Census.

^b Housing units in projects anticipated to be completed by the end of 2005.

^c Housing in approved projects, in projects in pre-development and planning, and housing on housing opportunity sites and other sites considered likely to be developed by 2025.

^d Housing units identified in City of Oakland 2007-2014 Housing Element to be completed by 2014.

SOURCE: City of Oakland, 2004; 2009.

As of April 2009, the 10K Downtown Housing initiative has resulted in the start and partial completion of 96 residential projects with 10,765 units. Forty projects (4,057 units) have been completed and eight projects (535 units) are currently under construction. In addition, 25 projects (2,236 units) have received planning approvals and 23 projects (3,928 units) are in the planning process. Altogether these projects will be able to house more than twice the 10K Housing Downtown initiative's original goal to build new housing for 10,000 new Oakland residents (City of Oakland, 2009).

As identified in Oakland's Housing Element, new housing is being built in downtown Oakland and also in many other parts of the city, including West Oakland, East Oakland, North Oakland, and along the Estuary waterfront. Most of the new housing is multi-family housing. New housing development is mostly focused around the city's BART stations, along transit corridors, in the downtown area, and in mixed-use neighborhoods. Lofts and other new housing are also being built in older industrial areas of the City. New housing in Oakland includes units covering a range of prices and rents, reflecting Oakland's land use policies encouraging higher-density development and the investment of substantial public funding for affordable housing.

The most recent Oakland Housing Element (2007-2014) identified the current status of the City's compliance with the Housing Element:

Units Constructed 2007-2008	1,128
Units with Planning Approvals	5,005
Units Planned (Site Acquisition or Pre-development)	7,070
Total	13,203
<i>Remaining Units to be Accommodated by 2014</i>	<i>1,426</i>

The market success of recent housing developments in Oakland and the continuing demand for housing have increased developer interest in building additional new housing in Oakland in recent years. Although in the interim some housing development has occurred (or is currently planned) at many of these identified opportunity sites, between 7,000 and 8,000 new units could be built over the next five years (2008 to 2013) in projects already approved, in projects in the pre-development and planning process, or on sites considered likely to be developed in this timeframe.

Beyond 2013, continued housing development is anticipated that could add considerable additional housing units through 2030. By 2030, the projections include development of the housing opportunity sites identified in Oakland's Housing Element as well as new housing on other sites. In total, based on ABAG's household population projections, nearly 43,000 new units are expected to be added to Oakland between 2005 and 2030. Such housing growth would represent a more than a 25 percent increase to Oakland's housing supply over the housing stock identified in the 2000 census (shown in Table IV.J-3).

Population and Household Projections

Population projections for Oakland indicate growth of approximately 42,810 households and 106,700 residents from 2005 to 2030 (see Table IV.J-2). This growth reflects the continuing development of new housing in Oakland (described above) and projected demographic trends. In both the city and the region, average household size is projected to decline over time, reflecting the aging of the population, particularly the increase in the proportion of the population over age 55. In Oakland, the development of higher-density housing in the downtown area and other locations also is anticipated to attract households with fewer people and smaller than average household sizes. Thus, population is projected to increase by 21 percent through 2030, while households and housing units are projected to grow by 22 percent.

Regional Market Context for Housing Prices and Rents

Recent Trends

Throughout the state and the region, housing production has not kept pace with the demand for housing associated with employment growth, in-migration, and household formation. Between 1990 and 2000, an estimated 220,000 housing units were added in the nine Bay Area counties (a ten percent increase). During the same period, the number of employed residents increased by 304,500 (10 percent) while the number of jobs increased by 552,500 (17 percent) as shown in **Table IV.J-5**. Housing prices and rents also increased, reflecting this imbalance.

Since 2000, housing production levels have increased at the same time that employment opportunities have fallen off. Nevertheless, historically low mortgage rates and other economic factors have contributed to maintaining for-sale housing demand, price levels, and price increases, in spite of the significant slowdown in economic activity in the region. Apartment rents, however, leveled off in 2001 and declined in most parts of the Bay Area until they began to stabilize in mid-2004, as a result of the slow economy and the ability of some renters to become homebuyers because of low interest rates. Rental unit vacancy rates also increased over this period, and have just recently stabilized and begun to decline in some parts of the region as rental housing demand increased as the mortgage crisis has reduced home sales.

**TABLE IV.J-5
TRENDS IN JOBS AND EMPLOYED RESIDENTS: 1990-2030**

	1990	2000	2005	2030	1990-2005		2005-2030	
					Change	Annual Rate	Change	Annual Rate
Total Jobs								
Oakland	173,270	199,470	202,570	273,600	29,300	1.05%	71,030	1.21%
Inner East Bay ^a	353,640	376,710	373,650	499,210	20,010	0.37%	125,560	1.16%
Total East Bay ^b	953,580	1,121,470	1,109,030	1,589,260	155,450	1.01%	479,960	1.45%
Total Bay Area	3,201,010	3,753,460	3,449,640	4,921,680	248,630	0.50%	1,472,040	1.43%
Employed Residents								
Oakland	162,490	178,716	174,740	233,960	12,250	0.49%	59,220	1.17%
Inner East Bay ^a	312,070	332,135	320,020	416,060	7,950	0.17%	96,040	1.05%
Total East Bay ^b	1,053,430	1,171,549	1,187,470	1,640,530	134,040	0.80%	453,060	1.30%
Total Bay Area	3,147,610	3,452,117	3,225,100	4,655,500	77,490	0.16%	1,430,400	1.48%
Ratio Jobs-to-Employed Residents								
Oakland	1.07:1	1.12:1	1.16:1	1.17:1				
Inner East Bay ^a	1.13:1	1.13:1	1.17:1	1.20:1				
Total East Bay ^b	0.91:1	0.96:1	0.93:1	0.97:1				
Total Bay Area	1.02:1	1.09:1	1.07:1	1.06:1				
Employed Residents as Percent of Population								
Oakland	44%	45%	43%	45%				
Inner East Bay ^a	48%	48%	45%	48%				
Total East Bay ^b	51%	49%	47%	53%				
Total Bay Area	52%	51%	45%	53%				

^a Inner East Bay includes Oakland and nearby cities of Albany, Berkeley, Emeryville, Piedmont, Alameda, and San Leandro. Data and projections from ABAG, *Projections 2007*.

^b Total East Bay includes all of Alameda and Contra Costa counties, and total Bay Area includes all nine Bay Area counties. Totals are from ABAG, *Projections 2007*.

SOURCES: U.S. Census; ABAG *Projections 2007*.

Housing Prices and Rents

Housing prices in the Bay Area are among the highest in the country. In December 2004, the median sale price for new and existing homes in the Bay Area was \$533,000. Between 1994 and 2004, house prices in the region increased by 136 percent. Home prices in Oakland and Alameda County were below those in the higher-priced markets – the median sale prices for new and existing homes averaging \$497,000 for Alameda County in December 2004. However, the appreciation in home values within Alameda County was even greater than the regional trends, with prices increasing by 155 percent from 1994 through 2004 (Dataquick, 2009). In recent years, home price increases in Oakland have exceeded regional trends as relatively lower-priced housing in Oakland was “discovered” and became more desirable *vis-à-vis* higher-priced housing in surrounding areas. For example, in January 2002 the median prices for Oakland homes was \$254,000 – approximately 74 percent of the comparable value for Alameda County as a whole. In June 2006, at the market peak, Oakland home prices were \$540,000 and almost 90 percent of the comparable value for Alameda County as a whole.

In recent years following the mortgage crisis and economic downturn, home prices have decreased significantly from their peak values in mid 2006 throughout most of California. Within most of the Bay Area, the home value losses have been less severe except for the more suburban areas of the East Bay. Home values in the more affluent areas of the Bay Area (such as San Francisco, San Mateo and Marin) nonetheless remain very high and relatively stable. In 2008, prices for new and existing homes in the Bay Area averaged \$704,580 and were \$755,000 in San Francisco. By contrast, Alameda County’s median home price was \$493,500. In 2008, Oakland median home price was \$407,000 – approximately 14.4 percent lower than its previous median home price of \$475,000 in 2005 (City of Oakland, 2008).

Information for larger rental apartment complexes show average apartment rents for the Bay Area at \$1,290 per month as of mid-2005, and average rents for apartments in Alameda County at \$1,200 per month, just below the regional average (Real Estate Research Council of Northern California, 2005). In both cases, rents peaked in early 2001, and then declined thereafter through mid-2004, as rental vacancy rates also increased. However, with the onset of the Mortgage crisis there has been greater demand for rental housing resulting in increases in both their occupancy and rental rates. In 2008, the average apartment rent in Oakland is \$1,410 per month, and the apartment vacancy rate is 4.5 percent (City of Oakland, 2008).

Oakland’s Housing Market Reflects Regional Context

Housing market conditions in Oakland reflect the broader regional housing market context. While housing prices and rents in Oakland have generally been below those in many other parts of the Bay Area, regional housing demand and higher prices and rents in other areas have been increasing demand for housing in Oakland and putting upward pressure on Oakland’s housing prices and rents. Increasing interest in higher-density urban living and in housing in closer-in locations with access to employment centers also supports demand for housing in Oakland and contributes to the market for new housing now under development in Oakland.

Employed Residents and Jobs/Housing Relationship

Employed Residents and Where Oakland Residents Work

In 2000, 178,716 people living in Oakland were employed according to the U.S. Census, representing 56 percent of the working age population (the population 16 years of age and older) and 92 percent of the civilian labor force (those 16 years of age and older working or looking for work). In the future, the number of employed residents is anticipated to increase at a faster rate than the growth of population, due to the growth of higher-density new housing in Oakland with proportionally more adult residents in their working years and to regional demographic trends related to the overall aging of the population and higher labor force participation rates.

Census data indicate that in 2000, about 39 percent of the employed residents of Oakland held jobs in Oakland. Another 16 percent worked in nearby cities of the Inner East Bay, indicating that the majority (55 percent) of Oakland's employed residents work close to home, in Oakland and adjacent cities. Another 18 percent worked in San Francisco, and about 19 percent worked elsewhere in Alameda County outside the Inner East Bay and in Contra Costa County. The remaining eight (8) percent worked in other locations, most in other Bay Area counties (U.S. Census [2000], 2008).

Oakland Jobs and Where People Working in Oakland Live

About 36 percent of the jobs in Oakland in 2000 were held by people who also lived in the city. Another 15 percent of jobs were held by residents of nearby cities in the Inner East Bay, indicating that over half (51 percent) of Oakland's jobs are held by residents of Oakland and its adjacent cities. Residents of other parts of Alameda County and Contra Costa County held another 31 percent of Oakland's jobs, San Francisco residents held about five (5) percent, with the remaining 13 percent of jobs held by residents of other counties in the Bay Area, adjacent areas, and beyond.

Overall Relationship of Jobs and Housing

As described above, Oakland is both a place of residence and a place of employment. The total number of jobs in the city (202,570 in 2005) is roughly comparable to the total number of employed residents (174,716 in 2005) (see Table IV.J-5). The overall relationship between jobs and employed residents in an area identifies the extent to which a community enjoys a balanced mix of land uses thereby offering job opportunities to local residents and housing opportunities for workers employed in local jobs. The resultant mix of who lives in Oakland and who works in Oakland and the extent to which these are the same individuals results from a complex set of interactions and decision factors that determine where people choose to live and work, how much they spend for housing, and their travel patterns. Jobs/housing balance evolves over time and reflects the role and location of particular areas within the larger regional context. Regional planning efforts in the Bay Area seek to "balance" the number of jobs and the number of employed residents, or to improve existing imbalances, for purposes of achieving goals related to improving housing availability and affordability, commute distances, congestion, and air quality.

Data and projections for Oakland indicate that Oakland has a good balance of jobs and housing as it continues to have a relatively similar number of jobs and employed residents. In the future, similar amounts of growth for employed residents and jobs are anticipated to maintain this “balance” over time, as shown in Table IV.J-5. The relationship of jobs to employed residents in Oakland is similar to that for the nine-county Bay Area overall. Data for the Inner East Bay, including Oakland and its nearby cities, show that this larger surrounding area has a somewhat higher ratio of jobs to employed residents than Oakland alone. Overall, data for the East Bay in total (all of Alameda and Contra Costa counties including the Inner East Bay) show more employed residents than jobs, indicating the important role of the East Bay as a place of residence for people employed in the East Bay and other parts of the region.

Local Plans and Policies

Oakland General Plan policies and other applicable plans and policies that pertain to housing, jobs, and related effects, and that apply to the Project, are identified and discussed in Section IV.A. *Land Use, Plans, and Policies*. General Plan and Housing Element policies also are addressed in that section, as relevant to the significance criteria identified above.

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

There are no *City of Oakland’s Standard Conditions of Approval and Uniformly Applied Development Standards* (SCAs) that are specific to Population, Employment, and Housing.

Impacts and Mitigation Measures

Significance Criteria

Although a project’s social and economic effects, *per se*, are not considered to be significant environmental effects under CEQA, those aspects of a project might affect other conditions in an area that are evaluated for physical environmental impacts under CEQA. Thus, this section also addresses the potential effects of the Project on housing demand, jobs/housing balance, and implications for housing availability and affordability. Such effects can have indirect implications for employee residence and commute patterns and related transportation and air quality impacts.

A project would have a significant effect on the environment if it would:

1. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere, in excess of that contained in the City’s Housing Element.
2. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere, in excess of that contained in the City’s Housing Element.
3. Displace substantial numbers of businesses and jobs, necessitating the construction of replacement facilities elsewhere, in excess of that contemplated in the City’s General Plan.

4. Induce substantial population growth in a manner not contemplated in the General Plan, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads and other infrastructure) such that additional infrastructure is required but the impacts of such were not previously considered or analyzed.

The Proposed Project is evaluated relevant to the above criteria in the rest of this section. Not all the criteria above apply to the Proposed Project. No residential population exists that would be displaced by the development of the proposed new office development. Because there is no residential development on the Project Site, the Proposed Project would not result in any either the loss of any housing units or the displacement of any current residents.

Project and Cumulative Impacts

Future Project Employment

This section quantifies and describes the employment impacts associated with the Kaiser Center Project. Employment and population changes in and of themselves, are not normally considered to be significant environmental effects under CEQA. However, these changes and effects can be indicators of other impacts, and they can have influence on the significance of those impacts. Thus, the description of employment and population changes that follows is included to provide context for considering and understanding potential physical environmental impacts associated with changes in employment and population that are analyzed later in this section and in other sections of this EIR (*e.g.*, traffic, public services, and air quality). In addition, the description also identifies beneficial aspects of the Proposed Project in terms of employment opportunities and support for increased business activity in nearby areas.

Overall, the Proposed Project would redevelop existing buildings at the westernmost area of the Project Site to construct two office towers with a total of 1,320,240 square feet of new office space development as well as 22,300 of street level retail and 23,900 square feet of new commercial development on the 6th floor level area. Consequently the Proposed Project would result in a total of approximately 1,366,240 square feet of office and commercial development. The Proposed Project would also replace 155 of the existing parking spaces and add 697 new additional spaces resulting in future total parking capacity of 2,037 parking spaces.

Office Business Development

The Proposed Project would greatly expand the office employment at the Kaiser Center Complex. All of the approximately 65,400 square feet of existing office space within the two mall buildings would also be removed for the site redevelopment. Currently, these offices are only 50 percent occupied. Consequently there are only an estimated 81 office workers currently employed within the 20th Street Mall that would be displaced by the proposed redevelopment.

The Proposed Project would construct two office towers with a total of 1,320,240 square feet of new office space. The employment density for the future office use at the site is estimated to average approximately 400 square foot per employee. Consequently, it is estimated that the future office businesses at the completed Project would employ approximately 3,300 people.

Commercial and Retail Business Development

The Proposed Project would maintain comparable levels of commercial business activity on the Project Site better supported by the increased office employees working on-site. The Project would replace all of 63,775 square feet of existing commercial retail use at the Project site. The commercial businesses currently operating at the Webster and 20th Street Malls include a fitness center, restaurants, retail and service business. As shown in Table IV.J-1, these businesses currently employ approximately 122 people. During the Project's future construction these businesses will have to seek temporary new locations, which could be nearby or elsewhere in Oakland.

The current parking facility would also be affected by the Proposed Project. During Project construction, the parking facilities' capacity will decrease from 1,340 to 1,185 spaces – a reduction of approximately 12 percent. The temporary parking capacity loss could result in a corresponding employment decrease from its current 8 to 7 parking attendants.

The Proposed Project would demolish all 63,775 square feet of the existing commercial/retail spaces, and construct 46,200 square feet of new commercial/retail space. This results in a total net decrease of 17,575 square feet of commercial use.

The expected future employment associated with the Proposed Project is shown in **Table IV.J-6**. It is conservatively assumed that the employment density for the future commercial and retail uses at the site will average approximately 350 square foot per employee. As a result, it is estimated that approximately 132 people will be employed by the Proposed Project's future commercial and retail tenants. Expansion of the site's parking facilities will add four employees resulting in a total of twelve parking facility employees.

**TABLE IV.J-6
FUTURE EMPLOYMENT ON THE PROPOSED PROJECT SITE, 2008**

	Future Size/Square Footage ^a		Employment Density Factor Estimate	Existing Employment	Net Change
Retail	22,300 Sq Ft	350 Sq Ft/Employee ^b	64	61	+3
Commercial Services	23,900 Sq Ft	350 Sq Ft/Employee ^b	68	61	+7
Office	1,320,040 Sq Ft	400 Sq Ft/Employee ^b	3,300	81	+3,219
Parking	2,037 Spaces	170 Spaces/Employee ^c	12	8	+4
Total	1,366,240 Sq Ft	--	3,444	211	+3,233

^a Square footages shown here are net measurements. Gross square footage does not distinguish between uses.

^b Future employment estimates based on Bay Area average employment densities estimated by Keyser Marston.

^c Based on current employment levels.

SOURCE: Keyser Marston, 2006; McCray, 2008; Lamb, 2008.

Net Changes in Project Site Employment Related to the Proposed Project

Overall, the Proposed Project is expected to employ a total of 3,444 employees.¹ After accounting for both the growth of employment from the Project's planned office development and the change in employment its commercial square footage, future employment at build-out would represent a net increase of 3,233 jobs to the estimated 211 jobs currently at the Project Site (see Table IV.J-6).

Population and Housing

No housing development is proposed.

Displacement of Substantial Housing, Population, Businesses, or Jobs

Impact POP-1: The Project would displace existing businesses and jobs, but not in substantial numbers necessitating construction of replacement facilities elsewhere, in excess of that anticipated in the City's General Plan. (Less than Significant)

Development of the Proposed Project would require that existing commercial businesses located in the mall buildings on the Project Site find new locations for their business operations. The buildings in which they are now located would be demolished for the construction of the two new office towers. However, new construction will add 46,200 square feet of ground floor retail and six floor new commercial development for a net decrease of 17,575 square feet.

During the Project's construction, the parking facility would be reduced in capacity by an estimated 155 spaces thereby leaving 1,185 spaces in operation – equivalent to an 11.5 percent short term decrease in the facility's parking capacity. However after completion, these lost spaces would be replaced along with an additional 697 parking spaces resulting in a total future parking capacity of 2,037 spaces – equivalent to an overall 52 percent parking capacity.

Relocation Implications for Businesses

The EIR analysis identifies 63,775 square feet of existing commercial businesses employing about 130 people in the 20th and Webster Street Malls and associated parking facility development (see earlier Table IV.J-1). As discussed earlier, the current on-site commercial uses retail stores, personal service businesses (e.g., dry cleaners and banking) and restaurants. As proposed, the Project would include approximately a total of 46,200 square feet of ground-floor and 6th floor commercial space within the two new office developments. The future business uses for the new and expanded commercial space could be very similar to those currently at the 20th Street Mall.² It is likely that existing tenants would find other suitable business space within the City or vicinity, and could eventually decide to return to the Proposed Project Site when construction is complete. However, these are matters of private negotiation between the business

¹ Total employment for the Proposed Project only; does not include existing Kaiser Center office tower.

² Excluding the current fitness center at Webster Mall which would not be replaced at the new Kaiser Center.

and property management/leasing specialists and no assurances to return to the Project Site can be presumed.

The relocation issues facing these businesses are likely to focus on locating comparable space at comparable rents, and covering the costs of relocation which can include expenses associated with searching for a new location, moving costs, and costs associated with getting re-established at a new location. Such costs can be particularly difficult for small businesses. However, while there could be adverse short-term economic implications of relocation for some businesses and business owners, the proposed additional office space and the upgrade/expansion of the commercial area available for lease at the site would likely improve the commercial potential for the facilities' future tenants. As shown in Table IV.J-6, overall, the Proposed Project would employ up to 3,444 workers in the Proposed Project. This would represent a major increase in employment at the site as an estimated 3,233 new jobs would be created by the Proposed Project. Full tenancy of the expanded office space is expected to employ up to 3,300 workers which would add approximately 3,220 new office employees. The approximately 50 percent increase in the parking facility's capacity is expected to create four additional parking attendant jobs. The future Proposed Project's total commercial area will be reduced by an estimated 17,575 square feet from that currently at the Webster and 20th Street Malls. However due to the greater employment associated with the new non-fitness center businesses, overall the Proposed Project's future commercial businesses would employ a total of 132 employees – representing a net future increase of 10 jobs. Thus, the Proposed Project would not result in the permanent displacement of existing businesses and jobs from the Project Site that would necessitate construction of any new replacement facilities.

Mitigation: None required.

Inducement of Substantial Population Growth

Impact POP-2: The Project would not induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)

Project Growth

The Proposed Project would add approximately 1,320,000 square feet of new office space on the Project Site. As shown in **Table IV.J-7**, the employment at the Project Site would increase from 211 to an estimated total of 3,444 at build-out of the Proposed Project, resulting in a net increase of 3,233 new jobs. This increase in employment at the Project Site would contribute to employment growth expected in Oakland over the next 25 years. The amount of employment growth anticipated for the Proposed Project would account for about 4.8 percent of total employment growth projected for Oakland between 2005 and 2030.

**TABLE IV.J-7
PROPOSED PROJECT EMPLOYMENT COMPARED TO EXISTING AND PROJECTED
FUTURE EMPLOYMENT IN OAKLAND**

	Existing Employment	Future Employment	Employment Growth
Webster and 20th Street Malls (2008)	211	--	--
City of Oakland, 2005	202,570		
Proposed Project	--	3,444	+3,233
Proposed Project (future) as Percent of City (2005)		1.7%	
City of Oakland, 2030 ^a	273,600		+71,030
Proposed Project (future) as Percent of City (2030)		1.3%	4.8%

^a Association of Bay Area Governments, *Projections 2007*.

SOURCE: ABAG, 2007.

For comparison, the Proposed Project employment would represent about 1.7 percent of the total 2005 employment in Oakland and only 1.3 percent of the City's future total employment as projected by ABAG's projections for Oakland in 2030. Consequently, the Proposed Project would not directly result in substantial business/employment growth over and above that which is anticipated for Oakland in the future.

The Proposed Project will bring additional employees and visitors to the Project Site. The Proposed Project will also locate new customers for local retail and commercial business activities, particularly for nearby locations and neighborhood commercial districts and the Oakland CBD. The additional customer demand would bring additional spending for eating and drinking, grocery store and specialty food purchases, drug store and other convenience items, retail shopping goods, local services (such as banking, hair care, and dry cleaning) and auto-related services in the surrounding area.

Redevelopment of the Kaiser Center has long been included in Oakland's future employment projections. Major new office expansion at the site has been planned for since the early 1980s. The Oakland General Plan and Housing Element's planning for future growth anticipated comparable levels of new office development of the site. As such, the Proposed Project would have a positive contribution to the continued revitalization and economic health of the Oakland CBD.

Infrastructure-induced Growth

The Proposed Project is an example of urban infill and intensification of activity and development at a central location well-served by existing transportation systems (including transit), and other infrastructure and utilities. Unlike an office development at an alternative location on vacant land in an outlying part of the region, the Proposed Project would not require construction of new roads, sewer and water lines, and other infrastructure that might stimulate population growth in previously undeveloped areas.

Therefore due to the Proposed Project's long planned development, its comparable magnitude of new employment and its location within Oakland's CBD, the Proposed Project would have a less than significant impact in inducing substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements.

Mitigation: None required.

Other Potential Indirect and Cumulative Project Effects on Housing

Impact POP-3: In combination with other past, present, pending and reasonably foreseeable projects, the Proposed Project would not cumulatively induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)

Cumulative and other indirect potential effects of the Proposed Project and other cumulative development on the local and region's housing market is expected to be limited due to the greater influence of other underlying population and market factors and comparable minor magnitude of the Project-related job growth within the context of the city and region's longer term economy. The key underlying factors related to the potential for Project-related indirect and cumulative impacts are discussed below.

Project Effects on Housing Demand and the Jobs and Housing Balance

As shown in Table IV.J-5, similar trends to Oakland's are also anticipated for the rest of the East Bay in the future. While future job growth is projected to exceed the growth of employed residents in nearby cities of the Inner East Bay (increasing the ratio of jobs-to-employed residents over time), those effects would be mostly offset by the growth of housing and employed residents in the rest of the East Bay which is projected to exceed employment growth in those areas (reducing the ratio of jobs-to-employed residents). When combined, growth of employed residents in all of the East Bay outside of Oakland is projected to exceed the anticipated job growth and to maintain and potentially improve the balance of jobs and housing over time, similar to the trends for Oakland.

Role of Employment in the Housing Market in Oakland and the East Bay Is Unlikely To Change

Cumulative employment growth in Oakland and the East Bay that is accompanied by corresponding growth of housing and employed residents would not increase overall competition for housing and put upward pressures on housing prices and rents. Thus, while employment growth in the Proposed Project and other cumulative projects would increase the demand for housing, housing market conditions in Oakland and the East Bay are not anticipated to change substantially as a result. That is because, on-going and future housing construction is anticipated

to increase the housing supply and offset the effects of increased demand. In addition, demographic trends are projected to increase the employed population accommodated within the housing stock, thereby reducing the amount of housing otherwise needed.

Employee Residence and Commute Patterns Unlikely To Be Affected

The limited effects of cumulative employment growth on housing demand and jobs/housing balance in Oakland and the East Bay and on housing availability as described above are unlikely to trigger shifts in housing demand to other parts of the region. For the most part, the increases in housing supply and the growth of employed residents in Oakland and the East Bay are anticipated to be able to accommodate the additional demand associated with employment growth. Thus, employee residence and commute patterns are unlikely to be noticeably affected by employment growth in Oakland.

Small Role of the Project Within the Cumulative Context

Within the cumulative context, the housing demand effects of the Proposed Project would represent a very small part of the bigger picture of cumulative employment and housing growth and other factors influencing housing market conditions. Comparisons summarized in **Table IV.J-8** show that the increases in Proposed Project employees likely to reside in Oakland, other parts of the East Bay, and elsewhere in the region would represent a small percentage of the growth of employed residents in each area.

**TABLE IV.J-8
INCREASE IN PROPOSED PROJECT EMPLOYMENT COMPARED TO
PROJECTED GROWTH OF EMPLOYED RESIDENTS, BY PLACE OF RESIDENCE**

Place of Residence	Increase in Proposed Project Employees^a	Growth of Employed Residents 2005-2030^b	Proposed Project Employees as Percent of Employed Resident Growth
Oakland	1,164 (36%)	59,220	2.0%
Rest of Inner East Bay ^c	485 (15%)	36,820	1.3%
Rest of East Bay ^d	1,002 (31%)	357,020	0.3%
Rest of Bay Area ^e	582 (18%)	997,400	0.06%
Total	3,233 (100%)		
Total East Bay	2,651 (82%)	453,060	0.5%
Total Bay Area	3,233 (100%)	1,430,400	0.23%

^a Future Proposed Project employment as summarized in Table IV.J-6, distributed to places of residence similarly to current Oakland employment as estimated by Census 2000.

^b Projections shown are from Table IV.J-5 adjustments to represent excluded cities. The growth covers 2005-2030.

^c Rest of Inner East Bay outside of Oakland, including nearby cities of Albany, Berkeley, Emeryville, Piedmont, Alameda, and San Leandro.

^d Rest of Alameda County outside of Oakland and other Inner East Bay cities plus all of Contra Costa County.

^e Rest of nine-county Bay Area beyond Alameda and Contra Costa counties. It is conservatively assumed that all Kaiser Center employees live within the Bay Area region.

SOURCE: U.S. Census (2000), 2008.

In Oakland, the new Proposed Project employees likely to reside in the city could represent about 2 percent of the anticipated growth of employed residents in the city. Similarly, additional Kaiser Center employees are likely to reside in nearby cities of the Inner East Bay could represent a little more than one percent of the growth of employed residents anticipated in those cities. Beyond the immediate Inner East Bay, the additional Proposed Project employees would represent even smaller shares (much less than one percent) of the anticipated growth of employed residents elsewhere in the East Bay and in the rest of the region. Thus, any effects of the Proposed Project on overall housing demand and affordable housing demand would be small in the much larger context of employment and housing growth and other factors influencing housing market conditions.

Overall, due to the greater influence of other underlying population and market factors and comparable minor magnitude of the Project-related job growth within the context of the city and region's longer term economy, the Project's cumulative effects on the local and region's housing market are expected to be less than significant.

Mitigation: None required.

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K. Public Services and Recreation Facilities

This section describes existing public services and facilities at the Kaiser Center Oakland Redevelopment Project Site and vicinity. It also evaluates the potential impact of the Proposed Project on the delivery of public services, and possible adverse physical impacts on the environment that could result from a need to provide new or physically altered facilities. As necessary, appropriate SCAs and/or mitigation measures are identified. The analysis reviews police services, fire protection and emergency medical response, public schools, and parks and recreational facilities.

Setting

Police Services

Facilities and Staffing

The Oakland Police Department provides police protection services throughout the city. The Police Department is headquartered at 455 7th Street in downtown Oakland, approximately one mile from the Project Site, and there is one sub-station located in the Eastmont Mall Shopping Center at 2651 73rd Avenue, approximately seven miles from the Project Site.

As of August 2008, the Police Department had 778 sworn police officers and a civilian staff of about 339. The Department anticipated an increase of 25 police officers by the end of 2008, for a total of 803 officers (OPD, 2008a). The current ratio of police officers to residents is approximately one officer to 510 residents, based on the city's population of 420,183 (State of California, 2008).

The City is geographically divided into 35 patrol beats. Each neighborhood services coordinator handles multiple patrol beats. Neighborhood service coordinators are civilian employees who serve as a liaison between the community and the Police Department, and work with residents, businesses, schools, and other institutions to set priorities and develop strategies to improve public safety and reduce crime. In November 2004, Oakland voters approved Measure Y, the Violence Prevention and Public Safety Act of 2004. Measure Y proposed a new parcel tax and parking surcharge (on parking in commercial parking lots) in order to fund violence, crime, and fire prevention programs. One of the permitted purposes of the tax revenues from Measure Y is the hiring and maintaining 63 new sworn police officers, including at least one officer for each existing community policing beat, for community and neighborhood policing efforts and targeting truancy, crime reduction, domestic violence, and child abuse intervention.

The Project Site is located within patrol beat 4X. Beat 4X is generally bounded by 23rd Street to the north, 14th Street to the south, Lakeside Drive to the east, and Castro Street to the west. Patrol beats have one officer assigned 24 hours a day. Officers generally work ten-hour shifts four times each week. At any one time, citywide, there are 35 officers, a watch commander, and up to six supervising sergeants on duty, all of whom are sworn personnel. The Traffic Operations Unit

generally staffs about 18 officers throughout the day, with additional staff available for special events and periods of special staffing needs (OPD, 2008b).

Service Demand

All emergency (911) and non-emergency calls for police services are received through the Police Department's communications center located at 1701 Edgewater Drive. Calls for fire and medical services are routed to the Oakland Fire Department for dispatching. Priorities for responding to police calls are set by a computer-aided dispatch system that may be overridden by dispatchers. Police officers are dispatched from the police communications center by radio and/or laptop computers mounted in police vehicles.

The Police Department's response times to calls for police services are recorded for the City of Oakland as a whole; the department does not track response times for individual service areas. Response times generally reflect the perceived seriousness of the call. The department ranks incoming calls for police services as follows: Priority 1 means imminent danger of death or serious injury, felonies in progress, or serious public health hazards; Priority 2 refers to disputes with potential for violence, misdemeanor crimes in progress, stolen vehicle reports, and similar matters; and Priority 3 calls are reports of incidents that do not present danger to life or property.

Table IV.K-1 summarizes reported crimes within the Project area in 2008.

**TABLE IV.K-1
REPORTED CRIMES IN THE CITY OF OAKLAND 2008**

Crime	Project Area^a
Robbery ^a	3,323
Felony Assault	4,129
Burglary ^b	4,488
Stolen Vehicles	8,085
Forcible Rape	338
Murder	116

^a Includes armed robbery, attempted robbery, and residential robbery.

^b Includes commercial, residential, and locked auto burglary.

SOURCE: City of Oakland, 2010.

City of Oakland Police Department Disclaimer: These numbers do not match the official monthly crime totals reported to the FBI through the Uniform Crime Reporting (UCR) program. Crime totals can be affected by late reporting, the reclassification or unfounding of crimes, or the geocoding process. The only certified crime numbers are those contained in the UCR.

Kaiser Center Onsite Security

Under the management of The Swig Company, the Kaiser Center complex currently has round-the-clock on-site security services. The Kaiser Center's Security staff currently consists of six full-time equivalent security officers and one security director during the business day, two officers during the swing shift and two officers during the graveyard period, providing 24 hour security, seven days a week (The Swig Company, 2009).

Other Security

The Kaiser Center is part of the Lake Merritt/Uptown District Association, a newly formed non-profit corporation whose primary functions are to administer the newly established Lake Merritt/Uptown Community Benefit District (District), a voter-mandated assessment district levied on the benefiting property owners to augment existing municipal services. The Lake Merritt/Uptown Community Benefit District encompasses a 20-block area generally bounded by Telegraph Avenue on the west, 25th Street on the north, Harrison Street/Lake Merritt on the east, and 17th Street on the south (The Swig Company, 2009).

The services funded by Lake Merritt/Uptown District include providing additional security throughout the District, maintaining cleanliness and order in the public rights of way, improving district identity and advocating on behalf of the area property owners, business owners and residents. Security tasks are conducted by a total of six security “ambassadors” who patrol the District on foot and bicycle. A security director manages the ambassadors. There are four ambassadors (including the security director) on hand during the business day and three ambassadors in the evening. The District security ambassadors coordinate with the City of Oakland Police Department and the onsite Kaiser Center Building security force (The Swig Company, 2009).

Fire Protection and Emergency Medical Services

Facilities and Staffing

The Oakland Fire Department provides fire protection services and emergency medical services throughout the city. The Fire Department operates 25 fire stations, including the Airport. The Department maintains 24 engine companies with approximately four personnel per engine, four truck companies with four personnel per truck, and three truck companies with five personnel per truck. Total Fire Department staffing consists of 500 uniformed personnel. The actual number of assigned personnel per station depends on the needs of that station. All personnel are trained as Paramedics or Emergency Medical Technicians.

There are four fire stations servicing the Project area. Fire Station 15 is closest to the Project area and would be the first station to respond to calls within the Project vicinity. The exact station locations and approximation to the Project area are listed below:

- Fire Station 1 at 1605 Martin Luther King Jr. Way, approximately one mile from the Project Site;
- Fire Station 10 at 172 Santa Clara Avenue, approximately one mile from the Project Site;
- Fire Station 12 at 822 Alice Street, approximately one mile from the Project Site; and
- Fire Station 15 at 455 27th Street, approximately one mile from the Project Site.

In addition to firefighting and emergency medical response capabilities, the Fire Department also has a hazardous materials unit that operates from Station 3 at 1445 14th Street and responds citywide to emergencies involving hazardous materials.

Water supply and fire flow for fire suppression purposes are discussed in Section IV.M, Utilities and Service Systems.

Service Demand

The Oakland Fire Department Dispatch Center (FDDC) is located in downtown Oakland and is responsible for fire and medical emergency coordination and response. The FDDC receives approximately 60,000 calls for response annually, of which 80 percent are medical emergencies. Fire Station 15, which serves the Project area, responded to approximately 4,543 calls in 2007.

The Fire Department's response time goal is seven minutes or less, 90 percent of the time. In most cases, Fire Station 15 responds to calls in four to six minutes or less (OFD, 2008).

Public Schools

School Facilities and Attendance

The Oakland Unified School District (OUSD) operates the public school system in the city of Oakland. The OUSD administers 70 elementary schools, 24 middle schools, one junior high school and 31 high schools. It is also responsible for three alternative schools, two special education schools, two continuation schools, two community day schools, and three opportunity schools. Total school enrollment for elementary and secondary students for the 2006/2007 academic year was 47,012, showing a decline in enrollment from 48,135 students in 2005/2006 and 49,214 students in 2004/2005 (Ed-Data, 2008).

Project Area Schools

The Project area is located within the service areas of Lakeview Elementary School, Westlake Middle School, and Oakland Tech and Far West high schools. Lakeview Elementary School is located at 746 Grand Avenue, approximately 1.6 miles east of the Project Site. Total enrollment at Lakeview was 322 students during the 2007-2008 school year. Westlake Middle School is located at 2629 Harrison Street, less than one mile north of the Project Site. Total enrollment at Westlake Middle School was 611 students during the 2007-2008 school year. Oakland Tech High School is located at 4351 Broadway, approximately 2 miles northeast of the Project Site, and Far West High School is located at 5263 Broadway Terrace, approximately 2.5 miles northeast of the Project Site. Total enrollment at Tech High School was 1,705 students during the 2007-2008 school year and total enrollment for Far West High School was 195 students during the same school year.

Senate Bill 50

The Leroy F. Greene School Facilities Act of 1998, or Senate Bill 50 (SB 50), authorizes school districts to levy developer fees to finance the construction or reconstruction of school facilities. On January 30, 2008, the State Allocation Board (SAB) raised Level 1 Fees from \$0.42 to \$0.47 per square foot of enclosed and covered space in any commercial or industrial development (SAB, 2008). These fees are intended to address the increased educational demands on the school

district resulting from new development. Public school districts can, however, impose higher fees than those established by the SAB, provided they meet the conditions outlined in the act. Private schools are not eligible for fees collected pursuant to SB 50.¹

Parks and Recreational Facilities

The City of Oakland's Office of Parks and Recreation manages the City's parks and recreation centers within the city boundaries. Oakland's Public Works Agency maintains the parks and park facilities. Including parkland within the East Bay Regional Parks District (EBRPD), Oakland has approximately 5,219 acres of parkland,, which is around 12.9 acres of parkland per 1,000 residents (Trust for Public Land, 2010).

Oakland's parks are categorized by size and intended service area. Generally, local-serving parks "meet the active recreational needs of the community" surrounding the park, rather than the city as a whole. Snow Park, located on the corner of 19th and Harrison Streets and adjacent to Lakeside Street, is closest to the Project Site. Amenities at Snow Park include a putting green and an open grassy area with shade trees. Lakeside Park, primarily known for Lake Merritt, is a regional park directly across the Project Site. Lakeside Park offers visitors paved trails for biking, walking or running and several specialty gardens including the Japanese Bonsai and Suiseki Gardens and other vegetable and fruit demonstration gardens. The Park is home to the 1876 historical House Museum.

The EBRPD, although responsible primarily for acquiring and developing regional parks, open spaces, and regional trails throughout the East Bay, also provides open space and recreational facilities within Oakland's city limits. EBRPD parks in Oakland include the 271-acre Leona Canyon Regional Open Space Preserve, the 1,220-acre Martin Luther King, Jr. Regional Shoreline Park, the 660-acre Robert Sibley Volcanic Regional Preserve, and the 100-acre Roberts Regional Recreational Area.

The City's Department of Parks and Recreation also operates several community-based centers located throughout city. The centers offer various public programs, including recreation, sports, arts and culture, computers, general learning, and after-school activities. In close proximity to the Project Site are the Lincoln Square Recreation Center at 250 10th Street, the Mosswood Recreation Center at 3612 Webster Street, and the Rotary Nature Center at 600 Bellevue Avenue.

Measure DD

In November 2002, the Oakland voters approved Measure DD, a bond measure to finance the preservation and acquisition of open space, parks renovation, Estuary waterfront parks and trails, water quality improvements related to Lake Merritt, restoration of Oakland's creeks, renovation

¹ The SAB is authorized by Government Code Section 65995(b) (3) to increase the base fee every two years. The Government Code establishes three types of school fees: Level 1, Level 2, and Level 3. Level 1 requires school districts to prepare a "nexus" analysis demonstrating why fees are required and how they will be used. Level 2 requires the school district to submit a timely application and show that it satisfies at least two of the four requirements set forth in the Government Code. Level 3 allows the school district to impose a developer fee up to 100% of the School Facility Program new construction project costs (Section 65995.7).

and creation of new youth and public recreation facilities, rehabilitation of open space and other safety and maintenance facilities, and provision of safe public access to Lake Merritt, Lake Merritt Channel, and the estuary. These projects involve facilities near the Project Site.

Libraries

Library Facilities

The City of Oakland's Public Library system operates a Main Library plus 15 branch libraries, a Second Start Adult Literacy Program, the Bookmobile, the Tool Lending Library, and an African-American Museum and Library. The Project Site is equidistant from the Main Library (125 14th Street) and the Asian Branch Library (388 9th Street), both about 1.2 miles southwest of the Project Site. The Main Library serves residents from all of Oakland, with heavy use by residents around Lake Merritt and in the downtown area. The Main Library is one of the largest public library facilities in the Bay Area, including collections of non-fiction and fiction books, magazines and newspapers, sheet music, maps, government publications and compact discs, videocassettes, DVDs and audiobooks. The Main Library houses the Oakland History Room, the Children's Room, the Teen Zone, and a meeting room that can accommodate up to 121 persons. The Main Library also provides 33 computers with internet access, basic internet classes, and adaptive technology to assist persons who are blind or have low vision or learning disabilities. The Asian Branch Library houses eight Asian languages (Chinese, Japanese, Korean, Vietnamese, Thai, Cambodian, Tagalog and Laotian) in major reference titles and general subject titles, an Asian Studies collection and an Asian American collection in English. The Asian Branch Library also includes computers and a computer lab with multilingual interface for instructional purposes (Oakland Public Library, 2008).

Local Plans and Policies

Relevant policies and conditions from the City's General Plan and Standard Conditions of Approval are described below.

City of Oakland General Plan

Policies contained in the LUTE elements of the Oakland General Plan pertain to the various public services and related topics. Discussion of the Project's overall consistency with the Oakland General Plan is provided in Section IV.H, *Land Use, Plans and Policies*, of this EIR. General Plan policies that are also significance criteria or contain a regulatory threshold which the Project must meet are addressed in this section.

- *Policy D8.2*: Future office development on Harrison Street opposite Lakeside Park and Snow Park should provide ground level landscaped open space to soften the edge between public park land and office core. This space should be clearly accessible to office workers and the public.
- *Policy N.12.1*: The development of public facilities and staffing of safety-related services, such as fire stations, should be sequenced and timed to provide a balance between land use and population growth, and public services at all times.

- *Policy N.12.2:* Adequate public school capacity should be available to meet the needs of Oakland's growing community. The City and the Oakland Unified School District (OUSD) should work together to establish a continuing procedure for coordinating residential and commercial development and exploring the imposition of mutually agreed upon reasonable and feasible strategies to provide for adequate school capacity. The City and OUSD should jointly consider, where feasible and appropriate, funding mechanisms such as assessment districts, redevelopment Agency funding (AB1290), uses of surplus City-owned land, bond issues, and adjacent or shared use of land or school facilities with recreation, libraries, child care and other public uses.
- *Policy N12.3:* High quality day care should be available throughout Oakland, appropriately sited and designed based on its capacity and attributes. The City should, when appropriate and feasible, require major development projects to provide on- or off-site facilities or other means to address potential child care inadequacies and encourage the inclusion of child care centers in major residential and commercial developments near transit centers, community centers and schools.
- *Policy N12.4:* Electrical, telephone, and related distribution lines should be undergrounded in commercial and residential areas, except where special local conditions such as limited visibility of the poles and wires make this unneeded.
- *Policy F1-1:* Maintain and enhance the City's capacity for emergency response, fire prevention and fire fighting.
- *Action F1-1.2:* Strive to meet a goal of responding to fires and other emergencies within seven minutes of notification 90 percent of the time.

City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards

The City of Oakland's SCA relevant to reducing impacts on public services due to the Proposed Project are listed below. If the Project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to public services. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA PUB-1: Conformance with other Requirements**

Prior to issuance of a demolition, grading, P-job, or other construction related permit

- a. The project applicant shall comply with all other applicable federal, state, regional and/or local laws/codes, requirements, regulations, and guidelines, including but not limited to those imposed by the City's Building Services Division, the City's Fire Marshal, and the City's Public Works Agency.
- b. The applicant shall submit approved building plans for project-specific needs related to fire protection to the Fire Services Division for review and approval, including, but not limited to automatic extinguishing systems, water supply improvements and hydrants, fire department access, and vegetation management for preventing fires and soil erosion.

- **SCA PUB-2: Fire Safety Phasing Plan**

Prior to issuance of a demolition, grading, and/or construction and concurrent with any p-job submittal permit. The project applicant shall submit a separate fire safety phasing plan to the Planning and Zoning Division and Fire Services Division for their review and

approval. The fire safety plan shall include all of the fire safety features incorporated into the project and the schedule for implementation of the features. Fire Services Division may require changes to the plan or may reject the plan if it does not adequately address fire hazards associated with the project as a whole or the individual phase.

To further implement SCA PUB-2, the Project shall implement the following Project-specific Conditions of Approval: The Project will incorporate building design elements to enhance fire-fighting and rescue capabilities beyond basic code requirements. Elements would include, but are not limited to, one elevator designed for fire-fighter use and rescue air stations at every fifth floor.

Impacts and Mitigation Measures

Significance Criteria

The Project would have a significant impact related to public services or recreation if it would:

1. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:
 - Police protection;
 - Fire protection;
 - Schools; or
 - Other public facilities.
2. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
3. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

Police Services Impacts

Impact PUB-1: The Project could result in an increase in calls for police protection services, but would not require new or physically altered police facilities in order to maintain acceptable performance objectives. (Less than Significant)

Approximately 218 crimes were reported in 2008 within a 1,000 foot radius of the Project area. The Project would increase development intensity on the Project Site as well as increase the onsite population (employees and visitors). This increase could result in an increase in reported crimes. Currently, the Project Site is patrolled by one beat officer, 24 hours a day, seven days a week. The Police Department does not, however, anticipate the need for any new physical facilities as a result of the Proposed Project.

In addition, the on-site Kaiser Center security staff will continue to be present during Project construction and with operation of the Proposed Project. During construction, site security will be supplemented by additional private security hired by the construction contractor to patrol the construction site. Furthermore, the Lake Merritt/Uptown Community Benefits District will also continue to patrol the 20-block area with implementation of the Proposed Project. These security teams will support and assist the OFD as needed.

Mitigation: None required.

Fire Protection and Emergency Medical Services Impacts

Impact PUB-2: The increased population and density resulting from the Project would not involve or require new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection and emergency medical services and facilities. (Less than Significant)

The Project Site is within the response boundaries of Fire Stations 1, 10, 12, and 15, which are located approximately one mile each from the Project Site.

New employees and visitors to the Kaiser Center complex resulting from the Proposed Project could increase the number of calls for fire and emergency service. However, the Fire Department indicates that it would be able to provide adequate fire suppression and emergency medical response services to the Project Site, with existing staff, and that the Project would not require development of new or physically altered facilities. In accordance with the California State Fire Code, the Fire Department would require that fire prevention measures, such as automatic sprinklers, smoke detectors, fire alarm systems, and fire resistant construction, be incorporated into final Project plans for each building. An automatic defibrillator should be installed in each building, specifically at public gathering points, to address potential heart related emergencies (Sierra, 2008). The appropriate building and fire code requirements adopted by the City of Oakland would be incorporated into Project construction. The Fire Department would review the Project, including provisions for onsite access, exits, and any necessary special equipment to assist firefighters on-site. The Project applicant would be required to incorporate the Fire Department's recommendations into the final Project. Project-specific Conditions of Approval that will be applied to the Project include incorporating building design elements to enhance fire-fighting and rescue capabilities beyond basic code requirements. Elements would include, but are not limited to, one elevator designed for fire-fighter use and rescue air stations at every fifth floor.

To further reduce the need for emergency response and new staff to serve the Project Site, the Project sponsor would provide occupants with fire prevention and public education information to reduce hazards and risks. These features would be required as part of the City's SCA PUB-1 and SCA PUB-2 to the Project and would supplement the standard fire prevention measures required by the California State Fire Code.

Mitigation: None required.

Public Schools Impacts

Impact PUB-3: The Project could result in new students for local schools, but would not require new or physically altered school facilities to maintain acceptable performance objectives. (Less than Significant)

The Proposed Project would not provide new residential uses, and therefore, would not directly generate new student enrollment in the Oakland Unified School District. However, it is possible that families could relocate to Oakland or other adjacent communities as a result of new employment opportunities generated by the Project. Although it cannot be determined where new employees would reside, based on projected employee residence patterns, the majority of new employees who do not currently reside in Oakland would potentially be located in other East Bay cities (Berkeley, Albany, Piedmont, Emeryville, Alameda, and San Leandro) and in Contra Costa County.

Pursuant to Senate Bill 50 (SB 50), the Project sponsor would be required to pay school impact fees established to offset potential impacts from new development on school facilities. Therefore, although the Project could indirectly increase resident populations and potential student enrollment in Oakland, payment of fees mandated under SB 50 is the mitigation measure prescribed by the statute, and payment of such fees is deemed full and complete mitigation. Therefore, no additional mitigation would be required.

Mitigation: None required.

Parks and Recreational, and Library Facilities

Impact PUB-4: The Project could increase the demand for parks, recreational facilities, and library facilities, but would not result in substantial physical deterioration of such facilities or require new or physically altered facilities in order to maintain acceptable performance objectives. (Less than Significant)

The Proposed Project's effect on parks and recreation, facilities and library facilities would be indirect, resulting from the provision of additional employment opportunities, which could increase the resident population in Oakland and surrounding communities.

Increases in the number of employees and visitors at the Project Site could result in an increased use of Lakeside Park and Snow Park, given their proximity to the Project Site, and the roof garden located on the Project Site. Based on observed uses of the parks and roof garden during typical daytime hours during the weekday, these areas offer substantial capacity for increased use.

Increased use of the park, particular at the highly visible, urban Lakeside and Snow parks situated in a high-activity area, would benefit the vitality of the area as well as public safety. However, it would be speculative to assume that the degree of use by employees and visitors would significantly increase from existing levels of use. In any case, the Proposed Project would not result in increased use to levels that would result in substantial physical deterioration of Lakeside Park or Snow Park facilities.

In summary, the effects on parks and recreation facilities, and library facilities from the Proposed Project would be less than significant.

Mitigation: None required.

Cumulative Impacts

Impact PUB-5: The Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, could result in cumulative impacts to the provision of public services. (Less than Significant)

Geographic Context

As discussed above, the Proposed Project would not result in significant Project-level effects on the ability of service providers to provide adequate police services, fire protection and emergency medical services, public schools, and parks and recreation facilities to the Project area and vicinity. Considered in combination with other cumulative development, there would likely be an increased demand for public services. Overall, the city of Oakland and its surrounding areas was used as context for assessing cumulative impacts on police services, fire protection and emergency medical services, public schools, and parks and recreational facilities.

Impacts

The Proposed Project would have a less-than-significant impact on the ability of the City of Oakland and other service providers to provide adequate public services (including police and fire protection, emergency medical services, schools, parks, recreational facilities, and library facilities) to the Project area and vicinity. Although likely to increase the demand for such services, other present and reasonably foreseeable development within the area would be addressed case by case during the development and review of such development. This would ensure that services to accommodate current and future citywide growth could be reasonably provided within the cumulative context. Therefore, the effect of the Proposed Project, in combination with other foreseeable development, would not be cumulatively significant.

Mitigation: None required.

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L. Transportation and Circulation

This section describes the existing traffic and site access conditions on the Project Site and in the vicinity of the Proposed Project and analyzes the potential impacts of the Project on the transportation network. This transportation impact assessment conforms to the requirements and methodologies of the City of Oakland CEDA Transportation Services Division (TSD) and Alameda Countywide Congestion Management Agency (ACCMA¹) guidelines. The transportation analysis describes the operational characteristics of the existing study area circulation system, determines the circulation system needs based on future transportation demand, and summarizes the potential circulation impacts associated with the development of the Proposed Project. **Appendix G** (Appendices G.1 through G.13) contains technical background information relating to transportation and circulation.

The analysis evaluates the traffic-related impacts of the Proposed Project during both the weekday morning and evening peak hours. Traffic conditions are analyzed at 51 key intersections and 12 roadway segments in the study area for the following seven scenarios:

- Existing Conditions – based on existing volumes obtained from traffic counts and site and area observations.
- Existing Plus Project (Phases I/II) – adds estimated traffic generated by the Project to existing volumes. Phase I includes buildout of only the south tower; Phase II includes buildout of both towers.
- Near-Term (2015) Without Project - Future conditions with planned population and employment growth and planned transportation system improvements for the year 2015. Traffic projections were developed using the newly updated Alameda Countywide Travel Demand Model provided by the ACCMA (ACCMA Model).
- Near-Term (2015) Plus Project (Phase I only) - Future forecasted conditions for the year 2015, as determined in the Near-Term (2015) Without Project scenario, plus Project Phase I-related traffic.
- Near-Term (2015) Plus Project (Phases I/II) - Future forecasted conditions for the year 2015, as determined in the Near-Term (2015) Without Project scenario, plus Project-related traffic for Phase I and Phase II.
- Cumulative (2030) Without Project - Future conditions with planned population and employment growth and planned transportation system improvements for the year 2030. Traffic projections were developed using the ACCMA Model.
- Cumulative (2030) Plus Project (Phases I/II) - Future forecasted conditions for the year 2030, as determined in the Cumulative (2030) Without Project scenario, plus Project-related traffic for Phase 1 and Phase II.

¹ In 2010, the Alameda County Congestion Management Agency (ACCMA) and the Alameda County Transportation Improvement Authority (ACTIA) merged to form the Alameda County Transportation Commission (Alameda CTC). The transportation analysis in this document is based on ACCMA guidelines, referred to as ACCMA and the ACCMA Model.

Environmental Setting

The existing transportation-related context in which the Proposed Project would be constructed is described below, beginning with a description of the study area and the street network that serves the Project Site. **Figure IV.L-1** shows the study area street network. Existing transit service, bicycle and pedestrian facilities, and on- and off-street parking in the vicinity of the Project Site are also described. Intersection and roadway levels of service are then defined and current conditions for roadways and intersections in the Project vicinity are summarized. This subsection also discusses planned transportation improvements in the Project vicinity as well as the applicable planning policies.

Existing Roadway Network

Regional Access

A brief description of the regional roadway network serving the Project Site is provided below. Average daily traffic volumes were obtained from Caltrans' 2008 database of 2007 Traffic Volumes on California State Highways.

- **Interstate 80 (I-80)** is a regional freeway extending west to San Francisco via the San Francisco-Oakland Bay Bridge, and east through Berkeley, Sacramento, and into Nevada. Four or five lanes are generally provided in each direction on this freeway west of the Project Site. Access to and from I-80 is provided by Interstate 580 (I-580), Interstate 880 (I-880), and Interstate 980 (I-980). Average daily traffic is 254,000 vehicles on the Bay Bridge and 294,000 vehicles north of the I-580 Junction.
- **Interstate 580 (I-580)** is a regional freeway located west of the Project Site, stretching from U.S. 101 in Marin County to Interstate 5 (I-5) south of Tracy. I-580 joins I-80 just south of the Project Site, splitting off farther north near Richmond. Access to and from I-580 is provided via I-980. Average daily traffic on I-580 west of the I-580 / I-980 / State Route 24 (SR 24) Interchange is 218,000 vehicles. Additional access to I-580 is provided at the Oakland Avenue / Harrison Street Interchange, with average daily traffic at 201,000 vehicles west of the interchange and 203,000 vehicles east of the interchange.
- **Interstate 880 (I-880)** is a regional freeway located south of the Project Site, extending between I-80 in Emeryville and Interstate 280 (I-280) in San Jose. Four lanes are generally provided in each direction on this freeway near the Project area. Access to and from I-880 is provided at the Jackson Street / Oak Street and Broadway Interchanges, as well as I-980 to the east. Average daily traffic on I-880 is 199,000 vehicles north of Broadway and 222,000 vehicles south of Jackson Street / Oak Street.
- **Interstate 980 (I-980)** is a local freeway extending from I-880 to I-580 / SR 24 in Oakland. I-980 has three lanes in each direction in the vicinity of the Project area. Access to and from I-980 is provided at the 17th Street / 18th Street Interchange. Average daily traffic on I-980 north of the interchange is approximately 97,000 vehicles.
- **State Route 24 (SR 24)** is a regional freeway between Walnut Creek to the east and Downtown Oakland to the west. SR 24 becomes I-980 at the I-580 interchange. Three lanes are generally provided in each direction on this freeway near the Project Site. Access to and from SR 24 is provided by I-580 and I-980. Average daily traffic on SR 24 just east of the I-580 / I-980 / SR 24 Interchange is 137,000 vehicles.



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-1
Project Study Area

Local Access

A brief description of the local and arterial streets serving the Project Site is given below:

- **Broadway** is a major north-south arterial stretching from Jack London Square in the south to SR 24 in the north. In the vicinity of the Project, Broadway consists of two lanes in the northbound direction and three lanes in the southbound direction. Broadway is the primary north-south roadway in the Downtown area.
- **Telegraph Avenue** is a major north-south arterial, beginning at Broadway in Downtown Oakland and continuing north into Berkeley. Generally, there are two through lanes in each direction. Telegraph Avenue, along with San Pablo Avenue, are the primary local roadways connecting Downtown Oakland with Berkeley.
- **San Pablo Avenue** is a major north-south arterial stretching from Downtown Oakland north to the City of San Pablo. It is designated as State Route 123. In the vicinity of the Project Site, San Pablo Avenue operates with two lanes in each direction, with left-turn pockets provided at key intersections. Along with Telegraph Avenue, it is one of the primary local roadways connecting Downtown Oakland with Berkeley.
- **Harrison Street** and **Webster Street** are north-south collectors providing access between the Webster and Posey Tubes to Alameda, Downtown Oakland, and I-580. South of 10th Street, Webster Street and Harrison Street operate as a one-way couplet, with Webster Street southbound (towards Alameda) and Harrison Street northbound (from Alameda). North of 10th Street, Harrison Street becomes a two-way roadway, while Webster Street remains one-way southbound, operating as a one-way couplet with Franklin Street. In the vicinity of the Project Site, both Harrison Street and Webster Street generally provide four lanes. Harrison Street continues north of Grand Avenue and provides access to and from I-580 at the Oakland Avenue / Harrison Street Interchange.
- **Madison Street** and **Oak Street / Lakeside Drive** are north-south collectors providing access between I-580, the Lake Merritt area, and I-880. Madison Street and Oak Street / Lakeside Drive operate as a one-way couplet, with Madison Street serving southbound traffic and Oak Street / Lakeside Drive serving northbound traffic. In the vicinity of the Project Site, both Madison Street and Oak Street / Lakeside Drive generally provide four lanes. North of 14th Street, Oak Street officially becomes Lakeside Drive, while north of 20th Street, Lakeside Drive merges with Harrison Street and continues north, providing access to I-580 at the Oakland Avenue / Harrison Street Interchange.
- **20th Street (Thomas L. Berkley Way)** is an east-west collector between Harrison Street / Lakeside Drive and Castro Street. In the vicinity of the Project Site, it operates with two lanes in each direction.
- **Grand Avenue** is an east-west arterial extending east from Broadway before veering north to connect with Pleasant Valley Avenue. Grand Avenue continues west past Broadway as West Grand Avenue until Maritime Street near the Oakland Army Base, offering access to I-80. In the vicinity of the Project Site, Grand Avenue generally operates with two lanes in each direction.
- **21st Street** is a two-lane minor street between Harrison Street and San Pablo Avenue.

Existing Traffic Conditions

Intersection operating conditions were analyzed at 51 key intersections in the vicinity of the Project Site for the weekday AM and PM peak hours (7:00-9:00 AM and 4:00-6:00 PM)—hereafter referred to simply as the “AM peak hour” and “PM peak hour.” These 51 intersections

were selected in coordination with City of Oakland staff and are inclusive of all locations which could be significantly affected by Project traffic. The following study intersections were selected for analysis and are shown on **Figure IV.L-2**:

- Intersections outside of Downtown Oakland (all signalized, unless indicated otherwise)²
 1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (*unsignalized*)³
 2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps
 3. Harrison Street / 27th Street / 24th Street / Bay Place
 4. Broadway / 27th Street
 5. Telegraph Avenue / 27th Street
 6. Northgate Avenue / 27th Street / I-980 Eastbound On-Ramp
 7. Northgate Avenue / 27th Street / I-980 Westbound Off-Ramp
 45. Grand Avenue / El Embarcadero
 46. Lakeshore Avenue / El Embarcadero
 47. Grand Avenue / MacArthur Boulevard (Eastbound)
 48. Lakeshore Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound On-Ramp
 49. Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp
 50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue
 51. Oakland Avenue / Monte Vista Avenue / Vernon Street (*unsignalized*)
- Intersections within Downtown Oakland (all signalized, unless indicated otherwise)²
 8. Northgate Avenue / West Grand Avenue
 9. Telegraph Avenue / West Grand Avenue
 10. Broadway / Grand Avenue
 11. Webster Street / Grand Avenue
 12. Harrison Street / Grand Avenue
 13. Harrison Street / 21st Street
 14. Kaiser Center Access Road / 21st Street (*unsignalized*)
 15. Kaiser Center Garage Entrance (Northeast) / 21st Street (*unsignalized*)
 16. Kaiser Center Garage Entrance (Northwest) / 21st Street (*unsignalized*)
 17. Webster Street / 21st Street
 18. Franklin Street / 21st Street
 19. Broadway / 21st Street

² Downtown is defined in the Land Use and Transportation Element of the City of Oakland General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south and I-980 / Brush Street to the west.

³ Numbers shown (e.g., 1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp) identify the location of the intersection on Figure IV.L-2.



20. Telegraph Avenue / 20th Street
21. Broadway / 20th Street
22. Franklin Street / 20th Street
23. Webster Street / 20th Street
24. Harrison Street / 20th Street / Kaiser Center Access Road
25. Kaiser Center Access Road / 20th Street (*unsignalized*)
26. Harrison Street / Lakeside Drive
27. Lakeside Drive / 20th Street
28. Brush Street / 18th Street / I-980 Westbound Off-Ramp
29. Castro Street / 17th Street / I-980 Eastbound Off-Ramp
30. Castro Street / 12th Street / I-980 Eastbound On-Ramp
31. Brush Street / 11th Street / I-980 Westbound On-Ramp
32. Oak Street / 14th Street
33. Madison Street / 14th Street
34. Harrison Street / 14th Street
35. Madison Street / 12th Street
36. Oak Street / 12th Street
37. Oak Street / 11th Street (*unsignalized*)
38. Madison Street / 11th Street
39. Franklin Street / 11th Street
40. Oak Street / 7th Street
41. Madison Street / 7th Street
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp
43. Oak Street / 6th Street / I-880 Northbound Off-Ramp
44. Oak Street / 5th Street / I-880 Southbound On-Ramp

Preliminary trip generation estimates determined that an ACCMA roadway analysis would be required. The following roadway segments in the vicinity of the Proposed Project are designated as part of the Congestion Management Program (CMP) and Metropolitan Transportation System (MTS) roadway networks and were selected for analysis (see Figure IV.L-2):

- Caltrans roadways
 1. SR 260 (Posey / Webster Tubes), from Alameda city limits to I-880 (*northbound / southbound*)
 2. I-880, from Market Street to I-980 (*eastbound / westbound*)
 3. I-880, from Oak Street to 5th Avenue (*eastbound / westbound*)
 4. I-980, from 27th Street to 29th Street (*northbound / southbound*)
- Non-Caltrans roadways
 5. Broadway, from 19th Street to Grand Avenue (*northbound / southbound*)
 6. Telegraph Avenue, from 20th Street to 27th Street (*northbound / southbound*)
 7. West Grand Avenue, from San Pablo Avenue to Telegraph Avenue (*eastbound / westbound*)
 8. Grand Avenue, from Broadway to Harrison Street (*eastbound / westbound*)

9. Grand Avenue, from Harrison Street to El Embarcadero (*eastbound / westbound*)
10. Harrison Street, from I-580 to 27th Street (*northbound / southbound*)
11. Harrison Street, from 27th Street to Grand Avenue (*northbound / southbound*)
12. Harrison Street, from 20th Street to 14th Street (*northbound / southbound*)

Level of Service Analysis Methodologies

The operation of a local roadway network is commonly evaluated using the Level of Service (LOS) methodology. This methodology qualitatively characterizes traffic conditions associated with varying levels of vehicular traffic, ranging from LOS A (indicating free flow traffic conditions with little or no delay experienced by motorists) to LOS F (indicating congested conditions where traffic flows exceed design capacity and result in long queues and delays). The LOS methodology applies to both signalized and unsignalized intersections and is summarized in **Table IV.L-1**.

**TABLE IV.L-1
DEFINITIONS FOR INTERSECTION LEVEL OF SERVICE**

Unsignalized Intersections		LOS Grade	Signalized Intersections	
Description	Average Total Vehicle Delay (Seconds)		Average Control Vehicle Delay (Seconds)	Description
No delay for stop-controlled approaches.	≤10.0	A	≤10.0	Insignificant delays: No approach phase is fully utilized and no vehicle waits longer than one red indication.
Operations with minor delay.	>10.0 and ≤15.0	B	>10.0 and ≤20.0	Minimal delays: An occasional approach phase is fully utilized. Drivers begin to feel restricted.
Operations with moderate delays.	>15.0 and ≤25.0	C	>20.0 and ≤35.0	Acceptable delays: Major approach phase may become fully utilized. Most drivers feel somewhat restricted.
Operations with some delays.	>25.0 and ≤35.0	D	>35.0 and ≤55.0	Tolerable delays: Drivers may wait through more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.
Operations with high delays and long queues.	>35.0 and ≤50.0	E	>55.0 and ≤80.0	Significant delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long vehicle queues form upstream.
Operation with extreme congestion, with very high delays and long queues unacceptable to most drivers.	>50.0	F	>80.0	Excessive delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.

SOURCE: Transportation Research Board, *Highway Capacity Manual*, 2000.

Signalized Intersections

At signalized study intersections, traffic conditions were evaluated using the 2000 *Highway Capacity Manual* (HCM) operations methodology. The operations analysis uses various intersection characteristics (e.g., traffic volumes, lane geometry, and signal phasing / timing) to estimate the average control delay experienced by motorists at an intersection.

Unsignalized Intersections

At unsignalized (side-street, and all-way stop-controlled) study intersections, traffic conditions were also evaluated using the 2000 HCM operations methodology. With this methodology, the LOS is related to the total delay per vehicle for the intersection as a whole (for all-way stop-controlled intersections) or for each stop-controlled approach only (for side-street stop-controlled intersections). Total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs the queue. This time includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position.

Roadway Segments

The ACCMA roadway analysis addresses Project impacts to roadway facilities on the CMP/MTS network, with LOS determinations based ranges of volume-to-capacity (v/c) ratios from the 2000 HCM (for Caltrans facilities), and from the 1985 HCM (for non-Caltrans facilities). The ranges of v/c ratios from both versions of the HCM are summarized in **Table IV.L-2**. LOS E or better is generally considered acceptable, and LOS F is considered unacceptable.

The assumed capacities are 2,000 vehicles per hour per lane (vphpl) for typical freeway segments, 1,700 vphpl for tunnel sections (Posey and Webster Tubes), and 900 vphpl for arterials such as Broadway, Telegraph Avenue, Grand Avenue, and Harrison Street.

TABLE IV.L-2
CRITERIA FOR ROADWAY LEVEL OF SERVICE

1985 HCM Methodology	LOS	Description	2000 HCM Methodology
V/C Ratio			V/C Ratio
≤0.30	A	Vehicles travel at free-flow speeds and can maneuver almost freely within the traffic stream.	≤0.30
>0.30 and ≤0.50	B	Vehicles travel at free-flow speeds and movement within the traffic stream is only slightly restricted.	>0.30 and ≤0.50
>0.50 and ≤0.70	C	Vehicles travel at or near free-flow speed and movement is somewhat restricted. Incidents can cause local queuing.	>0.50 and ≤0.71
>0.70 and ≤0.84	D	Vehicle speed declines as density increases, and maneuverability within the traffic stream is noticeably limited.	>0.71 and ≤0.89
>0.84 and ≤1.00	E	Roadway is operating at or near capacity, with vehicles closely spaced. Any incident can cause backups that propagate upstream.	>0.89 and ≤1.00
>1.00	F	Roadway operates beyond capacity, with significant queuing at bottlenecks such as key intersections or lane drops. Vehicles are closely spaced and maneuverability is extremely restricted.	>1.00

SOURCE: Transportation Research Board, 1985, 2000.

Existing Intersection Operating Conditions

Weekday traffic counts for the AM and PM peak hours were collected on Tuesdays, Wednesdays, and Thursdays of non-holiday weeks in July and September of 2007; in May, June, August, October, and November of 2008; and, in January of 2009 (see **Appendix G.1**). **Figure IV.L-3** shows the existing intersection geometry (lane geometry and signal control) for the 51 study intersections. **Figure IV.L-4** shows existing traffic volumes during the AM and PM peak hours.

The 51 study intersections were analyzed using Synchro 7 software package based on the methodologies in the 2000 HCM. As shown in **Table IV.L-3**, the following five intersections currently operate at an unacceptable LOS during one or both peak hour (all others operate acceptably). The LOS calculation sheets for all study intersections are provided in **Appendix G.2**.

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in PM peak hour)

Within Downtown Area

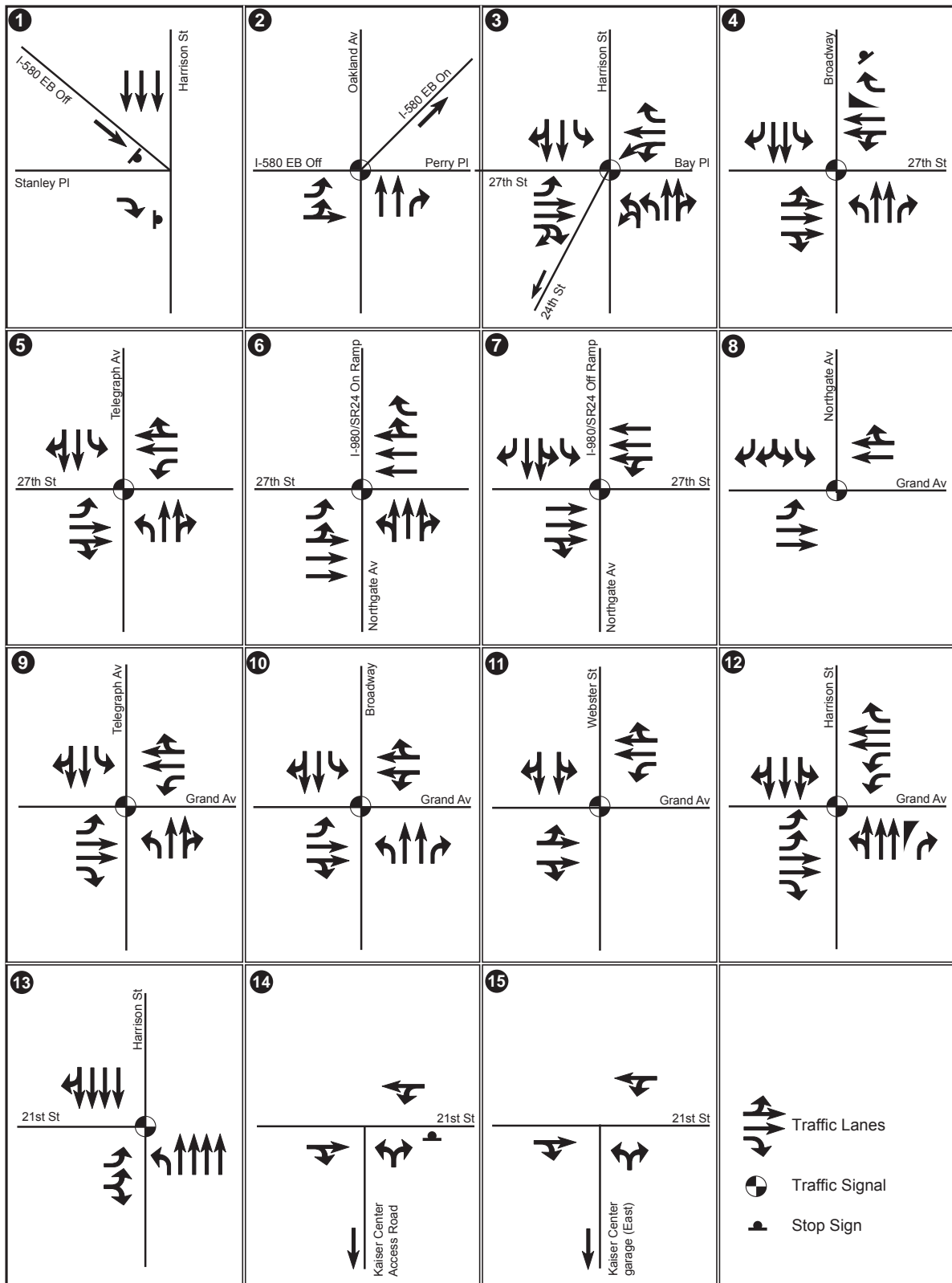
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in PM peak hour)

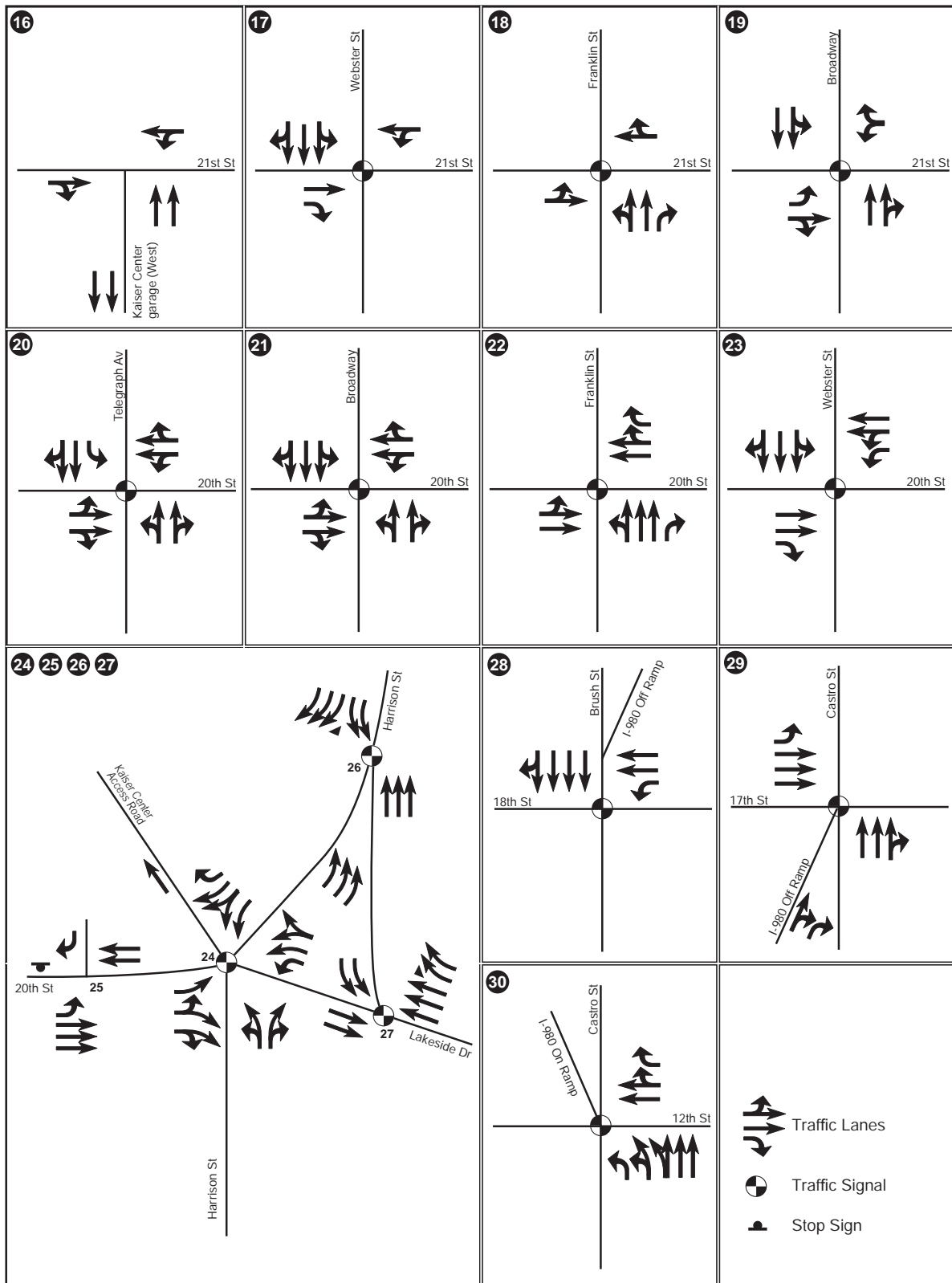
Measure DD Implementation

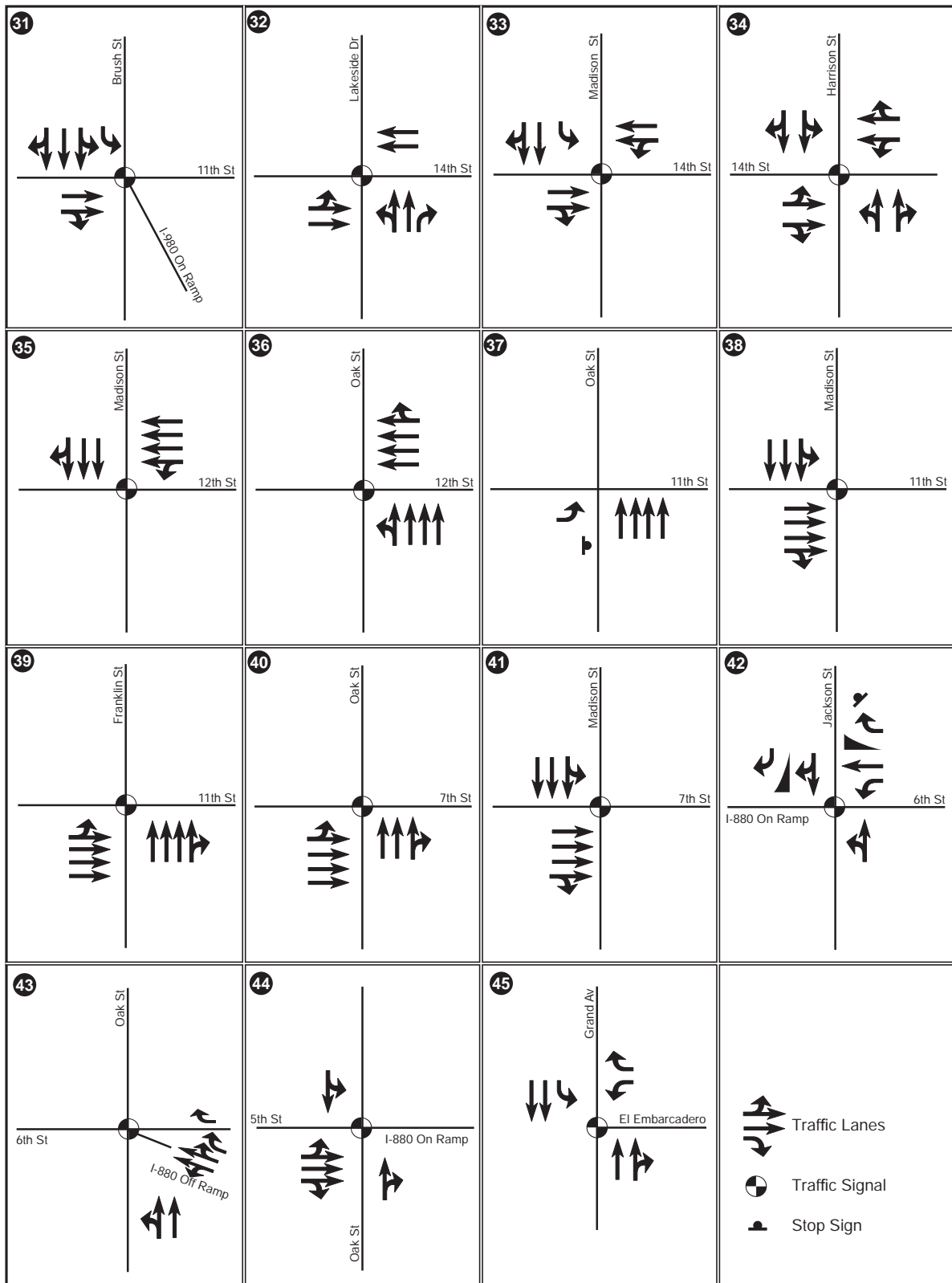
The Existing Conditions analysis assumes roadway changes have been installed or are currently in the process of being constructed as part of the Measure DD Implementation Project (see **Appendix G**). These changes include the following improvements:

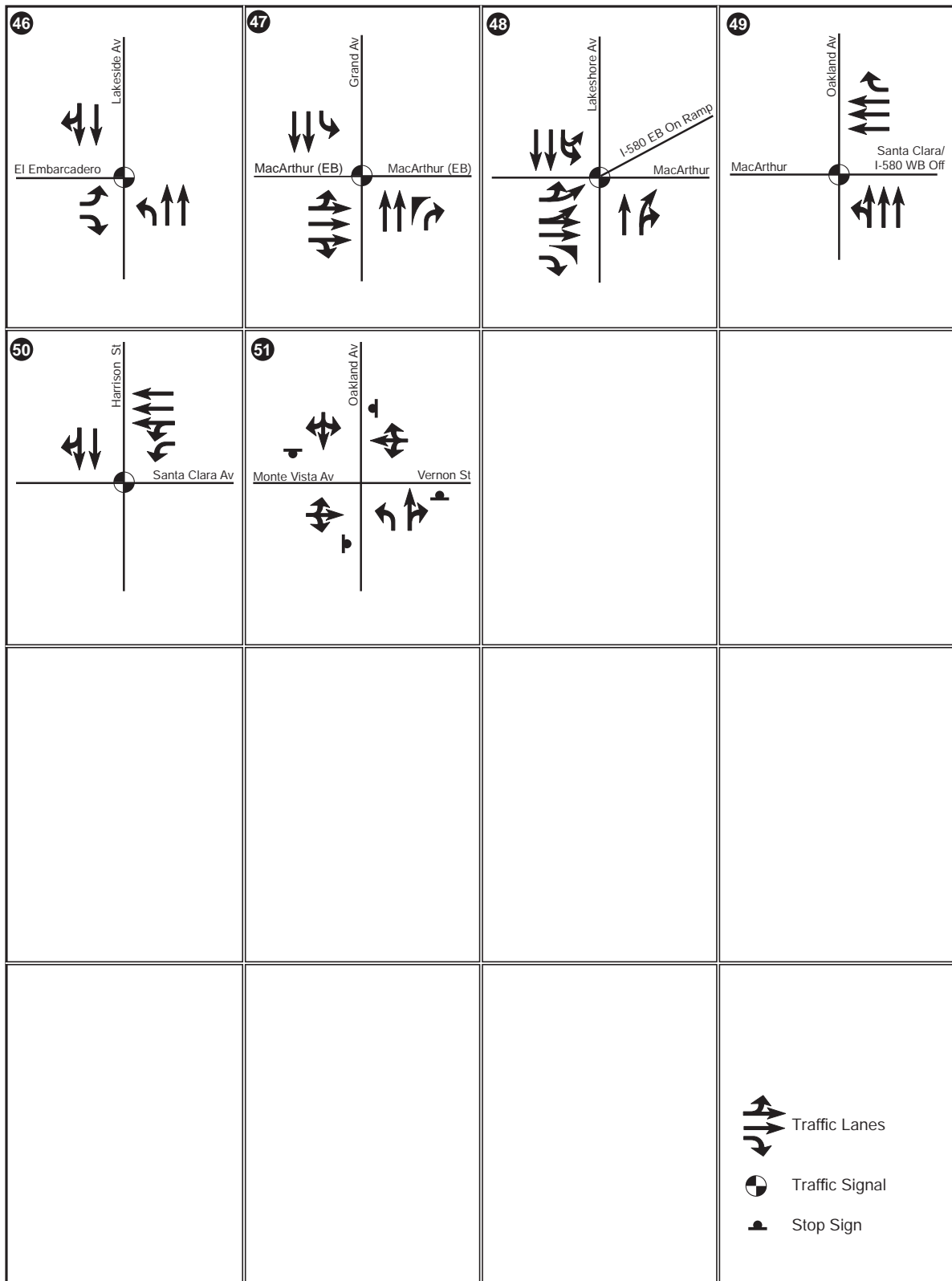
- Lakeshore Avenue is being restriped to one lane in each direction (with a center two-way left-turn lane), with bicycle lanes. The pedestrian crossing at El Embarcadero has been improved, with crosswalks with pedestrian push buttons on both the north and south sides of the intersection.
- The former southern (eastbound) half of the El Embarcadero couplet has been removed, allowing for an expanded plaza area fronting Lake Merritt. The northern (westbound) segment was widened two feet north towards Lakeview Branch Public Library and reconfigured to accommodate two-way traffic (one eastbound lane and one westbound lane). The intersection of Lakeshore Avenue / El Embarcadero was also signalized as part of this improvement.
- Lakeside Drive has been narrowed from the existing four lanes of traffic to two lanes from 14th Street to just beyond 17th Street, and striped with a new Class 2 bicycle facility (bicycle lane).⁴ The shoreline east of Lakeside Drive has been improved and new trails constructed, and a staircase has been connecting Lakeside Drive to the Municipal Boathouse. Bulbouts have been constructed along Lakeside Drive at the Scottish Rite Center (midblock between 14th Street and 17th Street) and at 17th Street.

⁴ See page IV.L-30 for a description of how bicycle facilities are classified (as Class 1, Class 2, and Class 3).









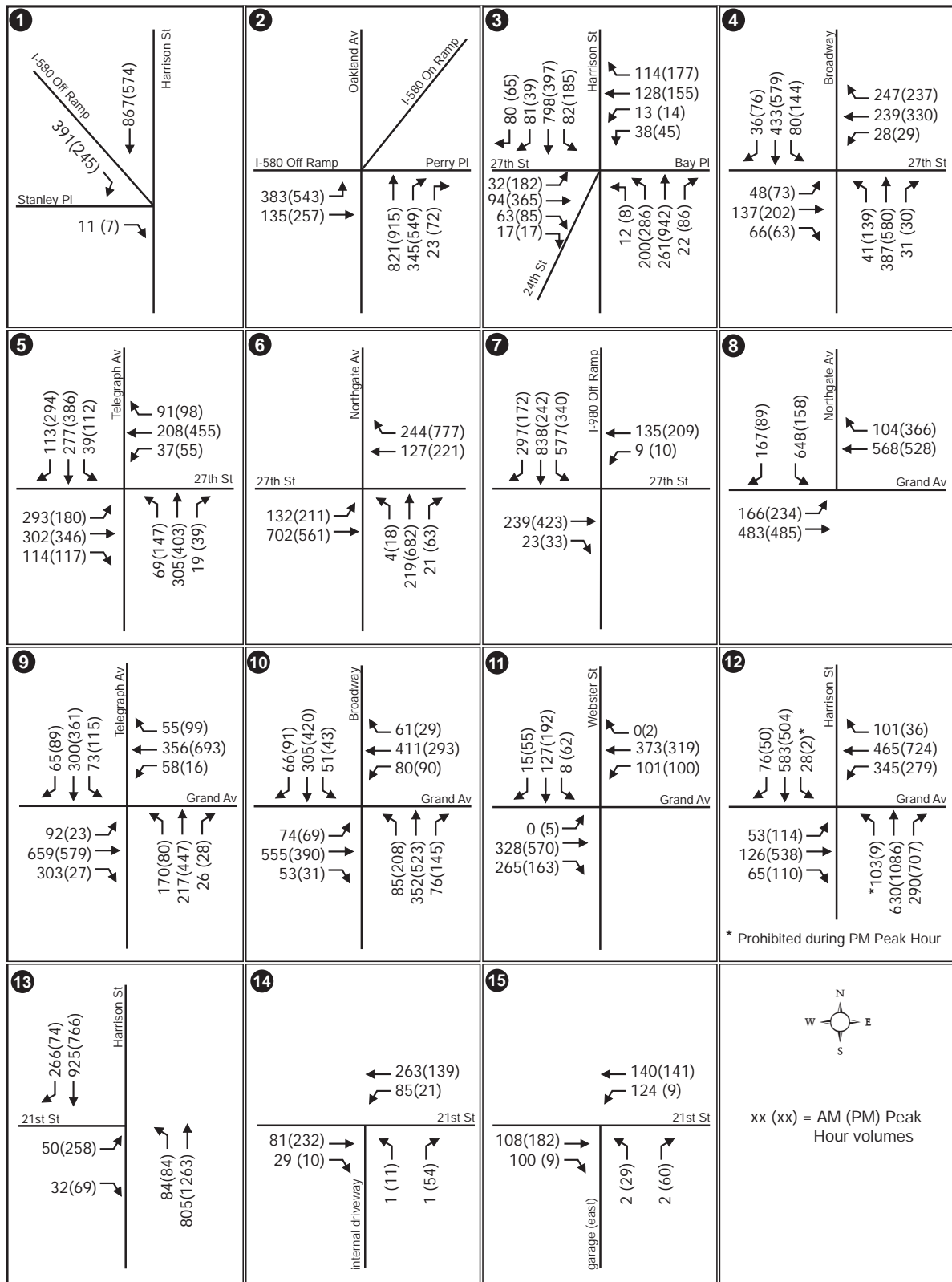
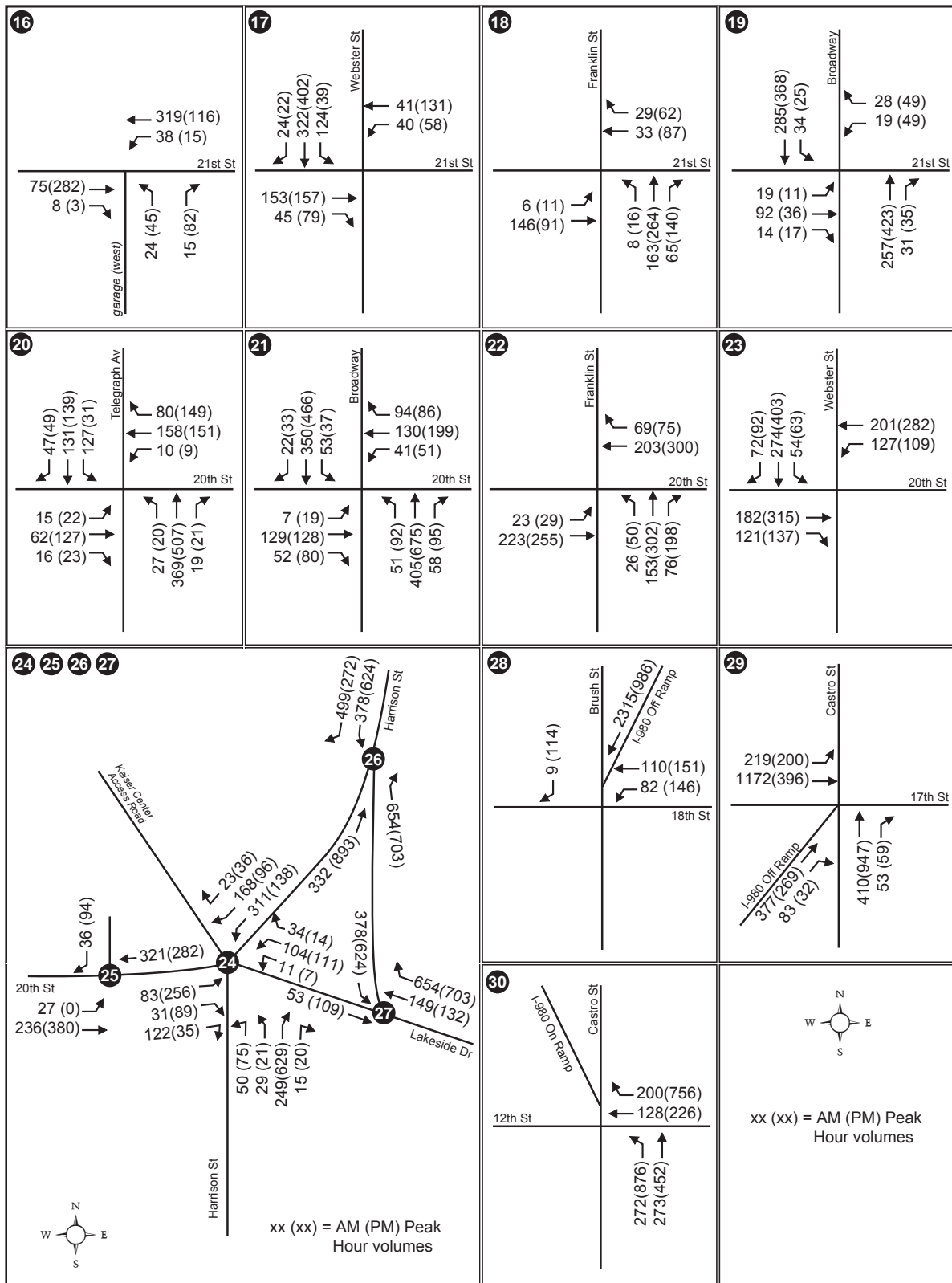
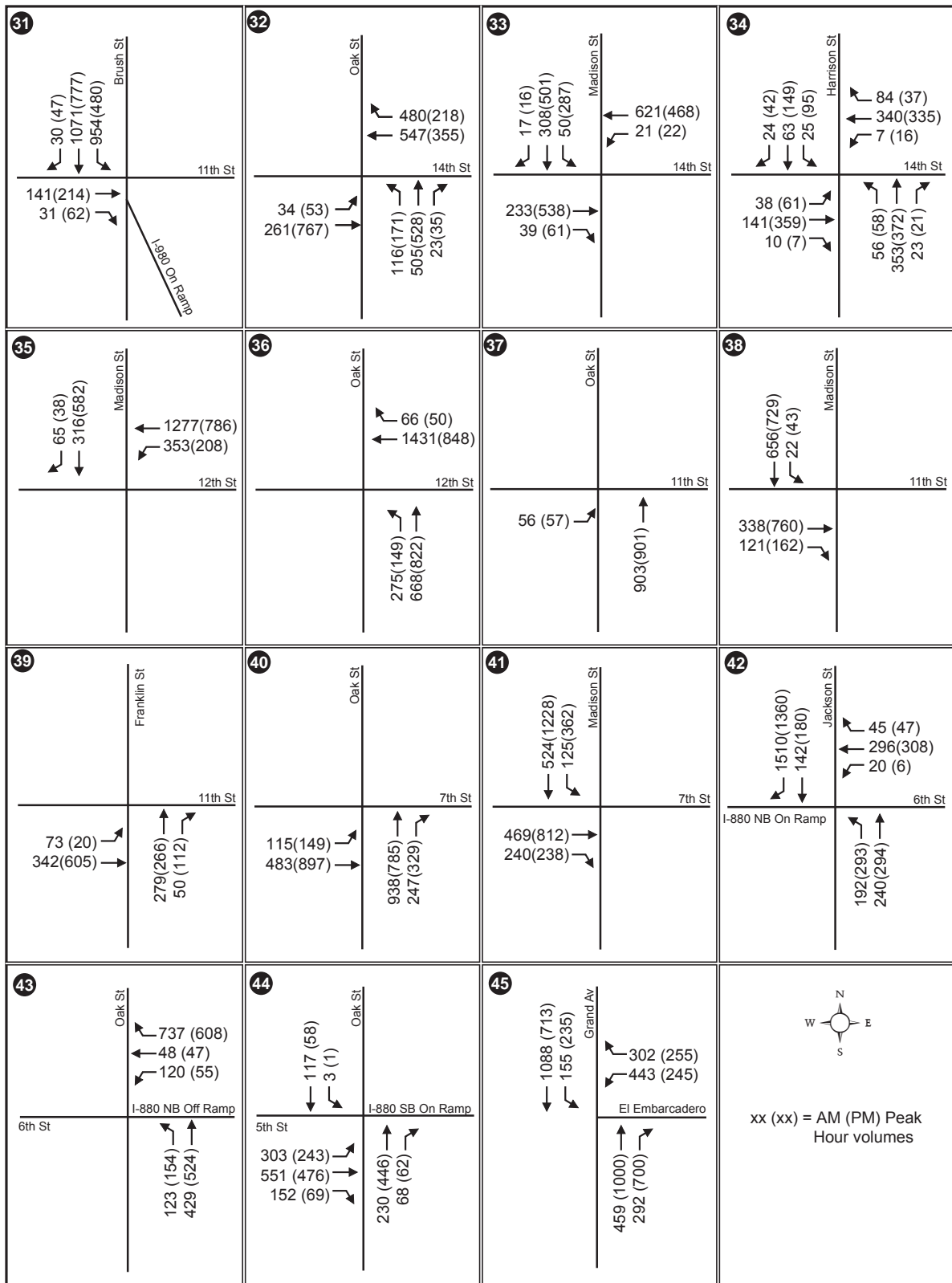
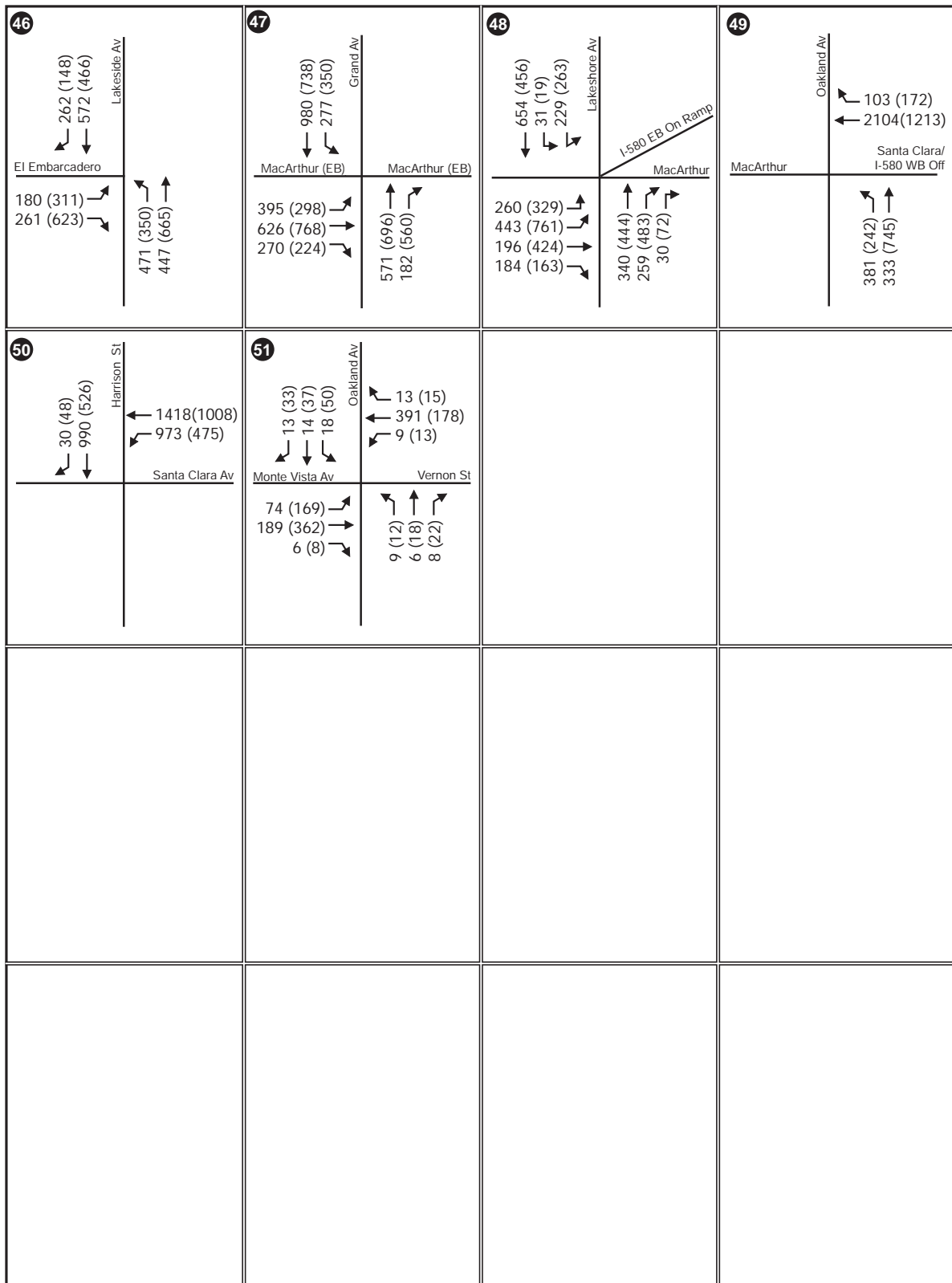


Figure IV.L-4a
Existing Traffic Volumes
AM (PM) Peak Hour







**TABLE IV.L-3
EXISTING INTERSECTION LEVELS OF SERVICE (LOS)**

No.	Intersection	Traffic Control ^a	Count Date ^b	AM Peak Hour		PM Peak Hour	
				LOS	Delay ^c	LOS	Delay ^c
Outside Downtown							
1	Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp	SSSC	08/07/08	C	16.9	B	11.9
2	Oakland Avenue / Perry Place / I-580 Eastbound Ramps	Signal	11/19/08	B	18.1	F	>120
3	Harrison Street / 27th Street / 24th Street	Signal	08/07/08 11/20/08	C	27.6	D	49.2
4	Broadway / 27th Street	Signal	10/21/08	B	15.3	B	18.0
5	Telegraph Avenue / 27th Street	Signal	05/22/08	B	18.8	C	25.0
6	Northgate Avenue / 27th Street / I-980 Eastbound On-Ramp	Signal	05/22/08	A	8.9	B	10.9
7	Northgate Avenue / 27th Street / I-980 Westbound Off-Ramp	Signal	05/22/08	B	12.0	B	11.0
45	Grand Avenue / El Embarcadero ^d	Signal	11/12/08 11/06/08	C	25.7	F	90.9
46	Lakeshore Avenue / El Embarcadero ^d	Signal	11/12/08 11/06/08	C	32.5	C	24.5
47	Grand Avenue / MacArthur Blvd. (Eastbound) / I-580 EB Off-Ramp	Signal	11/12/08 11/06/08	D	41.9	E	76.2
48	Lakeshore Ave. / MacArthur Blvd. (Eastbound) / I-580 EB On-Ramp	Signal	11/12/08 11/06/08	C	23.9	D	49.2
49	Oakland Ave. / MacArthur Blvd. (Westbound) / Santa Clara Ave. / I-580 WB Off-Ramp	Signal	10/29/08	C	22.8	B	12.1
50	Harrison St. / MacArthur Blvd. (Westbound) / Santa Clara Ave.	Signal	01/13/09	C	26.1	B	16.5
51	Oakland Avenue / Monte Vista Ave.	AWSC	07/31/07	B	12.7	B	12.8
Within Downtown							
8	Northgate Avenue / West Grand Avenue	Signal	10/21/08 05/22/08	C	21.3	B	17.7
9	Telegraph Avenue / West Grand Ave.	Signal	05/22/08	C	24.9	C	27.1
10	Broadway / Grand Avenue	Signal	10/21/08	C	20.9	B	17.0
11	Webster Street / Grand Avenue	Signal	08/06/08	C	29.2	C	23.7
12	Harrison Street / Grand Avenue	Signal	05/22/08	C	27.8	D	39.0
13	Harrison Street / 21st Street	Signal	08/07/08	A	6.9	B	13.7
14	Kaiser Center Access Road / 21st St.	SSSC	08/07/08	B	11.6	B	10.9
15	Kaiser Center Garage Entrance (NE) / 21st Street	SSSC	08/07/08	B	12.5	B	11.4
16	Kaiser Center Garage Entrance (NW) / 21st Street	SSSC	08/07/08	B	11.5	B	10.8
17	Webster Street / 21st Street	Signal	08/06/08	B	13.8	B	18.2
18	Franklin Street / 21st Street	Signal	08/06/08	B	10.1	B	10.8
19	Broadway / 21st Street	Signal	08/06/08	A	10.0	B	10.6
20	Telegraph Avenue / 20th Street	Signal	10/29/08	B	11.6	B	12.5
21	Broadway / 20th Street	Signal	05/22/08	B	13.3	B	17.0
22	Franklin Street / 20th Street	Signal	08/06/08	B	13.0	B	15.1
23	Webster Street / 20th Street	Signal	08/06/08	C	20.8	C	21.0
24	Harrison Street / 20th Street / Kaiser Center Access Road	Signal	05/22/08	C	24.2	C	27.2
25	Kaiser Center Access Road / 20th St.	SSSC	08/07/08	B	14.7	B	14.8
26	Harrison Street / Lakeside Drive	Signal	05/22/08	A	6.2	B	13.8
27	Lakeside Drive / 20th Street	Signal	08/07/08	B	11.6	B	10.1

See next page for table footnotes.

TABLE IV.L-3 (Continued)
EXISTING INTERSECTION LEVELS OF SERVICE (LOS)

No.	Intersection	Traffic Control ^a	Count Date ^b	AM Peak Hour		PM Peak Hour	
				LOS	Delay ^c	LOS	Delay ^c
Within Downtown							
28	Brush Street / 18th Street / I-980 Westbound Off-Ramp	Signal	06/02/08	A	5.9	A	9.5
29	Castro Street / 17th Street / I-980 Eastbound Off-Ramp	Signal	06/02/08	C	21.0	C	23.8
30	Castro Street / 12th Street / I-980 Eastbound On-Ramp	Signal	08/05/08	C	21.4	B	16.7
31	Brush Street / 11th Street / I-980 Westbound On-Ramp	Signal	08/05/08	C	32.9	B	15.9
32	Oak Street / 14th Street	Signal	05/21/08	B	17.4	C	34.6
33	Madison Street / 14th Street	Signal	05/22/08	A	9.6	B	10.1
34	Harrison Street / 14th Street	Signal	08/05/08	A	9.3	A	9.7
35	Madison Street / 12th Street	Signal	05/21/08	A	7.7	A	7.8
36	Oak Street / 12th Street	Signal	05/21/08	B	12.8	B	12.8
37	Oak Street / 11th Street	SSSC	05/21/08	B	10.5	B	10.7
38	Madison Street / 11th Street	Signal	05/21/08	B	12.2	A	9.7
39	Franklin Street / 11th Street	Signal	08/05/08	B	13.3	B	14.9
40	Oak Street / 7th Street	Signal	05/21/08	A	9.4	B	14.2
41	Madison Street / 7th Street	Signal	05/21/08	A	8.8	B	11.8
42	Jackson Street / 6th Street / I-880 Northbound On-Ramp	Signal	10/23/08	F	>120	F	>120
43	Oak Street / 6th Street / I-880 Northbound Off-Ramp	Signal	05/21/08	B	14.9	B	11.2
44	Oak Street / 5th Street / I-880 Southbound On-Ramp	Signal	05/21/08	E	65.3	F	>120

Bold indicates intersections operating at unacceptable LOS E (outside Downtown) or LOS F (outside and within Downtown).

^a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

^b Two count dates indicates separate dates for AM and PM peak period counts, respectively.

^c The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

^d Volumes for this intersection are before Measure DD improvements.

SOURCE: AECOM, 2009.

For the changes to Lakeshore Avenue and El Embarcadero, which affect Intersection #45 (Grand Avenue / El Embarcadero) and Intersection #46 (Lakeshore Avenue / El Embarcadero), traffic counts were conducted both before implementation of Measure DD and after implementation of Measure DD (with some ongoing construction activity to the median on Lakeshore Avenue and surrounding roadway and sidewalks). The latter counts were found to be lower, but because construction was still occurring at the time, older counts for these intersections were used instead, adjusted to match the new intersection geometries. This is a conservative assumption, as reductions in roadway capacity generally result in corresponding reductions in traffic volumes.

Existing Roadway Operating Conditions

A roadway facility operating at LOS F indicates that the facility is over-capacity (i.e., v/c ratio is greater than 1.00). As shown in **Table IV.L-4**, all of the study roadway segments currently operate at LOS E or better during the AM and PM peak hours. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

Existing Transit Conditions

The Project is served by AC Transit and Bay Area Rapid Transit (BART). The existing transit network in the vicinity of the Project is illustrated in **Figure IV.L-5**.

Bus Services

AC Transit provides local and regional bus service within Alameda and Contra Costa Counties and between the East Bay and San Francisco's Transbay Terminal. AC Transit bus service in the vicinity of the Project is summarized in **Table IV.L-5**.

In the immediate vicinity of the Project, AC Transit lines 11, 12, and 59 provide local service within Oakland. Line NL provides direct service to San Francisco and parts of the Dimond District and East Oakland via MacArthur Boulevard. In addition to these services within the immediate vicinity of the Project, multiple AC Transit lines converge at the 19th Street BART Station and the Uptown Transit Center, providing additional local service within Oakland and regional service to Emeryville, Berkeley, Albany, El Cerrito, and Richmond in the north and San Leandro and Hayward in the south. In addition to the services summarized in Table IV.L-5, an extensive network of "all-nighter" services also connects the Project with San Francisco and major destination points in the East Bay during the late evening and early morning.

BART

BART provides local and regional rail service. The 19th Street BART station is located underneath Broadway between 19th and 20th streets, with the closest station entrance to the Project Site located on the northeast corner of the intersection of Broadway / 20th Street. This entrance is within one quarter-mile (approximately five-minute walking distance) of the Project.

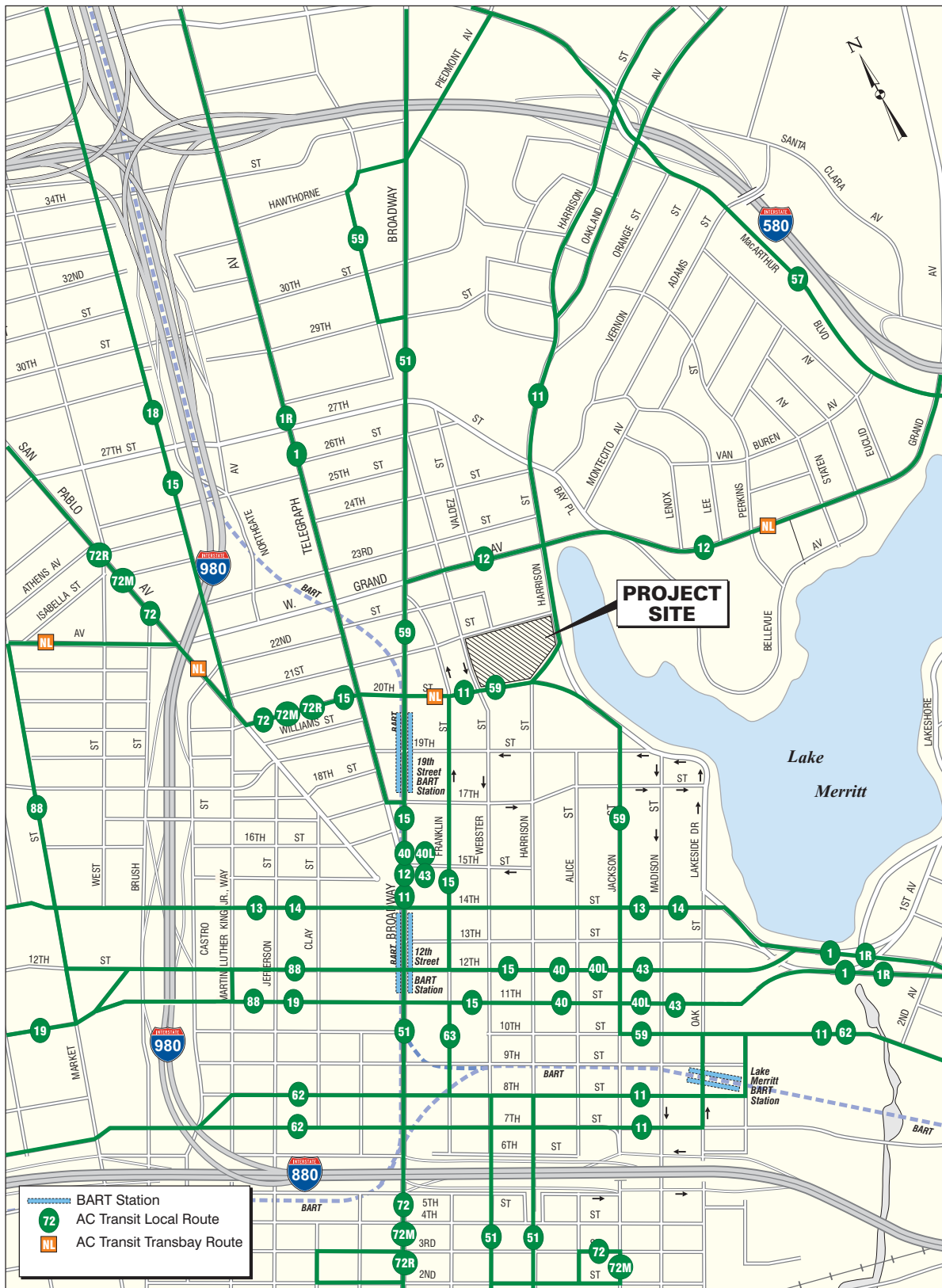
Three BART lines serve the 19th Street Station (Richmond – Millbrae, Pittsburg / Bay Point – San Francisco International Airport (SFO), and Richmond – Fremont). In this regard, all BART stations (with the exception of Dublin / Pleasanton and Castro Valley) have direct service to and from 19th Street Station during the weekday peak and midday periods.

Weekday peak period and midday frequencies on these lines are every 15 minutes, except for the Pittsburg / Bay Point – SFO line, which operate every five to ten minutes during the weekday peak periods (AM peak to SFO, AM and PM peaks to Pittsburg / Bay Point). The Richmond – Millbrae line stops running at about 6:50 p.m. on weekdays, about 7:50 p.m. on Saturdays, and does not operate at all on Sundays. Directly above the Station at ground level is the Uptown Transit Center on 20th Street, which allows for easy connections between the various AC Transit lines and BART. Service at 19th Street Station is summarized in **Table IV.L-6**.

**TABLE IV.L-4
EXISTING ROADWAY SEGMENT LEVEL OF SERVICE (LOS)**

No.	Roadway Segment	Direction	Lanes	Capacity (veh/hr)	AM Peak Hour			PM Peak Hour		
					LOS	Volume	v/c ratio	LOS	Volume	v/c ratio
Caltrans Facilities										
1	SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880	NB	2	3,400	E	3,081	0.91	D	2,478	0.73
		SB	2	3,400	B	1,575	0.46	C	2,347	0.69
2	I-880 from Market Street to I-980	EB	4	8,000	B	3,070	0.38	B	3,164	0.40
		WB	4	8,000	B	3,720	0.47	B	3,426	0.43
3	I-880 from Oak Street to 5th Avenue	EB	4	8,000	C	4,968	0.62	D	5,737	0.72
		WB	4	8,000	C	5,606	0.70	C	5,075	0.63
4	I-980 from 27th Street to 29th Street	NB	3	6,000	A	1,611	0.27	C	3,609	0.60
		SB	3	6,000	D	4,679	0.78	B	1,858	0.31
Non-Caltrans Facilities										
5	Broadway from 19th Street to Grand Avenue	NB	2	1,800	A	513	0.29	B	876	0.49
		SB	2	1,800	A	438	0.24	B	597	0.33
6	Telegraph Avenue from 20th Street to 27th Street	NB	2	1,800	A	464	0.26	B	678	0.38
		SB	2	1,800	B	661	0.37	B	565	0.31
7	West Grand Avenue from San Pablo Avenue to Telegraph Avenue	EB	2	1,800	C	1,054	0.59	B	719	0.40
		WB	2	1,800	B	672	0.37	B	862	0.48
8	Grand Avenue from Broadway to Harrison Street	EB	2	1,800	B	682	0.38	B	762	0.42
		WB	2	1,800	B	644	0.36	B	783	0.44
9	Grand Avenue from Harrison Street to El Embarcadero	EB	2	1,800	B	751	0.42	E	1,700	0.94
		WB	2	1,800	E	1,531	0.85	C	968	0.54
10	Harrison Street / Oakland Avenue from I-580 to 27th Street	NB	2	1,800	C	1,189	0.66	E	1,536	0.85
		SB	2	1,800	C	1,041	0.58	B	686	0.38
11	Harrison Street from 27th Street to Grand Avenue	NB	3	2,700	A	784	0.29	B	1,236	0.46
		SB	3	2,700	B	899	0.33	A	556	0.21
12	Harrison Street from 20th Street to 14th Street	NB	2	1,800	A	475	0.26	B	745	0.41
		SB	2	1,800	A	444	0.25	A	286	0.16

SOURCE: AECOM, 2009.



SOURCE: AECOM

Kaiser Oakland . 206213
Figure IV.L-5
 Existing Transit Network

**TABLE IV.L-5
EXISTING AC TRANSIT NETWORK**

Line	Route	Service Frequency (minutes)		
		Weekday Peak	Weekday Off-Peak	Weekend
1 International	From Downtown Berkeley to Bay Fair BART via Telegraph Avenue and International Boulevard	15	20	20
1R International Rapid	From Downtown Berkeley to Bay Fair BART via Telegraph Avenue and International Boulevard	12	12	15
11 Harrison	From Dimond to Piedmont via 14th Avenue, Lake Merritt, Downtown Oakland, and Oakland Avenue	20	30	60
12 Grand	From MacArthur BART to Downtown Oakland via Grand Avenue	20	30	30
13 14th Street	From Oakland Army Base to Trestle Glen via 14th Street and Lakeshore Avenue	20	30	60
14 East 18th Street	From MacArthur BART to Fruitvale via Adeline Street, East 18th Street, and High Street	15	30	30
15 MLK, Jr.	From UC Berkeley to Downtown Oakland via Martin Luther King, Jr. Way	20	20	20
18	From Albany to Montclair via Shattuck Avenue, Martin Luther King, Jr. Way, and Park Boulevard	15	20	20
19 Hollis	From Downtown Berkeley to Fruitvale via Hollis Street and Alameda	30	30	30
40	From Bay Fair BART to Downtown Oakland via Bancroft Avenue and Foothill Boulevard	8-12	8-12	8-12
51 Broadway	From Berkeley Amtrak to Alameda via University Avenue, College Avenue, and Broadway	8-10	8-10	15
59 Piedmont Avenue	From Rockridge BART to Lake Merritt BART via Piedmont Ave. and Downtown Oakland	60	60	60
72 San Pablo Avenue	From Hilltop Mall to Jack London Square via San Pablo Avenue	30	30	30
72M Macdonald	From Point Richmond to Jack London Square via San Pablo Avenue	30	30	30
72R San Pablo Rapid	From Contra Costa College to Jack London Square via San Pablo Avenue	12	12	----
88 Market	From North Berkeley BART to Lake Merritt BART via Sacramento Street and Market Street	20	20	20
NL MacArthur	From Eastmont Transit Center to San Francisco via MacArthur Boulevard	15	15	30

SOURCE: AC Transit, 2008.

**TABLE IV.L-6
EXISTING BART SERVICE AT 19TH STREET STATION**

Corridor	Areas Served	Service Frequency (minutes)		
		Weekday Peak	Weekday Mid-day	Weekend
Richmond	Richmond, El Cerrito, Albany, Berkeley, North Oakland	7-8	7-8	5-15
Pittsburg / Bay Point	Pittsburg, Concord, Pleasant Hill, Walnut Creek, Lafayette, Orinda, Rockridge	5-10	15	20
Fremont / Dublin-Pleasanton	Fremont, Union City, Hayward, Dublin, Pleasanton, Castro Valley, San Leandro, East Oakland, Fruitvale, Lake Merritt	15	15	20
San Francisco / Daly City / Millbrae	Millbrae, San Bruno, South San Francisco, Colma, Daly City, San Francisco, West Oakland	5	7-8	10

SOURCE: BART, 2009.

As shown in Table IV.L-6, service on BART corridors to / from 19th Street Station generally operates every ten minutes or less during the weekday peak periods. The only exceptions are stations on the Fremont and Dublin / Pleasanton Lines and the SFO and Millbrae Stations, which have 15-minute headways.

Given the nature of Downtown Oakland as a center of commercial activities, transit service heading into Downtown Oakland during the weekday AM and PM peak periods is generally well-utilized. Service in the reverse commute direction (e.g., away from Downtown Oakland during the AM peak period) is generally less well-utilized.

Existing Pedestrian and Bicycle Conditions

Existing Pedestrian Conditions

A field survey of crosswalk and sidewalk facilities in the immediate vicinity of the Project was also conducted to determine where curb ramps are not yet updated to ADA compliance and pedestrian countdown signals were lacking. The results of this field survey are summarized in **Appendix G.4**.

Unobstructed widths for existing sidewalk facilities along the north side of 20th Street are illustrated in **Figure IV.L-6**. Existing sidewalk and crosswalk conditions at key locations in the vicinity of the Project are illustrated in **Figure IV.L-7**.

Sidewalk Conditions

Sidewalks are provided on all streets in the vicinity of the Project Site including the north side of 20th Street – the primary pedestrian route between the 19th Street BART Station and the Project Site. This is also the primary route for AC Transit bus passengers alighting on Broadway to access the Project Site.

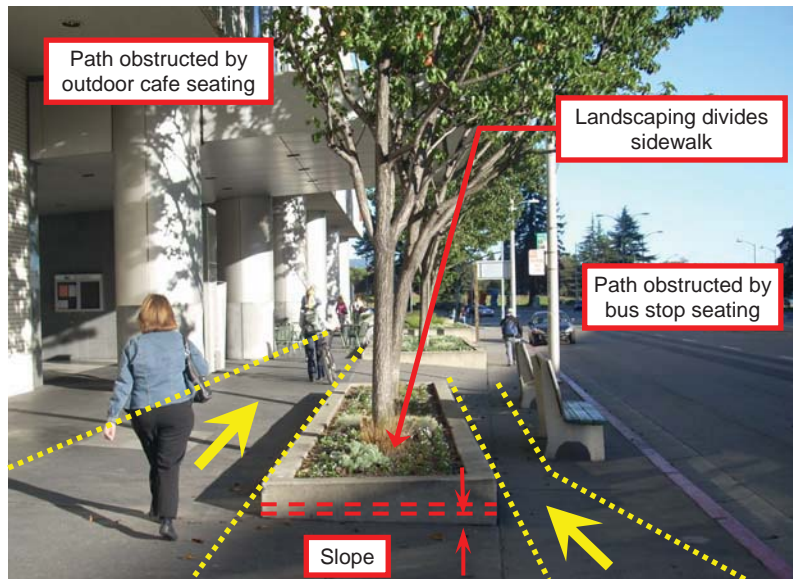


SOURCE: AECOM

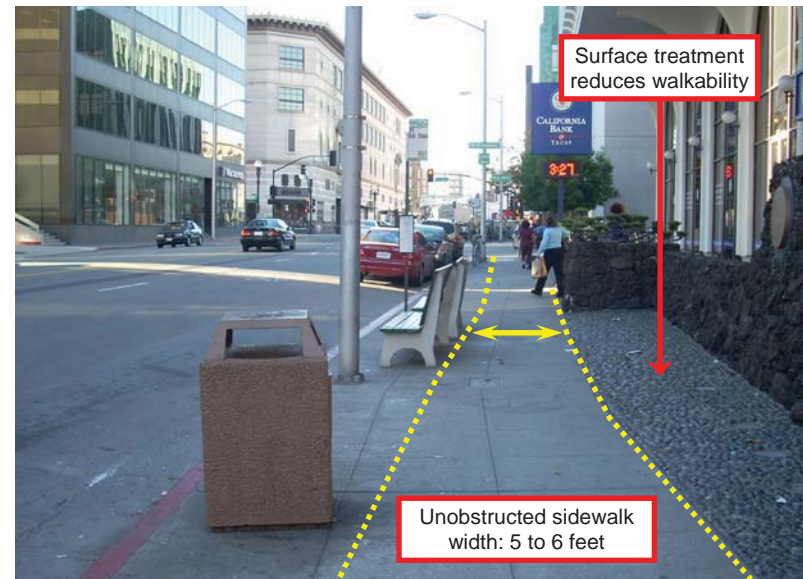
Kaiser Oakland . 206213

Figure IV.L-6
Existing Pedestrian Network

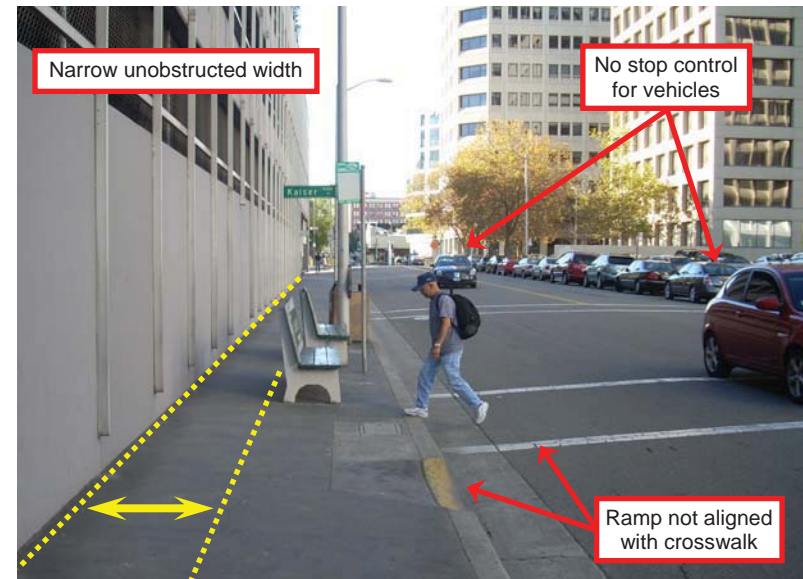
20th Street (North Side) – Abutting Project Site



20th Street (North Side) – Between BART Station and Franklin Street



20th Street (North Side) – Between Franklin Street and Webster Street

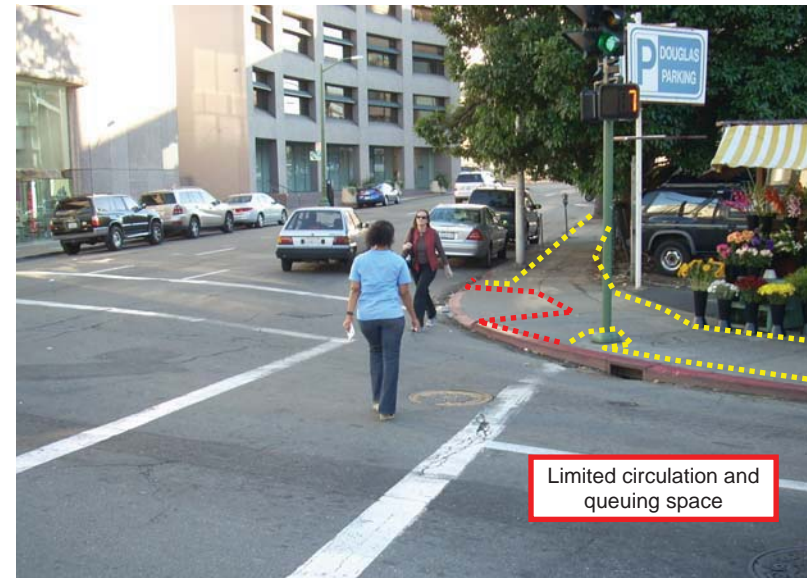


21st Street (South Side) – Abutting Kaiser Center Garage

Franklin Street / 20th Street – Northeast Corner



Webster Street / 20th Street – Southwest Corner



Webster Street / 20th Street – Northwest Corner

It should be noted, however, that while the paved width of the sidewalk (measured from curb edge to building frontage) along this route ranges from about eight to ten feet, the unobstructed width is reduced in many locations to about five to six feet due to obstructions such as signs, lamp poles, and outdoor seating, as shown in Figure IV.L-6 and Figure IV.L-7. The sidewalk on 20th Street directly abutting the Project Site is obstructed by planter boxes, support columns, bus stop seating, and outdoor cafe seating. These obstructions create a pedestrian path that can be circuitous, discontinuous, and narrow (as narrow as three feet wide in certain locations).

Sidewalk width along 21st Street on the north side of the Project Site is about seven to eight feet, but obstacles such as bus stop seating (currently unused) also reduce the unobstructed width to less than five feet.

Crosswalk Conditions

Signalized pedestrian crosswalks are provided at all four approaches at the intersections immediately west of the Project Site (Webster Street / 20th Street and Webster Street / 21st Street).

Pedestrian countdown signals are provided on all approaches at intersections between the BART Station and the Project Site. Crossing distances along the north side of 20th Street are about 47 feet across Webster Street and 60 feet across Franklin Street. The crossing distance across 20th Street at Webster Street is about 90 to 100 feet. Some intersection corners (e.g., northeast corner of Franklin Street / 20th Street and southwest corner of Webster Street / 20th Street) are currently designed with large radii, which increases the crossing distance, encourages high vehicle turning speeds, and reduces the pedestrian storage area.

Field observations during the midday lunch hour period indicated that pedestrian storage areas at intersections along 20th Street was limited, particularly due to conflicts between pedestrians attempting to cross with the signal in one direction and queued pedestrians waiting to cross in the perpendicular direction.

Pedestrian access is generally more limited on the east side of the Project Site along Harrison Street and Lakeside Drive. Only one crosswalk is provided across Harrison Street and Lakeside Drive, located at 21st Street on the south side of the intersection. No crosswalk is provided on the north side of the intersection. At the intersection of Harrison Street / 20th Street, crosswalks are provided at all approaches except for the northeast side across Harrison Street, due to signal operations.

The existing configuration of crosswalks across the Kaiser Center Access Road at Harrison Street / 20th Street introduces potential pedestrian conflicts with vehicular traffic because vehicles are permitted to make turns into the Access Road without signal control. Pedestrians using the two crosswalks across the Access Road must be cautious of left-turning vehicles from the exclusive left-turn lane along eastbound 20th Street and right-turning vehicles from the exclusive right-turn lane on southbound Harrison Street. In particular, vehicles attempting to make the left turn from 20th Street may pay more attention to conflicting vehicular traffic heading westbound on 20th Street than to pedestrians in the crosswalk.

Uncontrolled crosswalks are provided across 21st Street between Webster Street and Harrison Street at Kaiser Plaza.

Pedestrian Facility Operations

Site observations undertaken during the AM peak period indicated that the existing pedestrian facilities are insufficient to accommodate pedestrian traffic on 20th Street traveling from and to the BART station. There is also insufficient space for pedestrian queuing at some intersections on 20th Street during the noon peak period. The highest concentration of pedestrians was observed on the north side of 20th Street between the BART Station and Franklin Street. A maximum of 50 pedestrians per minute were recorded during the AM peak periods as “platoons” of pedestrians exited the BART Station. This section of sidewalk was observed to carry by far the highest pedestrian volumes of all the sidewalks in vicinity of the Project Site. Pedestrians were observed to disperse at the intersection of Franklin Street / 20th Street, with some heading north or south along Franklin Street or east along 20th Street.

An additional concern identified from site observations was the fact that about 90 percent of pedestrians who queue at the intersection of Franklin Street / 20th Street resorted to illegally crossing against the “Do Not Walk” signal to avoid lengthy waiting times. This intersection operates on 80-second cycle lengths during the AM peak period, and pedestrian wait times to cross Franklin Street (along 20th Street) were between 42 and 53 seconds, depending on the pedestrian’s willingness to cross during the “Flashing Do Not Walk” period. Field observations indicated that the majority of queued pedestrians would wait about 20 to 30 seconds for traffic to clear before crossing illegally.

Existing Bicycle Conditions

Bikeways are typically classified as Class 1, Class 2, and Class 3 facilities, depending primarily on the level of separation from vehicular traffic:

- *Class 1 bicycle facility*: Also known as a bicycle path, this is a dedicated path for bicyclists and pedestrians that does not permit motorized travel. Bicycle paths create a relaxed environment for non-motorized travel and reduce the risk of potential conflict between vehicles and bicyclists. Often these facilities are located in parks or greenway areas, areas connecting two dead-end streets, or atop railroad right-of-way that is no longer in use. The only existing Class 1 bicycle facility in the vicinity of the Project consists of portions along the north and west shore of Lake Merritt.
- *Class 2 bicycle facility*: Also known as a bicycle lane, this is a portion of the roadway network that has been striped and signed for bicycle use. Implementation of Class 2 facilities requires sufficient right-of-way between the vehicle stream and the curb or curbside parking. Bicycle lanes are typically used along collector or major streets with medium to high traffic volumes, providing additional travel space for bicyclists along busy roadway segments. Bicycle lanes exist on most of Grand Avenue / West Grand Avenue and portions of Broadway in the vicinity of the Project.
- *Class 3 bicycle facility*: Also known as a bicycle route, this is a bikeway that primarily serves to connect other facilities and destinations in the bikeway network but provides a lower level of service than Class 1 or Class 2 bikeway facilities. These routes include signage but do not have roadway markings or striping to indicate reserved space for the

bicyclist. Bicycle routes are easier to implement because they do not require right of way to be reallocated from vehicular traffic. Bicycle routes currently exist on Grand Avenue between Telegraph Avenue and Webster Street.

- ***Class 3A and 3B facilities:*** These facilities are similar to Class 3 facilities in that they are shared bicycle-automobile facilities. Class 3A facilities (“arterial bicycle routes”) generally have lower posted speed limits (around 25 miles per hour) and feature shared-lane bicycle stencils with wide curb lanes. Class 3B facilities (“bicycle boulevards”) are bikeways on low-volume residential streets that prioritize bicycle traffic.

Figure IV.L-8 illustrates the existing bikeway network in the vicinity of the Project. It should be noted that the existing bikeways illustrated represent the network before the implementation of Measure DD-related bikeway projects (particularly, Lakeside Drive) and other more recent projects such as the Oakland Avenue bike lane.

Existing Parking Conditions

On-Street Parking Conditions

Surveys conducted in October 2008 observed that weekday midday peak on-street parking occupancy was about 95 percent along most streets in the vicinity of the Project. Most on-street parking in the vicinity of the Project is metered or restricted, but some street sections currently provide unrestricted parking. Metered parking is currently charged at the rate of \$2.00 per hour (Monday through Saturday, 8:00 AM to 6:00 PM) within the City of Oakland.⁵ **Figure IV.L-9** illustrates on-street parking restrictions in the vicinity of the Project.

Off-Street Parking Conditions

Numerous off-street parking facilities are located within walking distance of the Project.

Figure IV.L-10 illustrates the location of off-street parking facilities located in the vicinity of the Project Site, most of which are located within a three-block radius of the site. The majority of these parking facilities charge about \$3.00 to \$4.00 per hour, limited to a maximum daily charge of about \$8.00 to \$20.00.

Parking occupancy surveys were conducted for the off-street parking facilities shown in **Figure IV.L-10** during the midday peak period on a typical weekday in October 2008. For the Kaiser Center Garage, existing occupancy data was collected in April and July 2010. **Table IV.L-7** summarizes the results of this survey. It should be noted that the survey was conducted prior to the July 2009 increase in parking meter rates, while rates were \$1.50 per hour. As shown in **Table IV.L-7**, there is a total midday parking surplus of approximately 913 spaces among the off-street parking facilities in the vicinity of the Project, assuming a typical maximum occupancy rate of 95 percent to minimize excessive driving when looking for a space, as well as to account for underutilization of handicapped spaces or undesirable spaces. Some facilities are shown with greater than 95 percent occupancy rates because they are valet facilities or facilities with low parking turnover. The existing Kaiser Center Garage alone has surplus capacity to accommodate an additional 241 vehicles during the midday peak period.

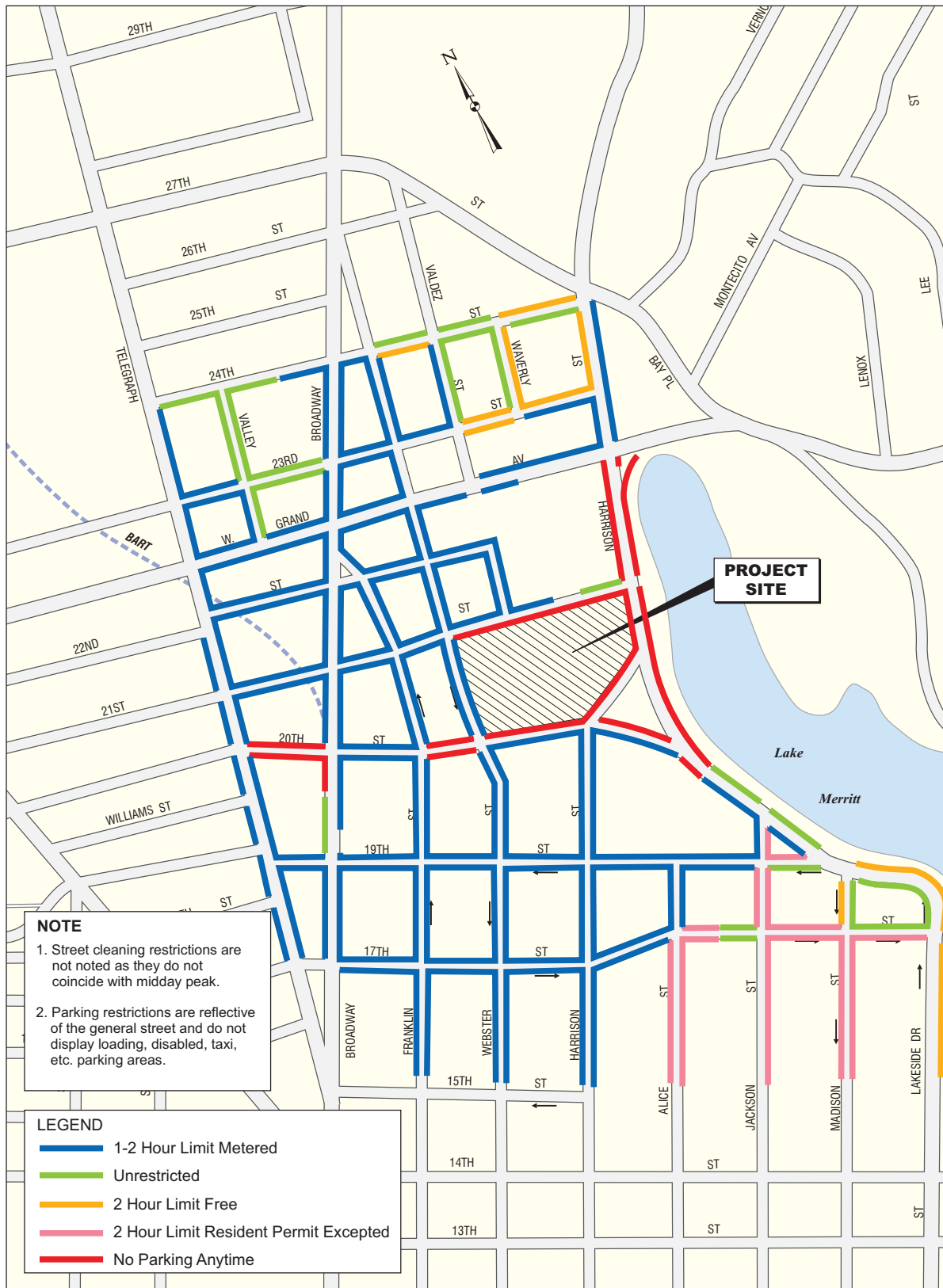
⁵ In July 2009, the City of Oakland raised parking meter rates from \$1.50 per hour to \$2.00 per hour and also extended parking enforcement until 8 p.m. Monday through Saturday (was originally until 6 p.m.). On October 7, 2009, the City Council rescinded the extended parking enforcement back to 6 p.m.; the \$2.00 per hour rate remains in place.

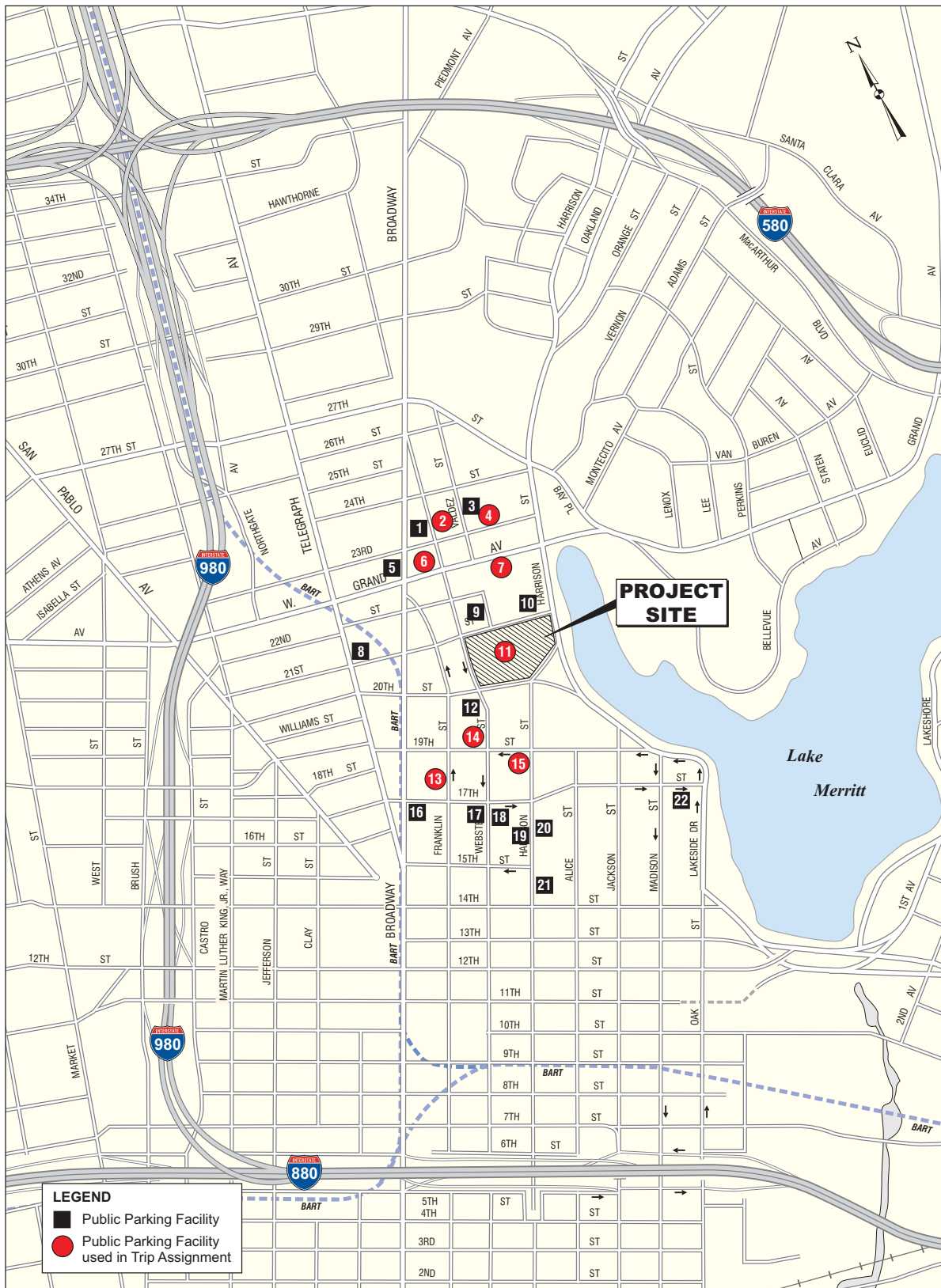


SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-8
Existing and Proposed Bikeway Network





SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-10
Existing Public Off-Street Parking Conditions

**TABLE IV.L-7
OFF-STREET PARKING FACILITIES**

No.	Operator / Facility Location	Rate	Capacity	Occupancy^a	Surplus^b
1	Douglas Parking Lot 54 Webster Street at 23rd Street	\$3/hr. \$10/day	40	70%	10
2	Douglas Parking Labor Temple Lot Webster Street between 23rd Street / 24th Street	\$3/hr. \$12/day	230	67%	64
3	West Coast Parking Inc. (Lot) Valdez Street at 23rd Street	\$8/day	250	96%	0
4	180 Grand (Structure) Waverly Street at 23rd Street	\$8/day	334	71%	80
5	Broadway Grand (Structure) Broadway at Grand Avenue	\$3/hr. \$10/day	62	89%	4
6	Douglas Parking 80 Grand Lot Webster Street at Grand Avenue	\$3/hr. \$12/day	78	69%	20
7	Douglas Parking 155 Grand Garage Grand Avenue between Webster St. / Harrison St.	\$4/hr. \$15/day	250	68%	68
8	Bay Area Parking Company (Structure) Telegraph Avenue at 21st Street	\$0.63/hr. \$7/day	300	97%	0
9	Douglas Parking Kaiser Plaza Lot Kaiser Plaza at 21st Street	\$4/hr. \$17/day	186	92%	6
10	Douglas Parking / Cathedral of Christ the Light Garage Harrison Street at 21st Street	\$4/hr. \$12/day	200	93%	4
11	Douglas Parking Kaiser Center Garage Harrison Street at 20th Street	\$8/hr. \$15/day	1,340	64%	419
12	Douglas Parking 20th and Webster Lot Webster Street at 20th Street	\$6/hr. \$16/day	60	100%	0
13	Douglas Parking Franklin Plaza Franklin Street at 19th Street	\$4/hr. \$20/day	473	63%	151
14	Douglas Parking Webster Lot / Lot 77 Webster Street between 17th Street / 19th Street	\$10/day	190	71%	46
15	Douglas Parking Scott Lot / Lot 8 Harrison Street at 19th Street	\$2/hr. \$10/day	168	88%	12
16	Douglas Parking 17B Lot Broadway at 17th Street	\$6/hr. \$15/day	100	94%	1
17	Central Parking System (Lot) Webster Street at 17th Street	\$6/hr. \$10/day	42	76%	8
18	Douglas Parking Lot 23 Webster Street at 17th Street	\$9/day	35	91%	1
19	Douglas Parking Lot 69 Harrison Street at 15th Street	\$8/day	78	86%	7
20	Star Park (Lot) Harrison Street at 15th Street	\$7/day	22	100%	0
21	Douglas Parking Lot 36 Harrison Street at 15th Street	\$8/day	60	77%	11
22	Star Park (Lot) Madison Street at 15th Street	\$6/day	30	90%	2
Total			4,528	75%	913

^a Parking occupancy surveys were conducted during the midday peak period on a typical weekday in October 2008, with the exception of the Kaiser Center Garage, where existing occupancy data were obtained for April and July 2010.

^b Surplus is based on an assumed (optimized) occupancy rate of no more than 95 percent.

SOURCE: AECOM, 2009.

Planned Improvements

Planned Transit Improvements

AC Transit has proposed converting the existing 1R-International Rapid into a full Bus Rapid Transit (BRT) service. The 1R currently operates with some BRT features, such as widely-spaced stops at key destinations and transfer points, vehicles designed for easy boarding and alighting, real-time schedules, and transit signal priority. However, AC Transit plans on implementing additional features for the service in the near future, including bus-only median and side-running transitways and stations along the line, completing BRT treatments for a corridor stretching from Berkeley through Downtown Oakland to San Leandro via Telegraph Avenue and International Boulevard.

In the vicinity of the Project, these improvements would generally require the removal of one through lane in each direction along Telegraph Avenue, narrowing the roadway to one vehicular lane in each direction. Buses would run in a protected median, with left turn pockets for autos provided at key intersections. Along 11th and 12th streets in Downtown Oakland, the BRT service would operate in a side-running configuration, removing one lane of through traffic and eliminating some parking to allow for bulbouts at stations.

Although the BRT is planned to be in service in 2015, the Project is only partially funded and not yet approved. As a result, implementation has not been assumed under Near-Term (2015) or Cumulative (2030) analysis scenarios. However, **Appendix G.10** contains intersection and roadway LOS results after implementation of the BRT project.

Planned Pedestrian and Bicycle Facility Improvements

The planned reconfiguration of the intersections of Harrison Street / 20th Street and Harrison Street / Lakeside Drive (discussed under Near-Term (2015) without Project conditions, on page IV.L-71) would improve pedestrian access between Downtown and Lake Merritt and enlarge Snow Park, helping to create a pedestrian-friendly environment in the immediate vicinity of the Project.

The City of Oakland Bicycle Master Plan (December 2007) calls for the implementation of the following bikeway network improvements (Figure IV.L-8):

- Class 2 / 3 facilities on Lakeside Drive / Harrison Street, extending south of I-880 and north of Grand Avenue;
- Class 2 / 3 facilities on 20th Street between Lakeside Drive and San Pablo Avenue;
- Class 2 / 3 facilities on Webster Street / Franklin Street between 8th Street and Broadway;
- Class 2 / 3 facilities on 14th Street extending east and west from Downtown Oakland;
- Class 2 / 3 facilities on 8th Street / 9th Street between Lakeside Drive and Martin Luther King, Jr. Way; and,
- Class 2 / 3 facilities on 27th Street between Grand Avenue and San Pablo Avenue.

The Lake Merritt Master Plan also proposes the completion of a Class 1 “loop” around Lake Merritt by upgrading the existing recreational paths to accommodate bicycles.

Other Transportation Improvements

In addition to the changes to the Harrison Street / Lakeside Drive / 20th Street triangle as part of the Measure DD Implementation Project and the geometry changes as part of the 27th Street / Bay Place bike lanes, additional transportation improvements have also been proposed as part of the following projects:

- AC Transit East Bay Bus Rapid Transit (BRT) Project;
- Franklin-Webster Bike Lane Project;
- Harrison Street / Oakland Avenue Community-Based Transportation Plan (CBTP) Study for improvements to the Harrison Street / Oakland Avenue couplet between Grand Avenue and Monte Vista Avenue to improve access for all modes; (see **Appendix G.12**)
- Broadway Retail Corridor Specific Plan; and,
- I-880 Broadway / Jackson Street Interchange.

The above projects are in various stages of planning and are neither fully funded nor approved. In several cases, such as for the Harrison Street / Oakland Avenue CBTP and Broadway Retail Corridor Specific Plan, the exact nature or design of planned transportation improvements has yet to be finalized. Although only funded and approved projects are typically considered for inclusion in impact analyses, separate supplementary traffic analyses have been conducted as part of this EIR for the BRT project and the Franklin-Webster bike lanes. **Appendix G.10** summarizes the results of these supplementary analyses and includes a discussion of possible transportation improvements under the other projects.

Regulatory Setting

Local Plans and Policies

The Oakland General Plan is comprised of numerous elements, and those containing policies relevant to transportation resources primarily are contained in the Land Use and Transportation Element (LUTE). The goals and policies contained in the various General Plan Elements are often competing. In reviewing a project for conformity with the General Plan, the City is required to ‘balance’ the competing goals and policies. This Project is reviewed for compliance with the following local plans and policies:

- General Plan LUTE
- City of Oakland Pedestrian Master Plan
- City of Oakland Bicycle Master Plan
- City of Oakland Bicycle Parking Ordinance
- AC Transit Short-Range Transit Plan
- BART Strategic Plan
- City of Oakland Standard Conditions of Approval

City of Oakland General Plan LUTE

The City of Oakland, through various policy documents, states a strong preference for encouraging use of alternative transportation modes. The following policies are included in the LUTE:

LUTE Policy Framework: Encouraging Alternative Means of Transportation. “A key challenge for Oakland is to encourage commuters to carpool or use alternative modes of transportation, including bicycling or walking. The Policy Framework proposes that congestion be lessened by promoting alternative means of transportation, such as transit, biking, and walking, providing facilities that support alternative modes, and implementing street improvements. The City will continue to work closely with local and regional transit providers to increase accessibility to transit and improve intermodal transportation connections and facilities. Additionally, policies support the introduction of light rail and trolley buses along appropriate arterials in heavily traveled corridors, and expanded use of ferries in the bay and estuary.”

- *Policy T3.5, Including Bikeways and Pedestrian Walks.* The City should include bikeways and pedestrian walks in the planning of new, reconstructed, or realized streets, wherever possible.
- *Policy T3.6, Encouraging Transit.* The City should encourage and promote use of public transit in Oakland by expediting the movement of and access to transit vehicles on designated “transit streets” as shown on the Transportation Plan. (Policies T3.6 and T3.7 are based on the City Council’s passage of “Transit First” policy in October 1996.)
- *Policy T3.7, Resolving Transportation Conflicts.* The City, in constructing and maintaining its transportation infrastructure, should resolve any conflicts between public transit and single occupant vehicles in favor of the transportation mode that has the potential to provide the greatest mobility and access for people, rather than vehicles, giving due consideration to the environmental, public safety, economic development, health and social equity impacts.
- *Policy T4.1, Incorporating Design Features for Alternative Travel.* The City will require new development, rebuilding, or retrofit to incorporate design features in their projects that encourage use of alternative modes of transportation such as transit, bicycling, and walking.

City of Oakland Pedestrian Master Plan

In November 2002, the Pedestrian Master Plan (PMP) was adopted by the City Council and incorporated into the adopted General Plan. The PMP identifies policies and implementation measures that promote a walkable City. In the study area, the PMP designates a Pedestrian Route Network throughout Oakland and identifies a “City Route” on Broadway, Lakeside Drive – Harrison Street, and Grand Avenue, and a “Neighborhood Route” on Webster Street, and 20th and 17th Streets.

The *PMP* includes the following relevant policies and actions:

Policy 1.1. Crossing Safety: Improve pedestrian crossings in area of high pedestrian activity where safety is an issue.

Action 1.1.1. Consider the full range of design elements – including bulbouts and refuge islands – to improve pedestrian safety.

Policy 1.2: Traffic Signals: Use traffic signals and their associated features to improve pedestrian safety at dangerous intersections.

Action 1.2.7. Consider using crossing enhancement technologies like countdown pedestrian signals at the highest pedestrian volume locations.

Policy 1.3: Sidewalk Safety: Strive to maintain a complete sidewalk network free of broken or missing sidewalks or curb ramps.

Action 1.3.7. Conduct a survey of all street intersections to identify corners with missing, damaged, or non-compliant curb ramps and create a plan for completing their installation.

Policy 2.1: Route Network: Create and maintain a pedestrian route network that provides direct connections between activity centers.

Action 2.1.8. To the maximum extent possible, make walkway accessible to people with physical disabilities.

Policy 2.3: Safe Routes to Transit: Implement pedestrian improvements along major AC Transit lines and at BART stations to strengthen connections to transit.

Action 2.3.1: Develop and implement street designs (like bus bulbouts) that improve pedestrian/bus connections.

Action 2.3.3: Prioritize the implementation of street furniture (including bus shelters) at the most heavily used transit stops.

Action 2.3.4: Improve pedestrian wayfinding by providing local area maps and directional signage at major AC Transit stops and BART stations.

Policy 3.2: Land Use: Promote land uses and site designs that make walking convenient and enjoyable.

Action 3.2.4: Require contractors to provide safe, convenient, and accessible pedestrian rights-of-way along construction sites that require sidewalk closure.

Action 3.2.8: Discourage motor vehicle parking facilities that create blank walls, unscreened edges along sidewalks, and/or gaps between sidewalks and building entrances.

City of Oakland Bicycle Master Plan

The Oakland City Council adopted the Oakland Bicycle Master Plan Update in December 2007. The adopted plan includes the following policy-supporting actions that are applicable to the Proposed Project:

Policy 1A: Bikeway Network: Develop and improve Oakland's bikeway network.

Action 1A.1 – Bicycle Lanes (Class 2): Install bicycle lanes where feasible as the preferred bikeway type for all streets on the proposed bikeway network (except for

the bicycle boulevards proposed for local streets with low traffic volumes and speeds).

Action 1A.3 – Bicycle Boulevards (Class 3B): Enhance bicycle routes on local streets by developing bicycle boulevards with signage, striping, and intersection modifications to prioritize bicycle travel.

Action 1A.6 – Dedicated Right Turn Lanes and “Slip Turns”: Where feasible, avoid the use of dedicated right turn lanes on streets included in the bikeway network. Where infeasible, consider a bicycle through lane to the left of the turn lane or a combined bicycle lane/right turn lane.

Policy 1B: Routine Accommodation: Address bicycle safety and access in the design and maintenance of all streets.

Action 1B.2 – Traffic Signals: Include bicycle-sensitive detectors, bicycle detector pavement markings, and adequate yellow time for cyclists with all new traffic signals and in the modernization of all existing signals.

Policy 1C – Safe Routes to Transit: Improve bicycle access to transit, bicycle parking at transit facilities, and bicycle access on transit vehicles.

Action 1C.1 – Bikeways to Transit Stations: Prioritize bicycle access to major transit facilities from four directions, integrating bicycle access into the station design and connecting the station to the surrounding neighborhoods.

Policy 1D – Parking and Support Facilities: Promote secure and conveniently located bicycle parking at destinations throughout Oakland.

Action 1D.6 – Bicycle Parking Ordinance: Adopt an ordinance as part of the City’s Planning Code that would require new development to include short and long-term bicycle parking.

Action 1D.7 – Development Incentives: Consider reduced automobile parking requirements in exchange for bicycle facilities as part of transportation demand management strategies in new development.

City of Oakland Bicycle Parking Ordinance

The Oakland City Council adopted a Bicycle Parking Ordinance in 2008. The ordinance is contained in Municipal Code Chapter 17.117, and requires new development to provide both short-term (i.e., bicycle racks) and long-term bicycle parking (i.e., lockers or indoor storage) for bicycles.

AC Transit Short-Range Transit Plan

AC Transit, the provider of bus transit service in the Project study area, has established goals related to transit service. These goals are documented in the Short Range Transit Plan – Fiscal Year (FY) 2003 to FY 2012 (AC Transit, 2004). Some of the major goals of AC Transit include:

- Goal 1: Provide High Quality, Useful Transit Service for Customers in the East Bay.
- Goal 4: Plan and Advocate for the Funding and Implementation of Future Projects.

- Work with City and Local agencies to make transit usage as safe, secure, reliable, and quick as possible and to promote transit usage in the planning process.
- Promote “Transit First” development practices and increased funding for transit through transit mitigation funding for new developments.

AC Transit has also established a Strategic Vision to provide fast, frequent, reliable service on a wide variety of routes with attractive vehicles and an easy-to-use, affordable fare structure (AC Transit, 2002). Key elements of the AC Transit Strategic Vision include: increased frequency of buses to reduce wait time; greater frequency of service during midday, evening and owl travel times; an easy-to-use, integrated fare system; flexible routes; adequate around-the-clock service; a redesigned network that matches travel patterns and helps meet demand in the high-density urban core; gradual transition to “Bus Rapid Transit” in the highest ridership corridors; and bus stop improvements including real time display of arrival times.

BART Strategic Plan

BART, the provider of rail transit service in the Project study area, has established strategies, projects and programs related to transit service. These goals are documented in the BART Strategic Plan, adopted in October 2008. Some of the relevant elements of the BART Strategic Plan include:

- Station Access Strategy: Develop alliances with our transit partners and the community to maximize connectivity and to facilitate multi-modal access including transit, bicycling and walking.
- Projects and Programs: Station Access Program: Develop a package of programs and projects to improve access to our stations by modes other than single occupant vehicles. Station Wayfinding Program: Implement wayfinding signage to and from BART station and within the station, to aid the customer in navigating the BART system and in making connections to other transit and local destinations.
- Partnerships for Financial Health Strategy: Protect the Bay Area’s investment in rail transit through long-term capital planning, strategic partnerships and outreach with elected and community leaders, the media and the public.
- Projects and Programs: Employer Transit Forum: Recognize and cultivate a closer relationship with the employers we serve.

City of Oakland’s Standard Conditions of Approval and Uniformly Applied Development Standards

The *City of Oakland’s Standard Conditions of Approval and Uniformly Applied Development Standards* (SCAs) relevant to reducing traffic and circulation impacts due to the Proposed Project are listed below for reference. If the Project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts from traffic. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures. SCAs applicable to potential transportation, circulation and parking impacts due to the Project include:

- **SCA TRANS-1 Parking and Transportation Demand Management.**

Prior to issuance of a final inspection of the building permit. The applicant shall submit for review and approval by the Planning and Zoning Division a Transportation Demand Management (TDM) plan containing strategies to reduce on-site parking demand and single occupancy vehicle travel. The applicant shall implement the approved TDM plan. The TDM plan shall include strategies to increase bicycle, pedestrian, transit, and carpools/vanpool use. All four modes of travel shall be considered. Strategies to consider include the following:

- Inclusion of additional bicycle parking, shower, and locker facilities that exceed the requirement;
- Construction of bike lanes per the Bicycle Master Plan Priority Bikeway Projects;
- Signage and striping onsite to encourage bike safety;
- Installation of safety elements per the Pedestrian Master Plan (such as cross walk striping, curb ramps, count down signals, bulb outs, etc.) to encourage convenient crossing at arterials;
- Installation of amenities such as lighting, street trees, trash receptacles per the Pedestrian Master Plan and any applicable streetscape plan;
- Direct transit sales or subsidized transit passes;
- Guaranteed ride home program;
- Pre-tax commuter benefits (checks);
- On-site car-sharing program (such as City Car Share, Zip Car, etc.);
- On-site carpooling program;
- Distribution of information concerning alternative transportation options;
- Parking spaces sold/leased separately; and,
- Parking management strategies, including attendant / valet parking and shared parking spaces.

- **SCA TRANS-2 Construction Traffic and Parking**

Prior to issuance of a grading, demolition or building permit, the Project applicant and construction contractor shall meet with appropriate City of Oakland agencies to determine traffic management strategies to reduce, to the maximum extent feasible, traffic congestion and the effects of parking demand by construction workers during construction of this project and other nearby projects that could be simultaneously under construction. The project applicant shall develop a construction management plan for review and approval by the Planning and Zoning Division, the Building Services Division, and the Transportation Services Division. The plan shall include at least the following items and requirements:

- A set of comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak traffic hours, detour signs if required, lane closure procedures, signs, cones for drivers, and designated construction access routes;
- Notification procedures for adjacent property owners and public safety personnel regarding when major deliveries, detours, and lane closures will occur;
- Location of construction staging areas for materials, equipment, and vehicles at an approved location;

- A process for responding to, and tracking, complaints pertaining to construction activity, including identification of an onsite complaint manager. The manager shall determine the cause of the complaints and shall take prompt action to correct the problem. Planning and Zoning shall be informed who the Manager is prior to the issuance of the first permit issued by Building Services;
- Provision for accommodation of pedestrian flow;
- Provision for parking management and spaces for all construction workers to ensure that construction workers do not park in on street spaces;
- Any damage to the street caused by heavy equipment, or as a result of this construction, shall be repaired, at the applicant's expense, within one week of the occurrence of the damage (or excessive wear), unless further damage/excessive wear may continue; in such case, repair shall occur prior to issuance of a final inspection of the building permit. All damage that is a threat to public health or safety shall be repaired immediately. The street shall be restored to its condition prior to the new construction as established by the City Building Inspector and/or photo documentation, at the applicant's expense, before the issuance of a Certificate of Occupancy;
- Any heavy equipment brought to the construction site shall be transported by truck, where feasible;
- No materials or equipment shall be stored on the traveled roadway at any time.
- Prior to construction, a portable toilet facility and a debris box shall be installed on the site, and properly maintained through project completion;
- All equipment shall be equipped with mufflers; and,
- Prior to the end of each work day during construction, the contractor or contractors shall pick up and properly dispose of all litter resulting from or related to the project, whether located on the property, within the public rights-of-way, or properties of adjacent or nearby neighbors.

Impacts and Mitigation Measures

This section estimates the Project's travel demand and evaluates the Project's potential impacts on transportation facilities, identifying mitigation measures where necessary.

Project Description

The Project would primarily consist of two new office towers totaling 1,470,000 square feet of office space to be located on the west portion of the block bounded by 21st Street on the north, 20th Street on the south, Webster Street on the west, and the existing Kaiser Center office tower on the east. Approximately 48,000 square feet of existing retail space would be removed and replaced with 46,000 square feet of retail located at street level along 20th Street and Webster Street and on the sixth floor adjacent to the existing Kaiser Center roof garden.

The Project is comprised of two phases: Phase I and Phase II. Tentative construction phasing of the Project as provided by the Project sponsor calls for construction of the South Tower first ("Phase I"), with the North Tower subsequent ("Phase II"). The removal of retail space would be executed across the two phases.

- *Phase I:* The “South Tower” consists of a 34-story office tower in conjunction with the street level retail complex along 20th Street, comprising about 552,000 square feet of office space and about 27,000 square feet of retail space located at street level and on the sixth floor; and,
- *Phase II:* The “North Tower” consists of a 42-story office tower in conjunction with the street level retail complex along Webster Street, comprising about 768,000 square feet of office space and about 19,000 square feet of retail space located at street level and on the sixth floor.

The Project Site plan, showing the location of uses, parking, and vehicular access, is illustrated in **Figures IV.L-11a and L-11b**.

Parking and Vehicular Access

The Project also proposes new subterranean and above-grade parking consisting of an additional 697 parking spaces. The new parking structures would be incorporated into the existing Kaiser Center Garage. Pedestrian entrances to the office towers would be located on Harrison Street, Webster Street, and 20th Street, while vehicular entrances to the Project complex would be via driveways on Harrison Street, 20th Street, and 21st Street. Vehicular access to the garage structure would be provided via the existing entrances and exits located on 21st Street and via the Access Road on the eastern portion of the block (entrances currently via Harrison Street, 20th Street, and 21st Street), as shown in Figures IV.L-11a and L-11b.

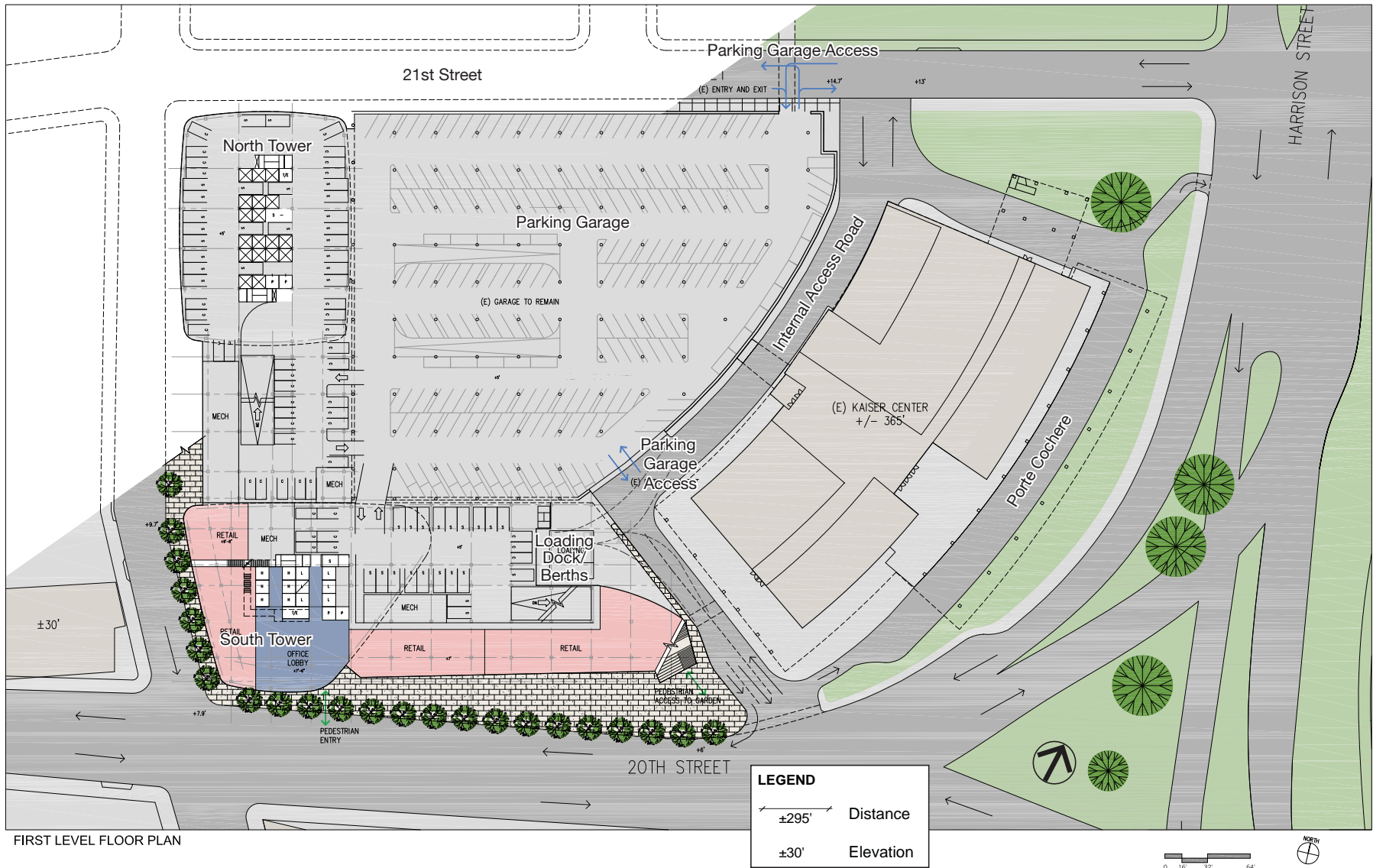
The direction of traffic flow in the existing porte cochere at the east entrance to the existing Kaiser Center Tower would be reversed to run eastbound. Currently, porte cochere traffic runs westbound via a slip lane off southbound Harrison Street. In order to improve the safety of pedestrians using the crosswalk at this slip lane and reduce the potential for queuing or disruptions in traffic flow along Harrison Street, the direction of the porte cochere would be reversed and its approach to Harrison Street would be stop-controlled. All internal intersections would be configured with stop control.

Project access at the intersection of Harrison Street / 20th Street would also change as part of the Project. The existing exit for the porte cochere would be removed to free up space for the upper level staircase to the roof garden. The existing inbound-only Access Road approach would be reconfigured with an outbound approach (one shared through-left lane and one exclusive right-turn lane).

Loading Docks

Loading docks would be located in two locations, as illustrated in Figure IV.L-11a:

- Near the southeast corner of the site, with primary access via the Access Road;
- Near the northwest corner of the site, with primary access via 21st Street. Trucks would back into the loading dock from 21st Street.

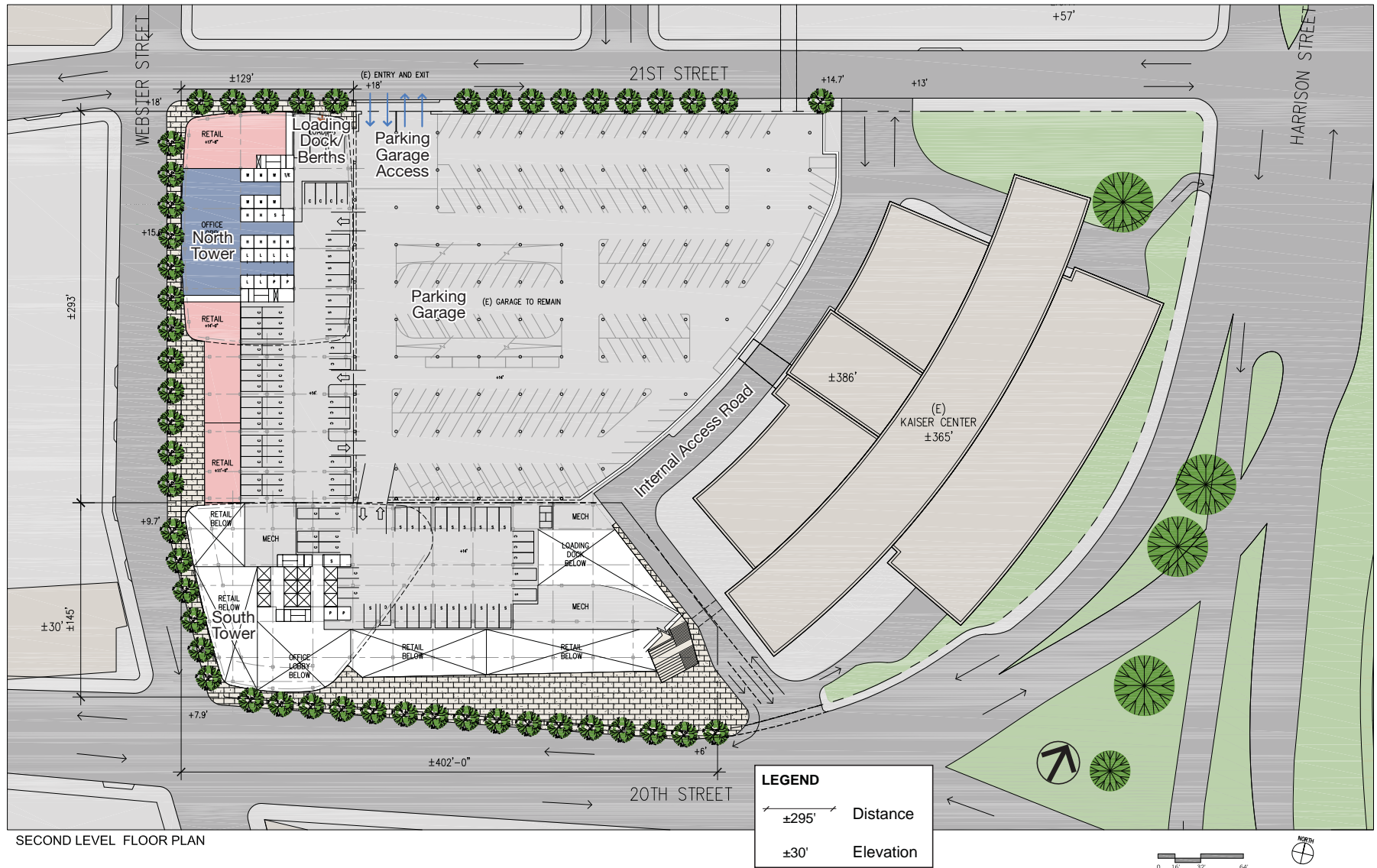


FIRST LEVEL FLOOR PLAN

SOURCE: AECOM; SOM

Kaiser Oakland . 206213

Figure IV.L-11a
Project Site Plan
First Level



SOURCE: AECOM; SOM

Kaiser Oakland . 206213

Figure IV.L-11b
Project Site Plan
Second Level

Approach to Analysis

With respect to transportation and circulation, the Project is defined to have a significant impact on the environment if it satisfies the City of Oakland thresholds of significance detailed below.

Significance Criteria

The project would have a significant impact on the environment if it would:

Project Impacts

Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit, specifically:

Traffic Load and Capacity Thresholds

1. at a study, signalized intersection which is located outside the Downtown⁶ area, the project would cause the level of service (LOS)⁷ to degrade to worse than LOS D (i.e., E);
2. at a study, signalized intersection which is located within the Downtown area, the project would cause the LOS to degrade to worse than LOS E (i.e., F);
3. at a study, signalized intersection outside the Downtown area where the level of service is LOS E, the project would cause the total intersection average vehicle delay to increase by four (4) or more seconds, or degrade to worse than LOS E (i.e., F);
4. at a study, signalized intersection for all areas where the level of service is LOS E, the project would cause an increase in the average delay for any of the critical movements of six (6) seconds or more, or degrade to worse than LOS E (i.e., F);
5. at a study, signalized intersection for all areas where the level of service is LOS F, the project would cause (a) the total intersection average vehicle delay to increase by two (2) or more seconds, or (b) an increase in average delay for any of the critical movements of four (4) seconds or more; or (c) the volume-to-capacity ("V/C") ratio exceeds three (3) percent (but only if the delay values cannot be measured accurately);
6. At a study, unsignalized intersection the project would add ten (10) or more vehicles and after project completion satisfy the Caltrans peak hour volume warrant;
7. For a Congestion Management Program (CMP) required analysis, (i.e., projects that generate 100 or more p.m. peak hour trips) cause a roadway segment on the Metropolitan Transportation System to operate at LOS F or increase the V/C ratio by more than three (3)

⁶ Downtown is defined in the Land Use and Transportation Element of the General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south and I-980/Brush Street to the west.

⁷ LOS and delay calculations for local intersections should be based on the *Highway Capacity Manual*, Transportation Research Board, National Research Council, 2000 edition. For CMA intersections (project proposes a general plan amendment, or if an EIR is performed and there are 100 or more peak trips), use the 2000 *Highway Capacity Manual*. For state facilities, consult with the Planning Department.

percent for a roadway segment that would operate at LOS F without the project;

8. Result in substantially increased travel times for AC Transit buses; [**NOTE:** Factors to consider in evaluating the potential impact include, but are not limited to, the proximity of the project site to the transit corridor(s), the function of the roadway segment(s), and the characteristics of the potentially affected bus routes(s). The evaluation may require a qualitative and/or quantitative analysis depending upon these relevant factors.]

Other Thresholds

9. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
10. Substantially increase traffic hazards to motor vehicles, bicycles, or pedestrians due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
11. Result in less than two emergency access routes for streets exceeding 600 feet in length unless otherwise determined to be acceptable by the Fire Chief, or his/her designee, in specific instances due to climatic, geographic, topographic, or other conditions; or
12. Fundamentally conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Cumulative Impacts (Year 2015 and 2030)

A project's contribution to cumulative impacts is considered "considerable" (i.e., significant) when the project exceeds at least one of the thresholds listed above under a future year scenario. [**NOTE:** The cumulative analysis shall analyze both the near-term future year and the long-term future year scenario of the applicable Alameda County Congestion Management Agency countywide transportation model.]

Planning-Related Non-CEQA Issues

The following transportation-related topics are not considerations under CEQA but should be evaluated in order to inform decision-makers and the public about these issues.

Transit Ridership

Evaluate the project's potential to:

- Increase the average ridership on AC Transit lines by three (3) percent at bus stops where the average load factor with the project in place would exceed 125% over a peak thirty minute period;
- Increase the peak hour average ridership on BART by three (3) percent where the passenger volume would exceed the standing capacity of BART trains;
- Increase the peak hour average ridership at a BART station by three (3) percent where average waiting time at fare gates would exceed one minute; and

Queuing

Evaluate the project's potential effect on 95th percentile queuing. Would the project cause an increase in 95th percentile queue length of 25 feet or more at a study, signalized intersection?

Traffic Control Devices

Evaluate the need for additional traffic control devices (e.g., stop signs, street lighting, crosswalks, traffic calming devices) using the California MUTCD and applicable City standards.

Collision History

Evaluate three years of vehicle, pedestrian, and bicycle collision data for intersections and roadway segments within three blocks of the project site to determine if the project would contribute to an existing problem or if any improvements are recommended in order to alleviate potential effects of the project.

Project Trip Generation

Trip Generation

Trip generation estimates are based on data published in the ITE's *Trip Generation*, 8th Edition, the industry standard for land-use based trip generation.⁸ The data presented are derived from a national sample of surveys of similar land uses.

Mode Split

Through the evaluation of various technical documents and sources—including surveys of office workers in the Oakland Downtown area—a detailed comparison of mode split results was conducted. The comparison found that the actual observed transit mode share in Downtown area projects was substantially higher than the 17 percent typically assumed for the evaluation of transportation impacts of Downtown projects. The comparison is outlined in the Mode Split Findings Memorandum in **Appendix G.5**.

The mode split and average vehicle occupancy (AVO) results from the Downtown Transportation and Parking Plan, compiled by Dowling Associates in October 2003, showed a mode split of 66 percent automobile, 30 percent transit, and 4 percent walk / bike / other and an AVO of 1.16. To achieve a more conservative analysis evaluating the potential transportation impacts due to the addition of Project-generated vehicle trips, a mode split of 70 percent automobile and 30 percent transit was assumed in all trip generation calculations.

Table IV.L-8 summarizes the Project weekday person-trip generation. Although the proposed retail space would be smaller than the existing retail space, to achieve a more conservative analysis, it was assumed that the trip generation characteristics would remain the same.

Table IV.L-9 summarizes the Project weekday vehicle-trip generation.

⁸ ITE's *Trip Generation* typically provides both a weighted average rate and a regression equation ("fitted curve") with which to calculate the trips generated by each land use. Given the large sample size of office land uses in *Trip Generation*, the fitted curve was used, augmented with doorway counts of tenants in the existing retail space.

**TABLE IV.L-8
PROJECT WEEKDAY PERSON-TRIP GENERATION**

Land Use	Size (KSF)	Daily Total	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office (North Tower)	768	7,438	978	133	1,111	186	904	1,090
Office (South Tower)	552	5,766	752	102	854	137	672	809
Retail	46	5,210	145	140	285	269	252	521
Existing Retail (to be removed) ^a	(48)	(5,210)	(145)	(140)	(285)	(269)	(252)	(521)
Net New Person-Trips		13,204	1,730	235	1,965	323	1,576	1,899

^a Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2009.

**TABLE IV.L-9
PROJECT WEEKDAY VEHICLE-TRIP GENERATION ^a**

Land Use	Size (KSF)	Daily Total	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office (North Tower)	768	4,487	590	81	671	112	545	657
Office (South Tower)	552	3,479	454	62	516	83	404	487
Retail	46	5,002	125	121	246	232	217	449
Existing Retail (to be removed) ^b	(48)	(5,002)	(125)	(121)	(246)	(232)	(217)	(449)
Net New Vehicle-Trips		7,966	1,045	142	1,187	194	950	1,144

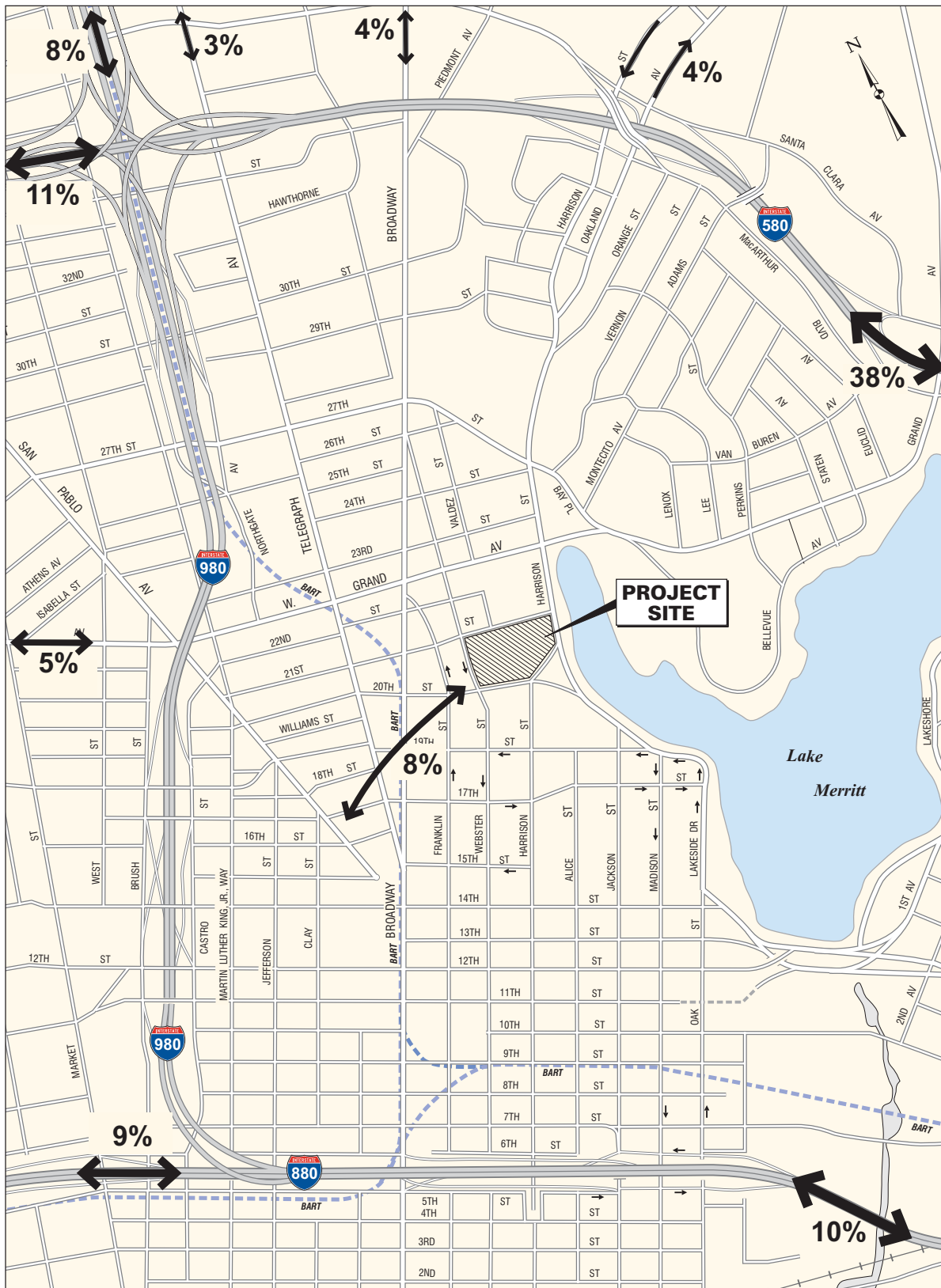
^a Vehicle-trip calculations based on 70 percent auto mode split and AVO of 1.16.

^b Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2009.

Project Trip Distribution and Trip Assignment

The Project's trip distribution pattern was developed using information from the ACCMA Travel Demand Model (see **Figure IV.L-12**). Preliminary intersection and roadway LOS analysis indicated that the primary routes between the Project and both I-580 and I-880 would experience severe congestion and delays in the future, even without the addition of Project-generated traffic. Given that drivers will often find the "optimum" solution with regards to travel time and the fact that travel demand models are generally unconstrained and assign vehicles onto roadway facilities regardless of available capacity, a portion of both background and Project-generated traffic during the weekday PM peak hour bound for EB I-580 via the Oakland Avenue / Perry Place ramp and for SB I-880 via the Oak Street / 5th Street ramp were diverted to alternative routes—namely via Oakland Avenue and State Route 13 (SR 13), via Grand Avenue and the Lakeshore Avenue / MacArthur Boulevard ramp, and via Embarcadero and the Embarcadero / 10th Avenue ramp for I-880. More detail on these assumptions is provided in **Appendix G.11**.



SOURCE: AECOM

Kaiser Oakland . 206213
Figure IV.L-12
 Project Trip Distribution

For the assignment of Project vehicle trips, given that the capacity of the Kaiser Center Garage after the Project would not be sufficient to accommodate all additional vehicular travel demand generated by the Project, the “overflow” trips were assigned to public off-street parking facilities in the immediate vicinity of the Project. This methodology best replicates the projected parking demands and the resulting effects on circulation patterns in the vicinity of the Project. The following seven parking facilities, illustrated in Figure IV.L-10, were selected for consideration:

- Douglas Parking Labor Temple Lot (Webster Street between 23rd Street and 24th Street);
- 180 Grand (Structure) (Waverly Street at 23rd Street);
- Douglas Parking 80 Grand Lot (Webster Street at Grand Avenue);
- Douglas Parking 155 Grand Garage (Grand Avenue between Webster Street and Harrison Street);
- Douglas Parking Franklin Plaza (Franklin Street at 19th Street);
- Douglas Parking Webster Lot / Lot 77 (Webster Street between 17th Street and 19th Street); and,
- Douglas Parking Scott Lot / Lot 8 (Harrison Street at 19th Street).

Under only Phase I, the Kaiser Center Garage would have sufficient capacity to handle the additional vehicular travel demand generated by the Project. Under Phase I and Phase II, the Kaiser Center Garage would have insufficient capacity to handle all the additional vehicular travel demand, and some drivers would use one of the overflow parking facilities identified above. Based on data from the parking occupancy surveys summarized in Table IV.L-7, overflow parking facilities would receive from ten additional trips for small facilities, to 80 additional trips for larger facilities such as Douglas Parking Franklin Plaza.

Existing plus Project (Phase I and Phase II) Conditions

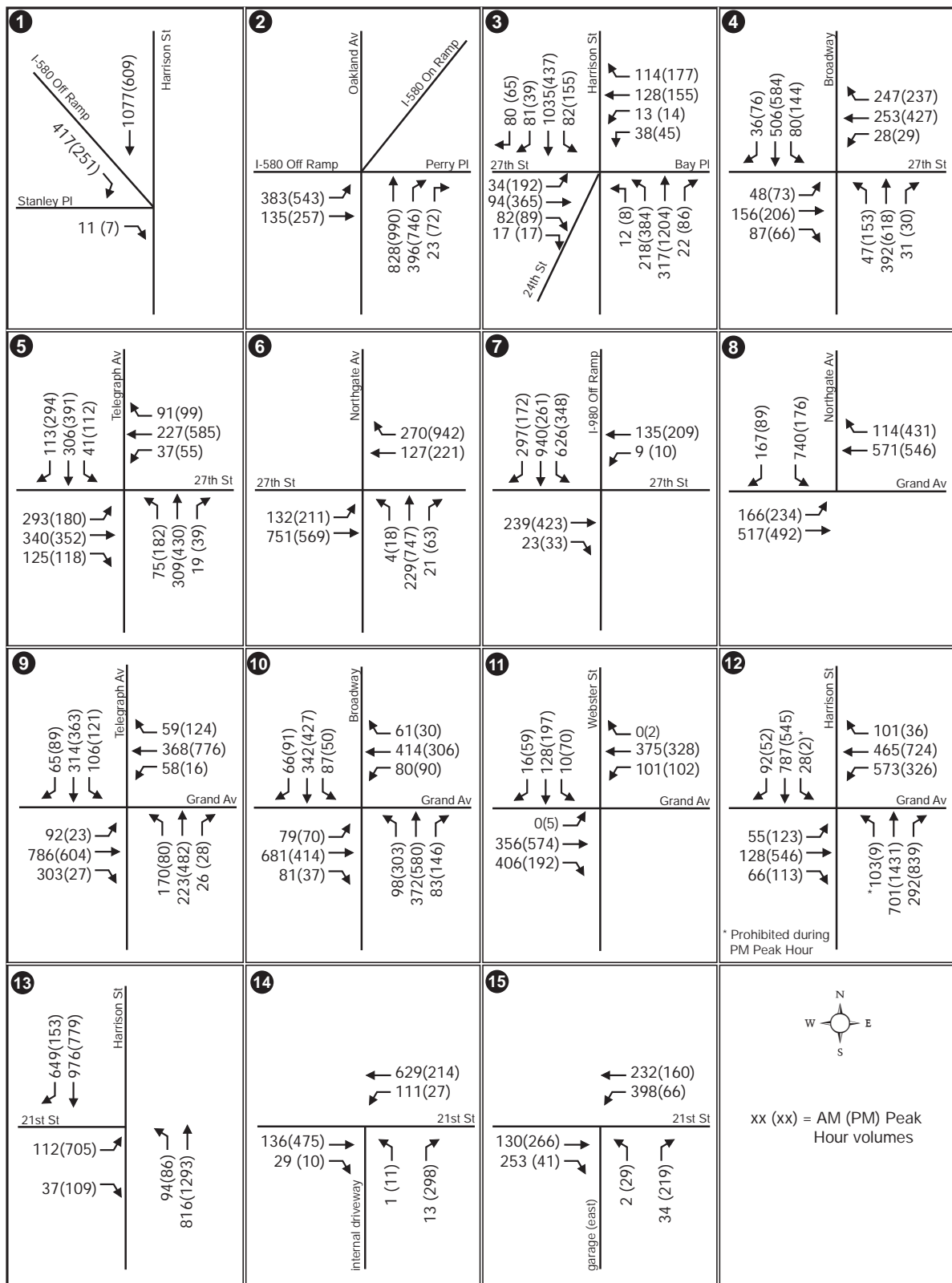
Intersection Impacts

Impact TRANS-1: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-1a through TRANS-1f)

Existing plus Project (Phase I and Phase II) Conditions traffic volumes are illustrated in **Figure IV.L-13. Table IV.L-10** summarizes the peak-hour LOS at the 51 study intersections under Existing plus Project (Phase I and Phase II) Conditions.

Average delay at some intersections would decrease under Existing plus Project (Phase I and Phase II) Conditions due to greater growth on movements that are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table IV.L-10, the following intersections would operate at unacceptable conditions under Existing plus Project (Phase I and Phase II) Conditions:



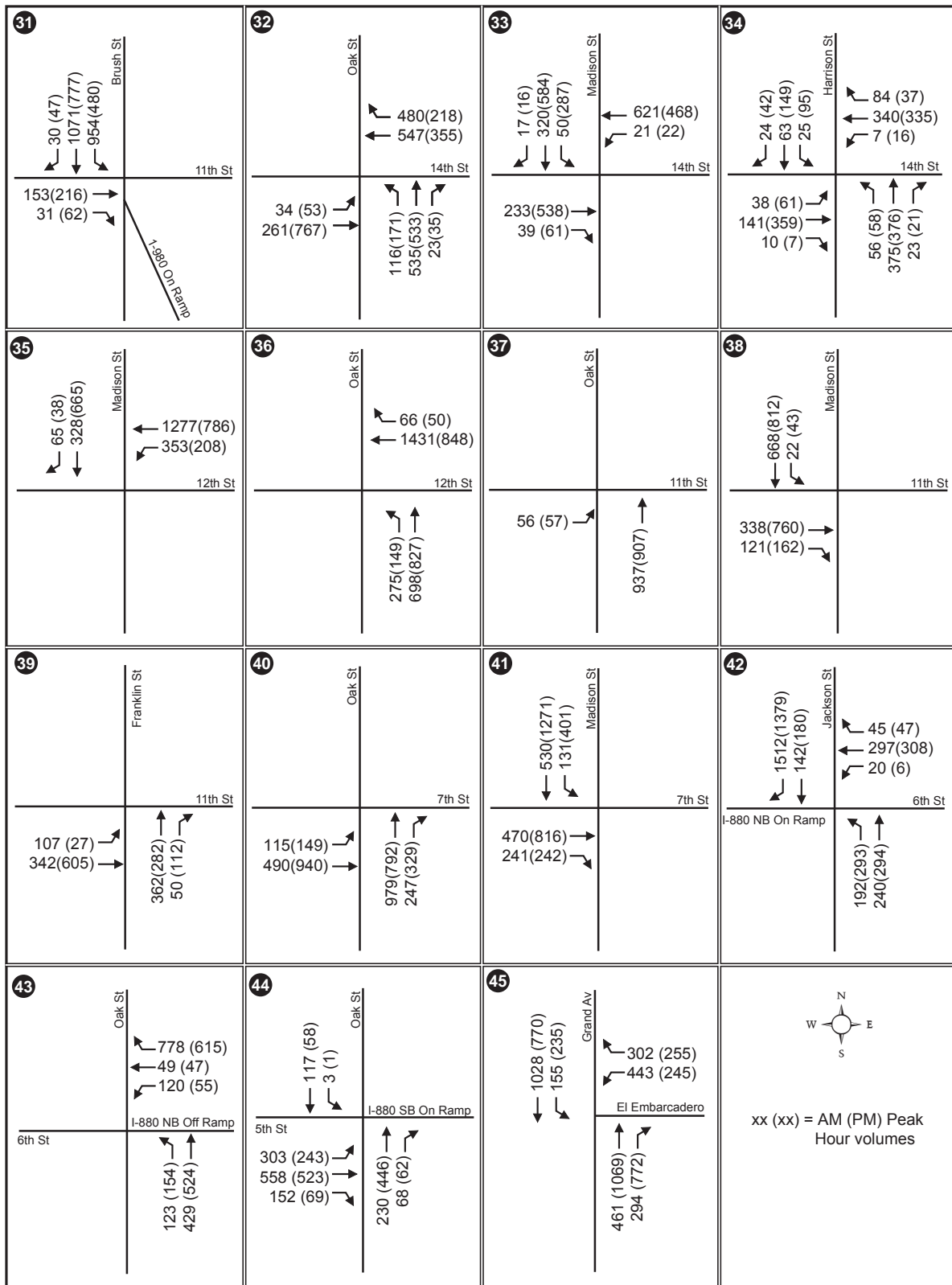
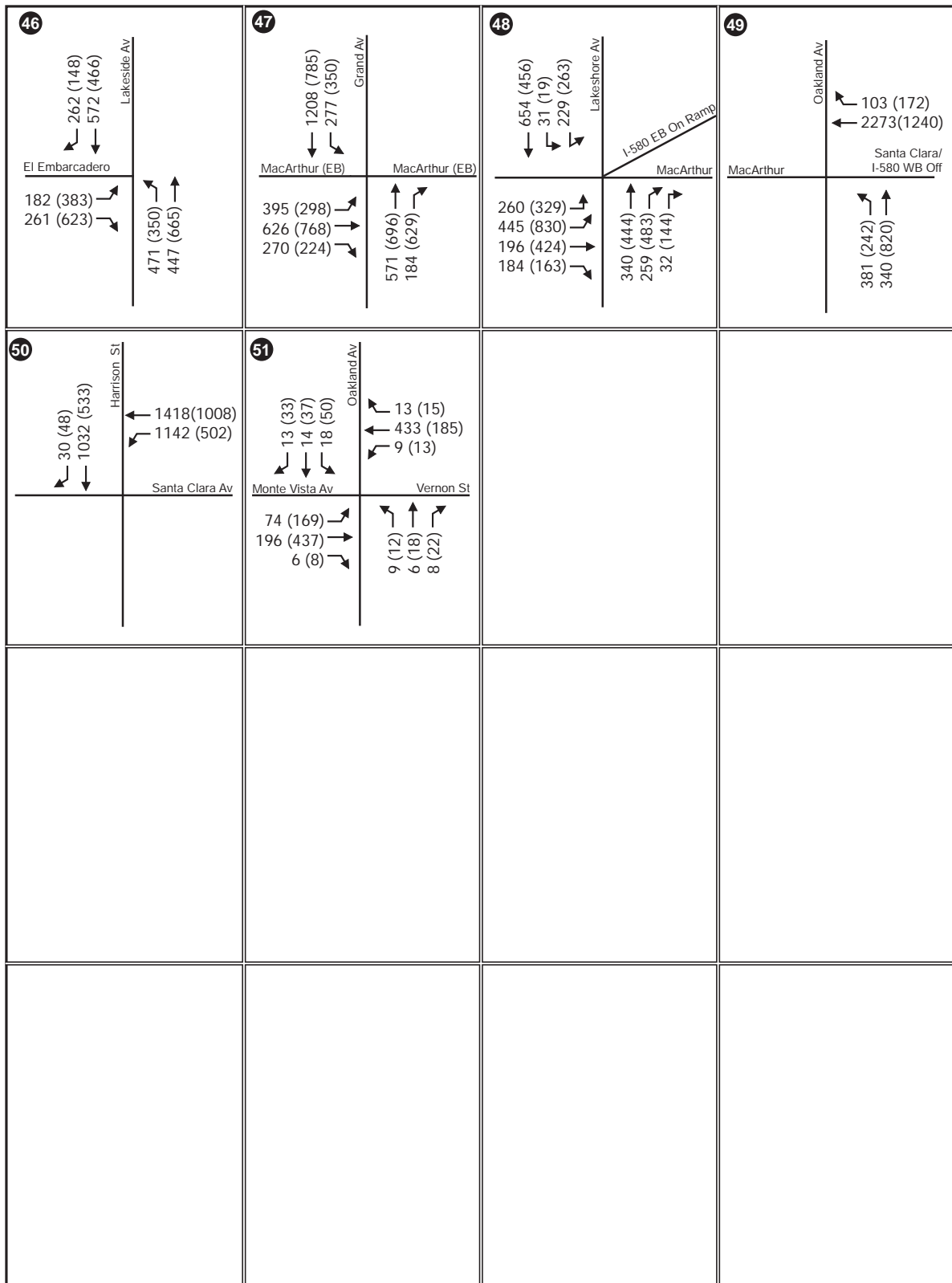


Figure IV.L-13c
Existing Plus Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-13d
Existing Plus Project Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-10
EXISTING PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE (LOS)

No.	Intersection	Traffic Control ^a	Existing Conditions				Existing plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	SSSC	C	16.9	B	11.9	C	22.1	B	12.2
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	B	18.1	F	>120	C	25.4	F	>120
3	Harrison Street / 27th Street / 24th Street	Signal	C	27.6	D	49.2	C	31.3	F	91.9
4	Broadway / 27th Street	Signal	B	15.3	B	18.0	B	15.5	B	19.6
5	Telegraph Ave. / 27th St.	Signal	B	18.8	C	25.0	B	19.0	C	28.3
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	A	8.9	B	10.9	A	9.1	B	13.0
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	12.0	B	11.0	B	12.8	B	11.0
45	Grand Avenue / El Embarcadero	Signal	C	25.7	F	90.9	C	25.8	F	119.9
46	Lakeshore Avenue / El Embarcadero	Signal	C	32.5	C	24.5	C	32.8	C	26.5
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	41.9	E	76.2	D	41.9	F	98.2
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	23.9	D	49.2	C	23.8	D	51.0
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	C	22.8	B	12.1	C	29.6	B	15.2
50	Harrison Street / MacArthur Blvd. (WB)	Signal	C	26.1	B	16.5	C	28.9	B	16.5
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	12.7	B	12.8	B	14.3	C	15.7
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	21.3	B	17.7	C	22.3	B	18.3
9	Telegraph Avenue / West Grand Avenue	Signal	C	24.9	C	27.1	E	60.1	D	35.5
10	Broadway / Grand Ave.	Signal	C	20.9	B	17.0	C	21.4	B	18.2
11	Webster St. / Grand Ave.	Signal	C	29.2	C	23.7	C	30.9	C	24.1
12	Harrison St. / Grand Ave.	Signal	C	27.8	D	39.0	D	45.2	E	64.4
13	Harrison St. / 21st Street	Signal	A	6.9	B	13.7	A	9.1	D	36.3
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	11.6	B	10.9	B	10.9	D	26.8
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	12.5	B	11.4	B	14.3	C	21.2
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	11.5	B	10.8	C	16.8	B	12.7
17	Webster St. / 21st Street	Signal	B	13.8	B	18.2	B	14.7	B	18.5
18	Franklin St. / 21st Street	Signal	B	10.1	B	10.8	A	9.8	B	10.3

See next page for table footnotes.

TABLE IV.L-10 (continued)
EXISTING PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE (LOS)

No.	Intersection	Traffic Control ^a	Existing Conditions				Existing plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
Outside Downtown										
19	Broadway / 21st Street	Signal	A	10.0	B	10.6	B	10.6	B	10.7
20	Telegraph Ave. / 20th St.	Signal	B	11.6	B	12.5	B	12.0	B	12.2
21	Broadway / 20th Street	Signal	B	13.3	B	17.0	B	13.5	B	17.2
22	Franklin St. / 20th Street	Signal	B	13.0	B	15.1	B	14.9	B	14.8
23	Webster St. / 20th Street	Signal	C	20.8	C	21.0	C	23.2	C	22.6
24	Harrison St. / 20th Street / Kaiser Ctr. Access Road	Signal	C	24.2	C	27.2	D	37.7	F	81.2
25	Kaiser Ctr. Access Road / 20th Street ^c	SSSC	B	14.7	B	14.8	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	A	6.2	B	13.8	A	9.1	B	19.8
27	Lakeside Dr. / 20th St.	Signal	B	11.6	B	10.1	B	11.7	B	14.7
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	5.9	A	9.5	A	5.9	A	9.6
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	C	21.0	C	23.8	C	21.2	C	23.8
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	21.4	B	16.7	C	21.4	B	16.7
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	C	32.9	B	15.9	C	32.8	B	15.9
32	Oak Street / 14th Street	Signal	B	17.4	C	34.6	B	17.6	C	34.5
33	Madison St. / 14th St.	Signal	A	9.6	B	10.1	A	9.6	B	10.2
34	Harrison St. / 14th St.	Signal	A	9.3	A	9.7	A	9.4	A	9.7
35	Madison St. / 12th St.	Signal	A	7.7	A	7.8	A	7.7	A	8.3
36	Oak Street / 12th Street	Signal	B	12.8	B	12.8	B	12.9	B	12.8
37	Oak Street / 11th Street	SSSC	B	10.5	B	10.7	B	10.6	B	10.7
38	Madison St. / 11th St.	Signal	B	12.2	A	9.7	B	12.1	A	9.5
39	Franklin St. / 11th St.	Signal	B	13.3	B	14.9	B	12.7	B	14.7
40	Oak Street / 7th Street	Signal	A	9.4	B	14.2	A	9.5	B	14.4
41	Madison St. / 7th St.	Signal	A	8.8	B	11.8	A	8.8	B	12.4
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak St. / 6th St. / I-880 NB Off-Ramp	Signal	B	14.9	B	11.2	B	16.0	B	11.3
44	Oak St. / 5th St. / I-880 SB On-Ramp	Signal	E	65.3	F	>120	E	67.9	F	>120

Bold indicates significant impact.

^a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

^b The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

^c The Project would eliminate this intersection.

SOURCE: AECOM, 2009.

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)

Within Downtown Area

24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in PM peak hour)

The Project would not result in a significant impact at the following intersection:

- #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM). Although the intersection would operate at LOS F during both the AM and PM peak hours under both Existing Conditions and Existing plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.

Impacts due to the Project at the remaining intersections above are discussed below.

Impact TRANS-1a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was used to evaluate the impact. The intersection operates with a v/c ratio of 0.98 under Existing Conditions and would operate with a v/c ratio of 1.16 under Existing plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 18 percent, which is greater than the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-1a: Implement the following measures at the Oakland Avenue / Perry Place / I-580 Eastbound Ramps intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

Because the delays at this intersection are primarily on the northbound right turn to the I-580 Eastbound On-Ramp and Perry Place, the existing crosswalk on the southeast side of the intersection (across I-580 Eastbound On-Ramp / Perry Place) could be repositioned to the northwest side of the intersection (across the I-580 Eastbound Off-Ramp), providing more green time to the northbound right-turn. However, this would require pedestrians to cross the I-580 Westbound Off-Ramp on the north side of Oakland Avenue between Perry Place and MacArthur Boulevard. Because this on-ramp is uncontrolled and visibility can be poor, this configuration would likely present more safety issues than the existing crosswalk across the eastbound on-ramp at this intersection, which is a signalized crossing.

Geometric modifications to increase capacity on the northbound right-turn would also be infeasible. The I-580 Eastbound On-Ramp is restricted to one lane, precluding the provision of an additional turn lane onto the on-ramp. A Class 2 bicycle lane has also been recently striped on Oakland Avenue, and adding an additional exclusive right-turn lane could require the removal of the bicycle lane or a reduction to its attractiveness, or could present safety issues for bicycles.

In addition, signal optimization at this location would require approval of the change by Caltrans, making implementation of the proposed mitigation measure uncertain. Given these

considerations, there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impact at this intersection would be significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still be a significant and unavoidable impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street) (Existing)*. (Significant)

Mitigation Measure TRANS-1b: Implement the following measures at the Harrison Street / 27th Street / 24th Street intersection:

- Prohibit westbound left turns from Bay Place (to Harrison Street and 24th Street) during the PM peak hour.
- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines

- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

With respect to implementation of the measure, one solution would involve restriping the existing westbound left-turn lane as a shared through-left lane and using special left-turn and through arrow bulbs on signal heads and extinguishable "no left turn" signs on the signal poles serving the westbound Bay Place approach.

A similar implementation of left-turn and through arrow bulbs and protected left-turn phasing for a shared through-left lane already exists on the westbound 20th Street approach at Webster Street / 20th Street. Likewise, a similar implementation of electronic "no right turn" signs has been installed at several intersections in Oakland Chinatown.

During off-peak periods, the shared westbound through-left lane at Harrison Street / 27th Street / 24th Street would be provided with a protected left-turn phase similar to the current signal phasing for the westbound 20th Street approach at Webster Street / 20th Street. After the end of the protected phase, like at Webster Street / 20th Street, vehicles would only be able to use this lane for through-movements until the next signal cycle. During the PM peak hour, the electronic "no left turn" sign would be illuminated and vehicles in the shared through-left lane would only be given through arrows. An illustration of the signal phasing sequence for the westbound Bay Place approach is included in **Appendix G.13**.

The 59 vehicles making these movements during the PM peak hour (45 vehicles to southbound Harrison Street and 14 vehicles to westbound 24th Street) would likely divert to the westbound through movement at this intersection or use other intersections in the area. Given that the volumes are relatively low, the diversion of traffic as a result of the left-turn prohibition would not result in substantial secondary impacts. By prohibiting westbound left turns, the green times can be reallocated to the northbound and southbound through Harrison Street movements. After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

However, the proposed mitigation measure would represent a less-than-ideal solution and could potentially still result in confusion for drivers who do not regularly use this intersection. This confusion could potentially result in drivers attempting to make abrupt lane changes out of the shared through-left lane or make prohibited traffic movements under the assumption that they have the "right of way."

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this

location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still be a conservatively deemed significant and unavoidable impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1c: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (Existing). (Significant)

Mitigation Measure TRANS-1c: Implement the following measures at the Harrison Street / 20th Street / Kaiser Center Access Road intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection (located within the Downtown area) would operate at an acceptable LOS E in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was used to evaluate the impact. The intersection operates with a v/c ratio of 1.45 under Existing Conditions and would operate with a v/c ratio of 1.51 under Existing plus Project (Phase I and Phase II) conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-1d: Implement the following measures at the Oak Street / 5th Street / I-580 Southbound On-Ramp intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

- 2070L Type Controller

- GPS communication (clock)
- Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
- City Standard ADA wheelchair ramps
- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional on-ramp lane before the metering lights to increase storage space and reduce the effects of spillback queuing at this intersection. Because the intersection and on-ramp facilities are under the jurisdiction of Caltrans, however, implementation of the proposed mitigation measure is under the jurisdiction of Caltrans and would require encroachment permits and approval. Therefore, this impact is significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1e: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Mitigation Measure TRANS-1e: Implement the following measures at the Grand Avenue / El Embarcadero intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections in the same coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, the intersection (located outside the Downtown area) would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Existing conditions, mitigating the Project's impact at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1f: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp) (Existing)*. (Significant)

Mitigation Measure TRANS-1f: Implement the following measures at the Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane along Grand Avenue. However, this improvement would reduce pedestrian accessibility at the intersection, which is located in an area with a high level of pedestrian traffic. An additional southbound left-turn lane would also not be feasible, as it would result in offset issues with far-side diagonal parking on the west side of Grand Avenue. There are no feasible measures to completely mitigate the Project's impacts and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.

Roadway Impacts

Impact TRANS-2: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would worsen level of service conditions on area roadway segments. (Significant on road segments described below under Impacts TRANS-2a through TRANS-2b)

Table IV.L-11 summarizes peak-hour LOS for the study roadway segments under Existing plus Project (Phase I and Phase II) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-11, the Non-Caltrans roadway segments on eastbound Grand Avenue (#9, Harrison Street to El Embarcadero), and on northbound Harrison Street / Oakland Avenue (#10, 27th Street to I-580) would operate at LOS F in the PM peak hour under Existing plus Project (Phase I and Phase II) Conditions:

The Project's impacts on those roadway segments are discussed below:

Impact TRANS-2a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero) (Existing). (Significant)

Mitigation Measure TRANS-2a: Implement the following measures on Grand Avenue between Harrison Street and El Embarcadero:

- Optimize traffic signals (to include determination of allocation of green time for each intersection approach) at intersections along Grand Avenue (i.e., Harrison Street, Bay Place, Park View Terrace / Bellevue Avenue, Perkins Street, Staten Avenue, Euclid Avenue, and El Embarcadero) for the AM and PM peak hours in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at the intersections in the road segment.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersections. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersections should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

**TABLE IV.L-11
EXISTING PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE**

No.	Roadway Segment	Dir.	Ln.	Capacity (veh/hr)	Existing Conditions						Existing plus Project (Phase I and Phase II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
					LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
1	SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880	NB	2	3,400	E	3,081	0.91	D	2,478	0.73	E	3,086	0.91	D	2,479	0.73
		SB	2	3,400	B	1,575	0.46	C	2,347	0.69	B	1,577	0.46	C	2,363	0.70
2	I-880 from Market Street to I-980	EB	4	8,000	B	3,070	0.38	B	3,164	0.40	B	3,164	0.40	B	3,181	0.40
		WB	4	8,000	B	3,720	0.47	B	3,426	0.43	B	3,733	0.47	B	3,512	0.44
3	I-880 from Oak Street to 5th Avenue	EB	4	8,000	C	4,968	0.62	D	5,737	0.72	C	4,983	0.62	D	5,831	0.73
		WB	4	8,000	C	5,606	0.70	C	5,075	0.63	D	5,710	0.71	C	5,095	0.64
4	I-980 from 27th Street to 29th Street	NB	3	6,000	A	1,611	0.27	C	3,609	0.60	A	1,647	0.27	C	3,842	0.64
		SB	3	6,000	D	4,679	0.78	B	1,858	0.31	D	4,832	0.81	B	1,885	0.31
Non-Caltrans Facilities																
5	Broadway from 19th Street to Grand Avenue	NB	2	1,800	A	513	0.29	B	876	0.49	B	553	0.31	C	1,029	0.57
		SB	2	1,800	A	438	0.24	B	597	0.33	A	503	0.28	B	611	0.34
6	Telegraph Avenue from 20th Street to 27th Street	NB	2	1,800	A	464	0.26	B	678	0.38	A	470	0.26	B	712	0.40
		SB	2	1,800	B	661	0.37	B	565	0.31	B	675	0.38	B	573	0.32
7	West Grand Avenue from S. Pablo Ave. to Telegraph Ave.	EB	2	1,800	C	1,054	0.59	B	719	0.40	C	1,181	0.66	B	726	0.40
		WB	2	1,800	B	672	0.37	B	862	0.48	B	685	0.38	C	945	0.53
8	Grand Avenue from Broadway to Harrison Street	EB	2	1,800	B	682	0.38	B	762	0.42	B	851	0.47	B	782	0.43
		WB	2	1,800	B	644	0.36	B	783	0.44	B	660	0.37	B	785	0.44
9	Grand Avenue from Harrison St. to El Embarcadero	EB	2	1,800	B	751	0.42	E	1,700	0.94	B	755	0.42	F	1,841	1.02
		WB	2	1,800	E	1,531	0.85	C	968	0.54	E	1,759	0.98	C	1,015	0.56
10	Harrison Street / Oakland Avenue from I-580 to 27th Street	NB	2	1,800	C	1,189	0.66	E	1,536	0.85	C	1,247	0.69	F	1,808	1.00
		SB	2	1,800	C	1,041	0.58	B	686	0.38	D	1,278	0.71	B	726	0.40
11	Harrison Street from 27th Street to Grand Avenue	NB	3	2,700	A	784	0.29	B	1,236	0.46	B	857	0.32	C	1,590	0.59
		SB	3	2,700	B	899	0.33	A	556	0.21	B	1,155	0.43	A	599	0.22
12	Harrison Street from 20th Street to 14th Street	NB	2	1,800	A	475	0.26	B	745	0.41	A	497	0.28	B	755	0.42
		SB	2	1,800	A	444	0.25	A	286	0.16	A	459	0.26	A	286	0.16

Bold indicates significant impact.

SOURCE: AECOM, 2009.

- 2070L Type Controller
- GPS communication (clock)
- Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
- City Standard ADA wheelchair ramps
- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions on this road segment would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts would require substantial capacity improvements such as an additional travel lane on Grand Avenue in the eastbound direction, which would conflict with improvements recently constructed or currently being implemented as part of the Measure DD project and could require removal of bike lanes or substantial amounts of on-street parking. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-2b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on *Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)* (Existing). (Significant)

It should also be noted that while the Project would cause the segment to operate to LOS F (because the traffic volume would exceed the hourly capacity of 1,800 vehicles), rounded to the hundredths place (per standard practice), the v/c ratio is 1.00, which is LOS E.

Mitigation Measure TRANS-2b: Implement Mitigation Measures TRANS-1a and TRANS-1b.

After implementation of these measures, conditions on this road segment would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts would require substantial capacity improvements such as an additional travel lane on Harrison Street / Oakland Avenue in the northbound direction, which would require removal of bike lanes or substantial amounts of on-street parking. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.

Near-Term (2015) Without Project Traffic Conditions

This section evaluates traffic operations at the study intersections under Near-Term (2015) without Project conditions, for which traffic volumes were forecasted using the June 2007 release of the ACCMA Travel Demand Model, with refinements to the volume forecasts within the City of Oakland to allow for more accurate representation of projected travel demand within city limits. The model was calibrated and validated to Spring 2007 travel conditions (the most up-to-date conditions possible using ABAG Projections 2005 land use data) within Oakland. More information on model assumptions surrounding land use and other developments in the Project vicinity is included in **Appendix G.6**.

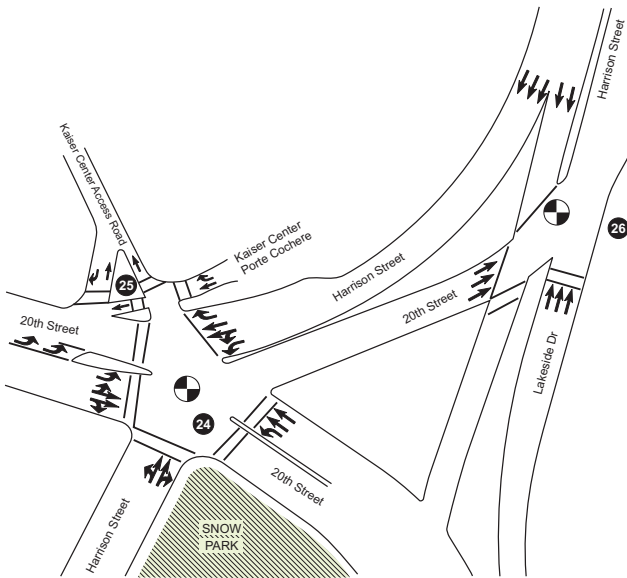
Planned Transportation Improvements

The following roadway and intersection geometry changes are planned to occur in the area within the near-term timeframe as a result of several different projects:

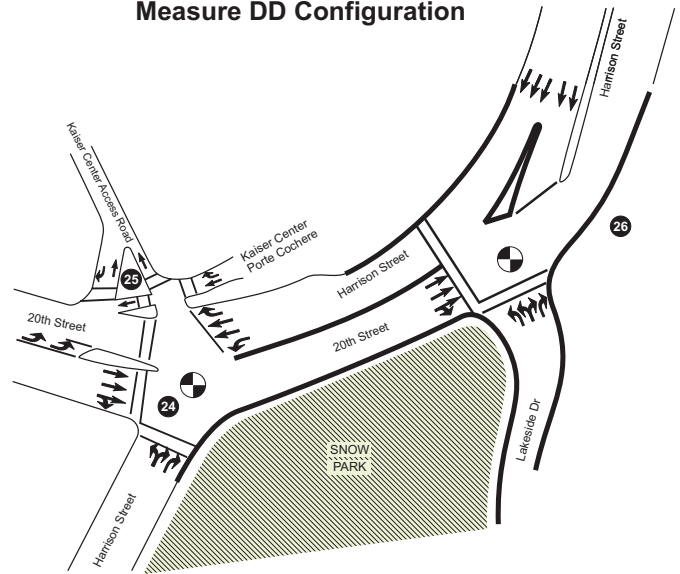
Measure DD Implementation Project

Measure DD improvements for Lakeshore Avenue, El Embarcadero, and Lakeside Drive have recently been installed or are currently under construction. Remaining improvements as part of the Measure DD Implementation Project include the removal of the 20th Street leg of the Harrison Street / Lakeside Drive / 20th Street "triangle" (the former right-of-way would then be converted to open space as part of an expanded Snow Park). The intersection of Harrison Street / Lakeside Drive would be reconfigured into a "T" intersection (this would require the realignment of Lakeside Drive). The reconfiguration of the triangle would improve pedestrian access to Lake Merritt from the Downtown area by simplifying routes for pedestrians and reducing the number of crossings. The proposed Measure DD Implementation Project roadway and intersection geometry changes at this location are illustrated in **Figure IV.L-14**.

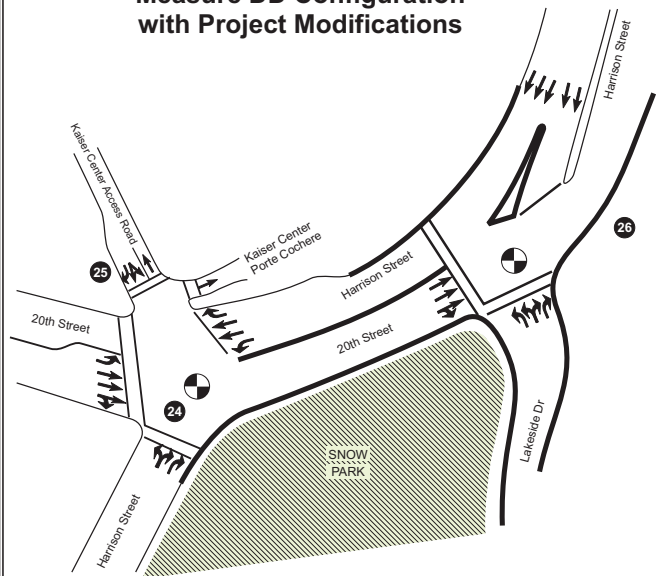
Existing Configuration



Measure DD Configuration



Measure DD Configuration with Project Modifications



Traffic Signal

27th Street / Bay Place Bike Lanes

The City of Oakland is in the process of expanding its bikeway network (Figure IV.L-8, page IV.L-32). Bike lanes along 27th Street and Bay Place have already been approved and funded and are thus assumed under Near-Term (2015) scenario. One travel lane in each direction would be removed along 27th Street and Bay Place to accommodate the bike lanes.

Near-Term (2015) without Project Intersection Operating Conditions

Growth factors between the ACCMA Travel Demand Model's traffic volumes for base (2005) and future (2030) conditions were calculated for each intersection approach, and interpolated to obtain near-term (2015) growth factors. These growth factors were applied to Existing Conditions traffic volumes to derive Near-Term (2015) without Project conditions traffic volumes. The volumes were then compared to the City of Oakland Measure DD Implementation Project Environmental Impact Report approved in April 2008 to ensure consistency. Near-Term (2015) without Project conditions traffic volumes at the 51 study intersections are illustrated in **Figure IV.L-15**.

The following intersections would operate unacceptable conditions under Near-Term (2015) without Project conditions:

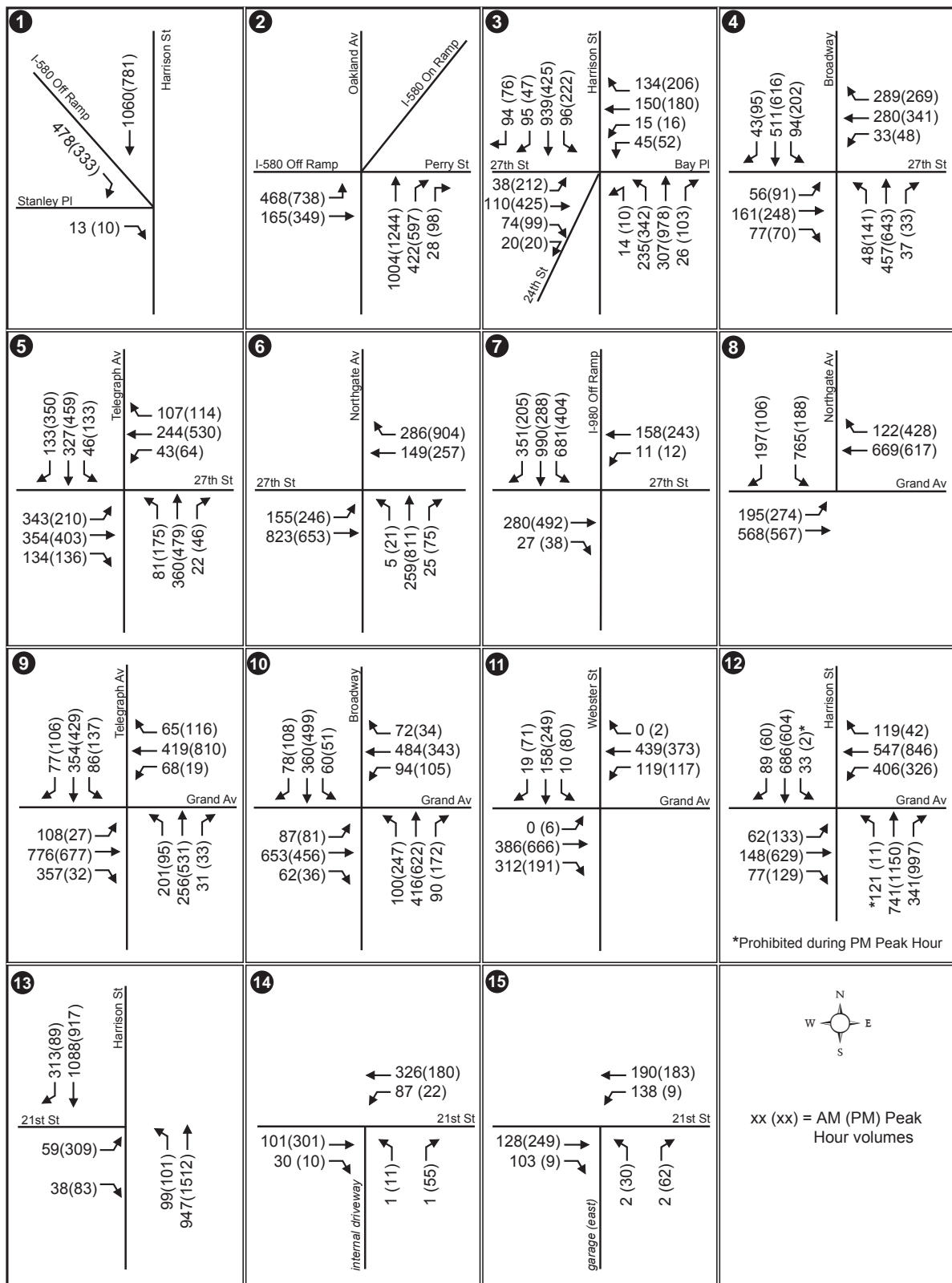
Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS E in AM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

Average delay at some intersections would decrease under Near-Term (2015) without Project conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.



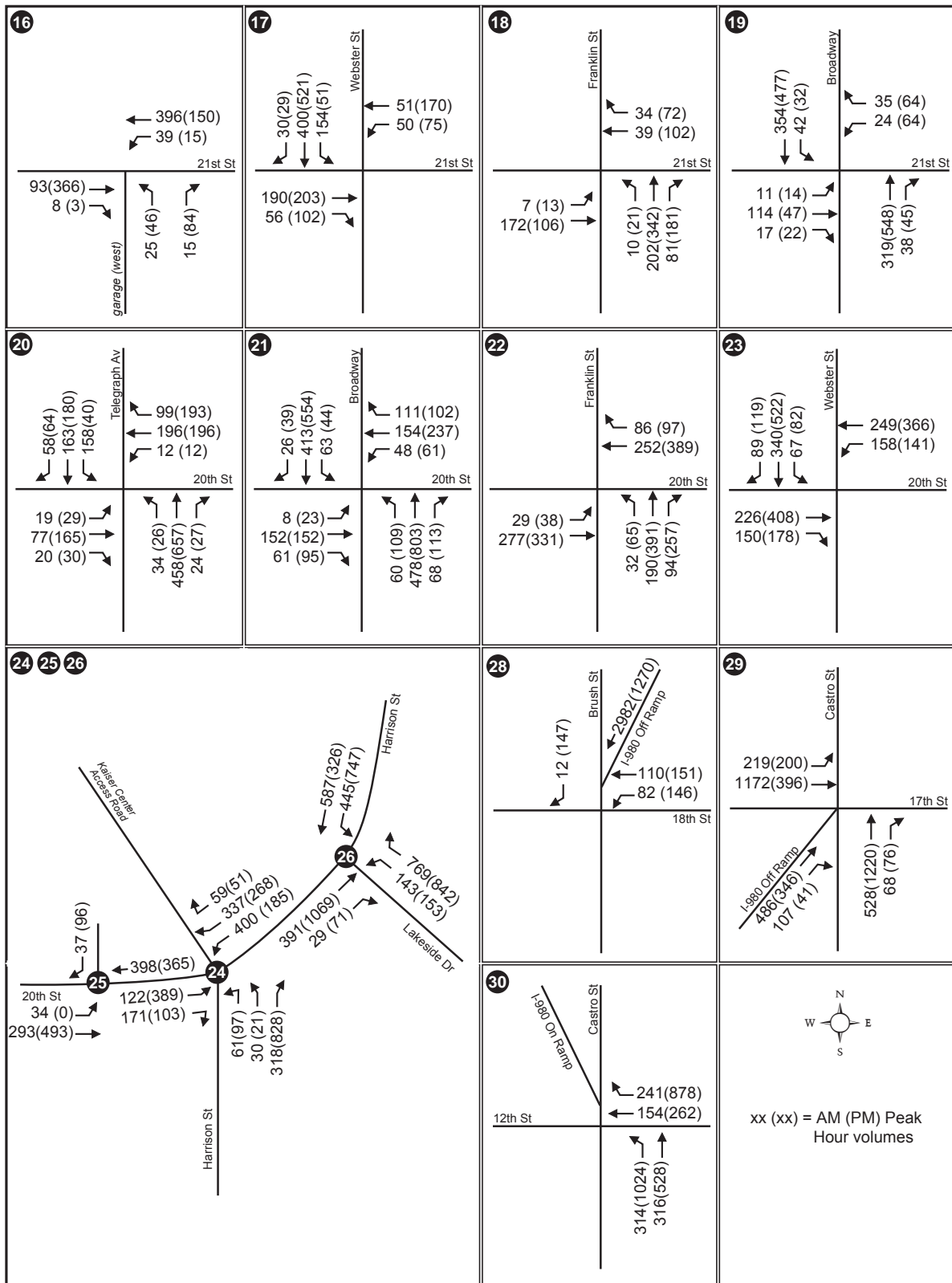


Figure IV.L-15b
Near Term (2015) Without Project Traffic Volumes
AM (PM) Peak Hour

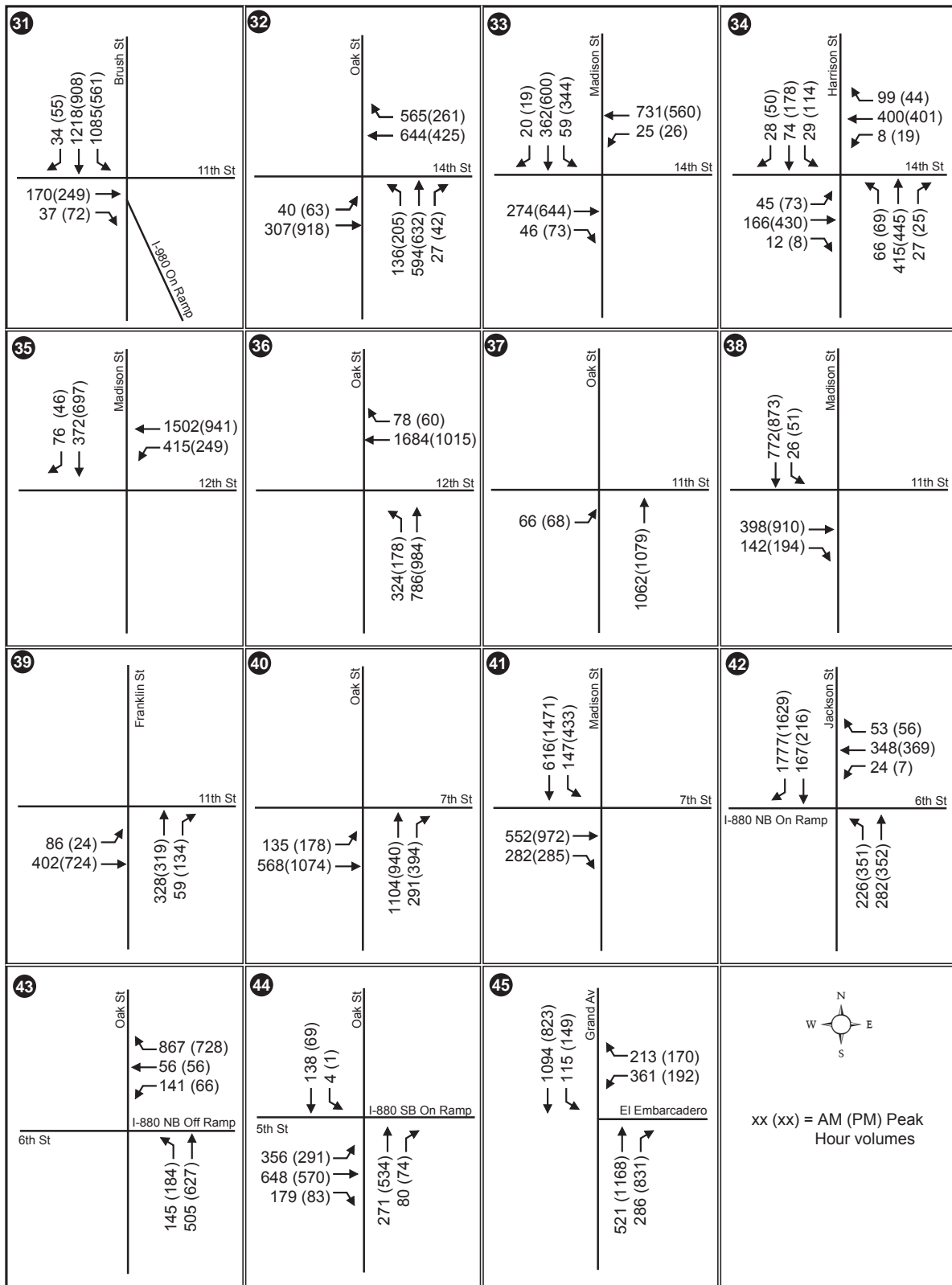
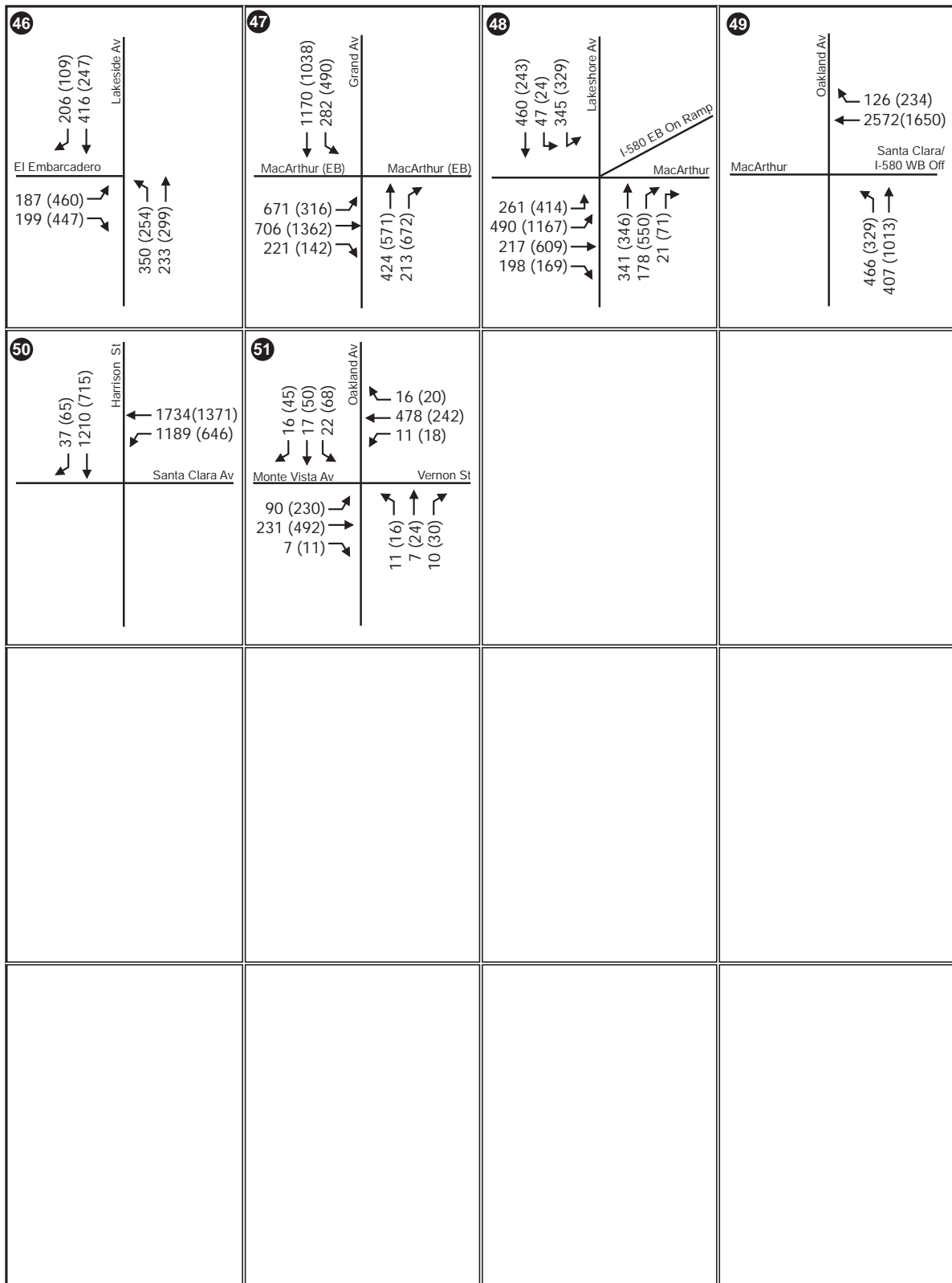


Figure IV.L-15c
Near Term (2015) Without Project Traffic Volumes
AM (PM) Peak Hour



For some peak hours, intersection delays at Intersection #45 (Grand Avenue / El Embarcadero) and Intersection #46 (Lakeshore Avenue / El Embarcadero) are lower in Near-Term (2015) without Project conditions than in Existing Conditions because the Existing Conditions analysis uses counts conducted before the Measure DD improvements were constructed. As construction of the improvements at these locations and adjacent roadways is still ongoing as of November 2009, drivers have yet to adjust to new traffic patterns and travel behavior.

Near-Term (2015) without Project Roadway Operating Conditions

A roadway facility operating at LOS F indicates that the facility is over-capacity (i.e., v/c ratio is greater than 1.00). The following two of the 11 roadway segments would operate at LOS F under Near-Term (2015) without Project conditions; detailed calculations for the roadway segment analysis are included in **Appendix G.9**:

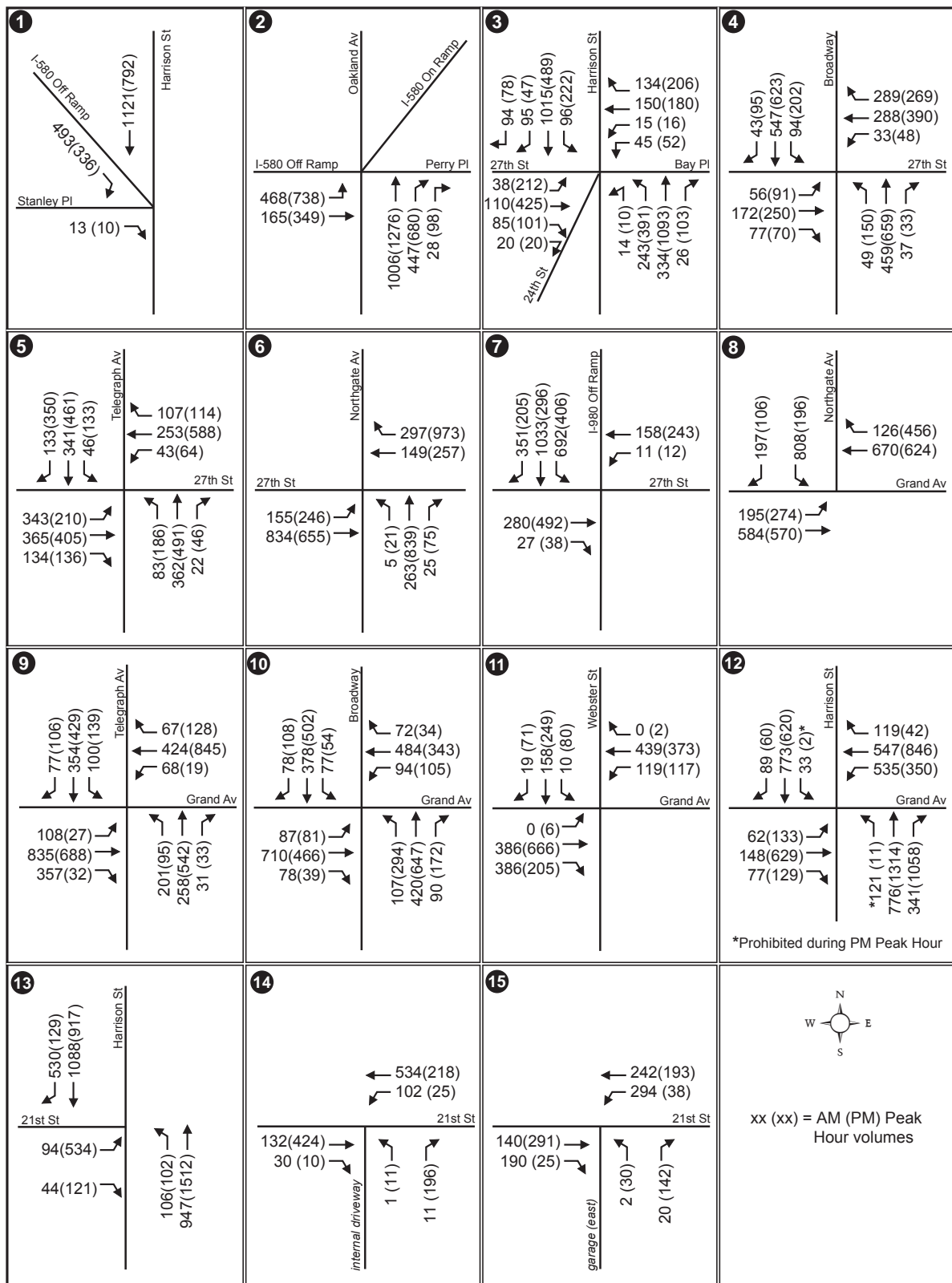
- Non-Caltrans roadways
 9. Grand Avenue, from Harrison Street to El Embarcadero (*eastbound, PM peak hour*)
 10. Harrison Street, from I-580 to 27th Street (*northbound, PM peak hour*)

Near-Term (2015) plus Project (Phase I) Conditions

Intersection Impacts

Impact TRANS-3: Phase I of the proposed Project, when added to projected 2015 traffic levels, would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-3a through TRANS-3e)

Near-Term (2015) plus Project (Phase I) conditions traffic volumes are illustrated in **Figure IV.L-16. Table IV.L-12** summarizes the peak hour LOS at the 51 study intersections under Near-Term (2015) plus Project (Phase I) conditions.



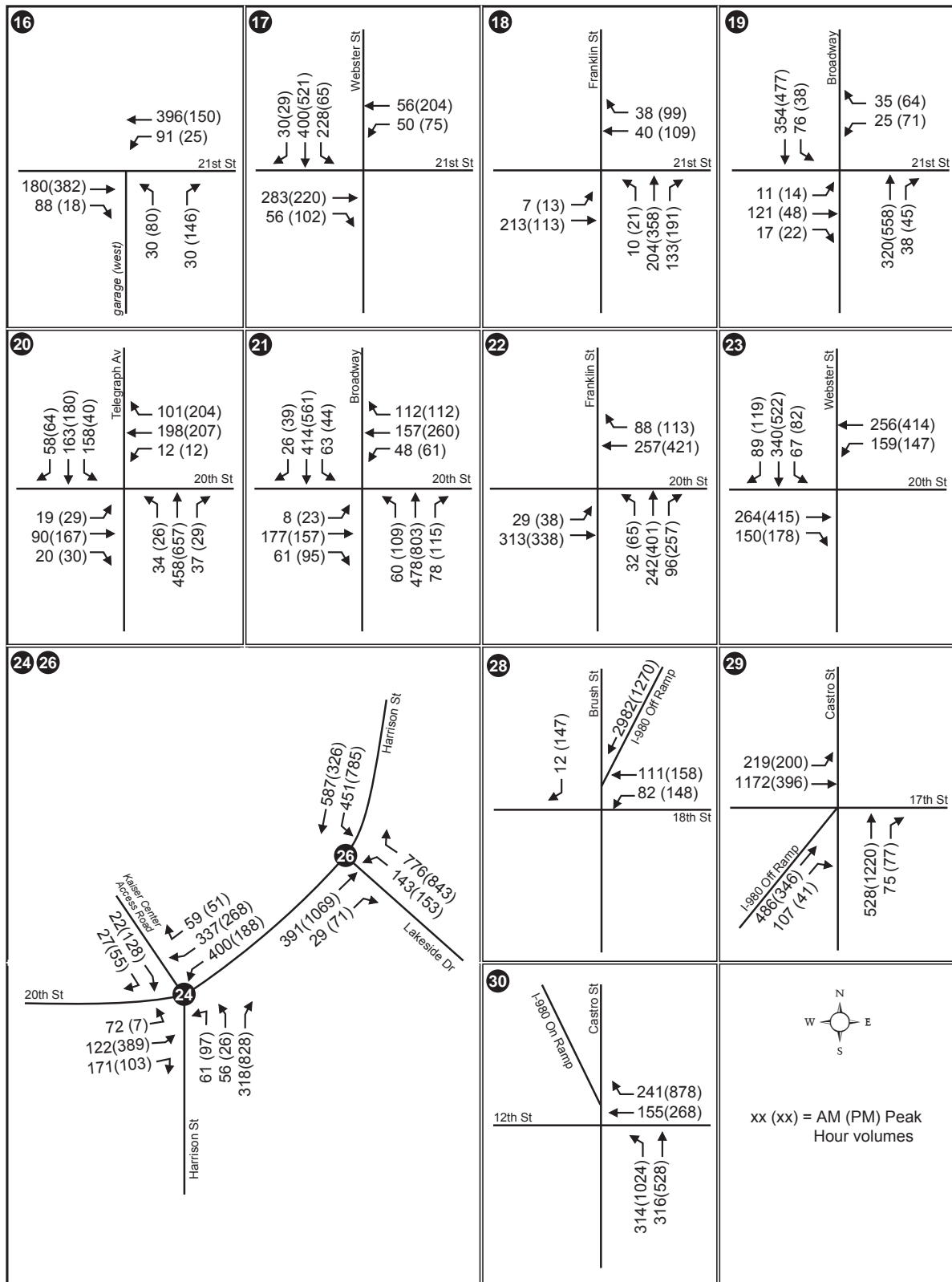


Figure IV.L-16b
Near Term (2015) Plus Project (Phase I) Traffic Volumes
AM (PM) Peak Hour

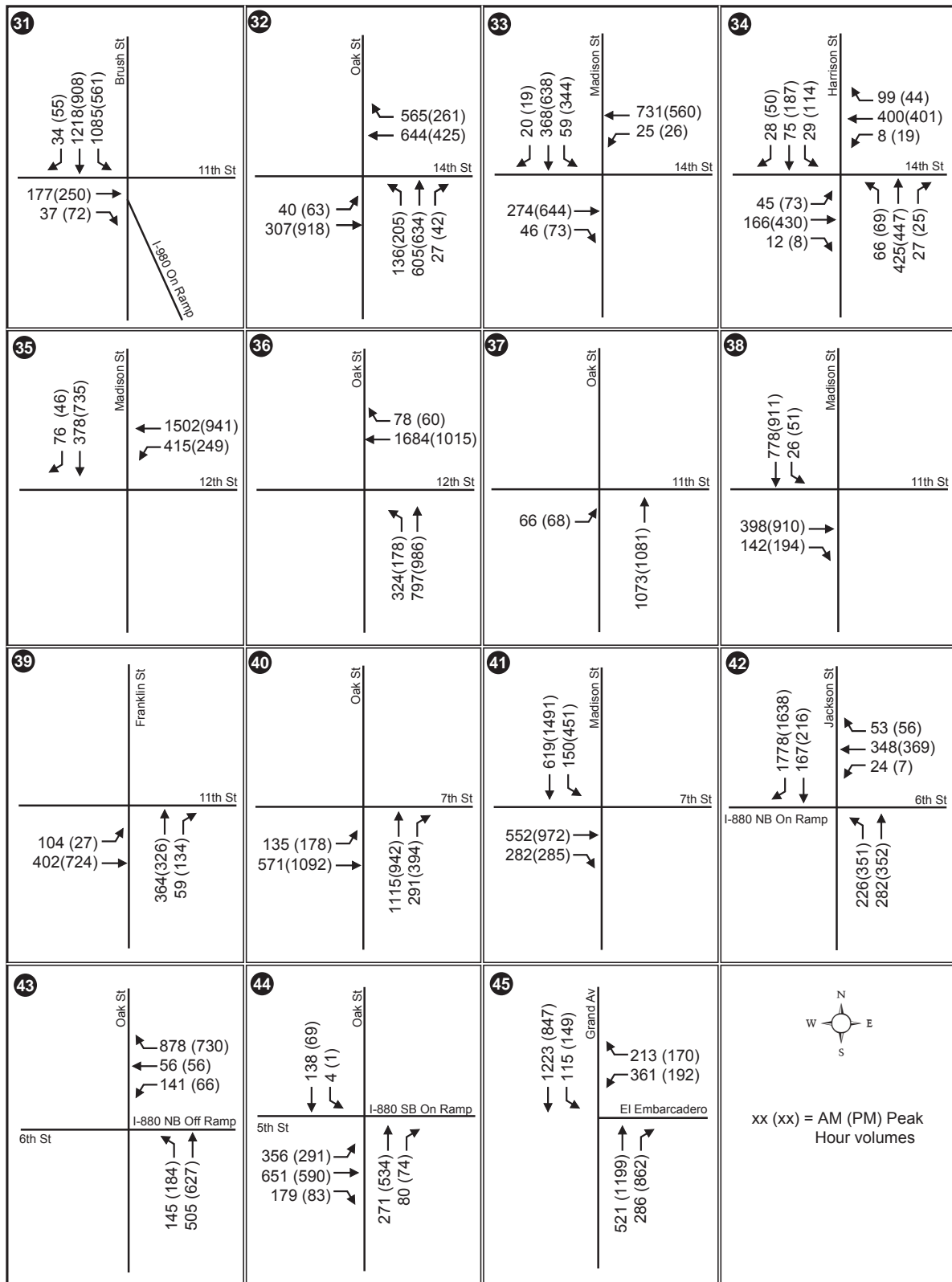


Figure IV.L-16c
Near Term (2015) Plus Project (Phase I) Traffic Volumes
AM (PM) Peak Hour

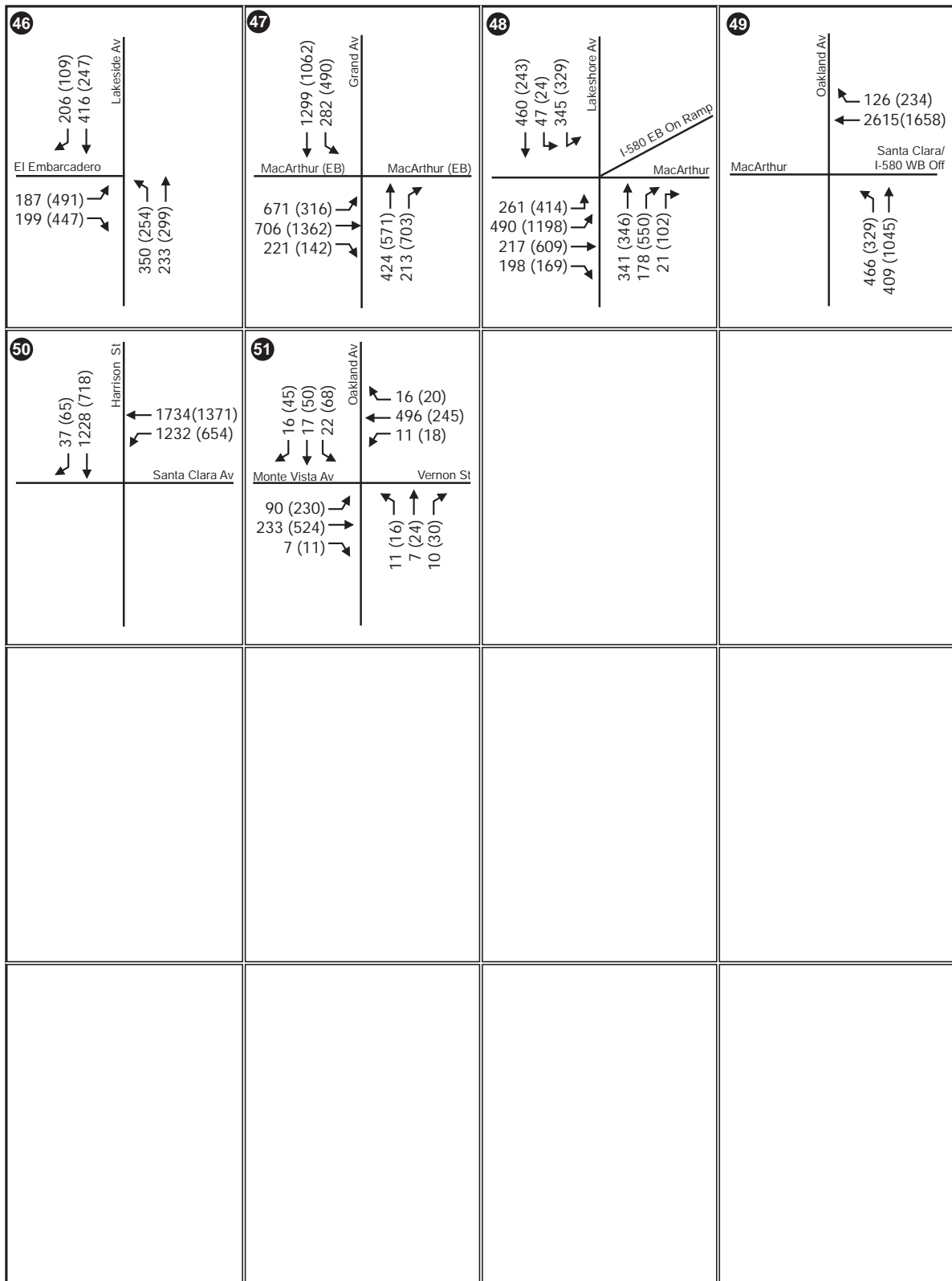


TABLE IV.L-12
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE (LOS)

No.	Intersection	Traffic Control ^a	Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	TWSC	D	28.3	B	14.2	D	30.8	B	14.2
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	C	32.8	F	>120	D	38.8	F	>120
3	Harrison Street / 27th Street / 24th Street	Signal	C	27.5	E	59.3	C	28.6	E	76.6
4	Broadway / 27th Street	Signal	B	16.0	C	20.3	B	16.2	C	21.0
5	Telegraph Ave. / 27th St.	Signal	B	19.5	D	37.9	B	19.8	D	45.4
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	B	10.7	B	12.3	B	10.8	B	13.4
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	13.4	B	11.7	B	13.8	B	11.7
45	Grand Avenue / El Embarcadero	Signal	C	20.0	F	>120	B	19.8	F	>120
46	Lakeshore Avenue / El Embarcadero	Signal	B	17.4	B	17.3	B	17.4	B	18.0
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	41.3	F	>120	D	41.0	F	>120
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	27.7	F	>120	C	27.7	F	>120
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	E	59.7	B	16.4	E	65.4	B	16.6
50	Harrison Street / MacArthur Blvd. (WB)	Signal	D	46.6	B	17.9	D	48.9	B	17.9
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	14.7	C	21.3	C	15.6	D	25.4
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	23.2	B	17.1	C	23.9	B	17.4
9	Telegraph Avenue / West Grand Avenue	Signal	C	26.6	D	36.3	C	27.7	D	42.6
10	Broadway / Grand Avenue	Signal	C	20.9	B	18.0	C	21.3	B	18.7
11	Webster St. / Grand Ave.	Signal	C	29.8	C	25.6	C	31.2	C	25.9
12	Harrison St. / Grand Ave.	Signal	C	29.6	F	84.9	D	37.9	F	97.9
13	Harrison St. / 21st Street	Signal	A	7.2	B	15.0	A	9.4	C	23.1
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	11.7	B	11.4	B	10.1	C	15.6
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	12.6	B	11.8	B	11.9	B	13.6
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	12.0	B	11.6	B	14.1	B	12.3
17	Webster St. / 21st St.	Signal	B	13.5	B	18.7	B	14.2	B	18.6
18	Franklin St. / 21st St.	Signal	B	10.3	B	11.1	A	9.9	B	10.9

See next page for table footnotes.

TABLE IV.L-12 (Continued)
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE (LOS)

No.	Intersection	Traffic Control ^a	Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
19	Broadway / 21st Street	Signal	B	10.3	B	11.3	B	10.6	B	11.4
20	Telegraph Ave. / 20th St.	Signal	B	12.1	B	11.7	B	12.3	B	11.5
21	Broadway / 20th Street	Signal	B	13.8	B	19.9	B	13.9	C	20.0
22	Franklin St. / 20th St.	Signal	B	11.6	B	14.9	B	13.7	B	14.6
23	Webster St. / 20th St.	Signal	C	24.2	C	22.5	C	22.0	C	22.5
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	Signal	C	26.5	C	20.9	D	36.8	F	90.3
25	Kaiser Ctr. Access Road / 20th Street ^c	SSSC	A	9.8	B	10.1	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	B	18.3	C	24.2	B	17.6	C	24.1
27	Lakeside Dr. / 20th St. ^d	Signal	--	--	--	--	--	--	--	--
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	6.2	A	9.1	A	6.2	A	9.2
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	C	29.1	C	25.3	C	29.1	C	25.3
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	21.3	B	17.3	C	21.3	B	17.3
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	D	37.9	B	16.3	D	37.9	B	16.3
32	Oak Street / 14th Street	Signal	C	24.3	D	45.2	C	24.7	D	45.1
33	Madison St. / 14th St.	Signal	B	10.1	B	10.8	B	10.1	B	10.8
34	Harrison St. / 14th St.	Signal	A	9.5	B	10.0	A	9.5	B	10.0
35	Madison St. / 12th St.	Signal	A	8.4	A	7.8	A	8.4	A	8.2
36	Oak Street / 12th Street	Signal	B	13.7	B	13.4	B	13.7	B	13.4
37	Oak Street / 11th Street	SSSC	B	10.9	B	11.1	B	10.9	B	11.1
38	Madison St. / 11th St.	Signal	B	12.2	B	10.3	B	12.2	B	10.1
39	Franklin St. / 11th St.	Signal	B	14.1	B	14.6	B	14.0	B	14.6
40	Oak Street / 7th Street	Signal	A	9.5	B	15.1	A	9.5	B	15.1
41	Madison St. / 7th St.	Signal	A	9.1	B	15.1	A	9.1	B	15.9
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak Street / 6th Street / I-880 NB Off-Ramp	Signal	B	18.0	B	13.0	B	18.5	B	13.0
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	117.5	F	>120	F	119.1	F	>120

Bold indicates significant impact.

^a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

^b The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

^c The Project would eliminate this intersection.

^d After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2009.

Average delay at some intersections would decrease under Near-Term (2015) plus Project (Phase I) conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table IV.L-12, the following intersections would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I) conditions:

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street / Bay Place (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS E in AM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in PM peak hour)
24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

The Project (Phase I) would not result in a significant impact at the following intersections:

- #42: Jackson Street / 6th Street / I-880 Northbound On-Ramp (AM / PM). Although the intersection would operate at LOS F during the both the AM and PM peak hours under both Near-Term (2015) without Project conditions and Near-Term (2015) plus Project (Phase I) conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.
- #44: Oak Street / 5th Street / I-880 Southbound On-Ramp (AM / PM). Although the intersection would operate at LOS F during both the AM and PM peak hours under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would not cause an increase in average intersection delay greater than two seconds or an increase in critical movement delay greater than four seconds (in the AM peak hour), or an increase in v/c ratio of more than two percent, i.e., not above the three percent threshold (in the PM peak hour).
- #45: Grand Avenue / El Embarcadero (PM). Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of three percent, i.e., not above the threshold of significance.

- **#47: Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp (PM).** Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of three percent, i.e., not above the threshold of significance.
- **#48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM).** Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than two percent, i.e., not above the three percent threshold.

Impacts due to the Project (Phase I) at the remaining intersections above are discussed below.

Impact TRANS-3a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection operates with a v/c ratio of 1.18 under Near-Term (2015) without Project Conditions and would operate with a v/c ratio of 1.25 under Near-Term (2015) plus Project (Phase I) Conditions for the PM peak hour. Because the increase in v/c ratio would be 7 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-3a: Implement Mitigation Measure TRANS-1a.

After implementation of this measure, conditions at this intersection (located within the Downtown area) would remain at an unacceptable LOS, and the Project impact would not be mitigated. As discussed for Impact TRANS-1a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, this impact is significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3b: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015), which would operate at an unacceptable LOS E during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-3b: Implement Mitigation Measure TRANS-1b.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

As discussed for Mitigation Measure TRANS-1b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion. As a result, this impact is conservatively deemed significant and unavoidable.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3c: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue) (2015)*, which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-3c: Implement the following measures at the Harrison Street / Grand Avenue intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

- 2070L Type Controller
- GPS communication (clock)
- Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
- City Standard ADA wheelchair ramps
- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane along Grand Avenue. As these improvements would result in substantial secondary impacts such as pedestrian / bicycle safety and driver visibility issues, there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3d: Phase I of the proposed Project, when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)

Mitigation Measure TRANS-3d: Implement Mitigation Measure TRANS-1c.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant. If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I) Conditions (under Alternative

Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I) impacts at this location would be Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3e: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour at *Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015)*, which would operate at an unacceptable LOS E during the AM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-3e: Implement the following measures at the Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp intersection:

- Restripe the northeast Oakland Avenue approach from the current configuration of one shared through-left lane and two through lanes to one exclusive left-turn lane, one shared through-left lane, and one through lane.
- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps

- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS C in the AM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Roadway Impacts

Impact TRANS-4: Phase I of the proposed Project, when added to projected 2015 traffic levels, would worsen level of service conditions on area roadway segments. (Significant on road segment described below under Impact TRANS-4a)

Table IV.L-13 summarizes peak hour LOS for the study roadway segments under Near-Term (2015) plus Project (Phase I) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-13, the Non-Caltrans roadway segments on eastbound Grand Avenue (#9, Harrison Street to El Embarcadero), and on northbound Harrison Street / Oakland Avenue (#10, I-580 to 27th Street) would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions. However, the Project impact on the Grand Avenue

**TABLE IV.L-13
NEAR-TERM (2015) PLUS PROJECT (PHASE I) ROADWAY SEGMENT LEVELS OF SERVICE**

No.	Roadway Segment	Dir.	Ln.	Capacity (veh/h)	Near-Term (2015) without Project Conditions						Near-Term (2015) plus Project (Phase I) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
					LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
1	SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880	NB	2	3,400	E	3,386	1.00	D	2,906	0.85	E	3,389	1.00	D	2,907	0.86
		SB	2	3,400	C	2,108	0.62	D	2,950	0.87	C	2,109	0.62	D	2,958	0.87
2	I-880 from Market Street to I-980	EB	4	8,000	B	3,303	0.41	B	3,234	0.40	B	3,344	0.42	B	3,241	0.41
		WB	4	8,000	B	3,939	0.49	B	3,610	0.45	B	3,944	0.49	B	3,646	0.46
3	I-880 from Oak Street to 5th Avenue	EB	4	8,000	D	5,705	0.71	D	6,401	0.80	D	5,711	0.71	D	6,441	0.81
		WB	4	8,000	D	6,312	0.79	D	5,727	0.72	D	6,357	0.79	D	5,735	0.72
4	I-980 from 27th Street to 29th Street	NB	3	6,000	B	1,821	0.30	C	3,973	0.66	B	1,836	0.31	C	4,070	0.68
		SB	3	6,000	D	5,280	0.88	B	2,208	0.37	D	5,333	0.89	B	2,218	0.37
Non-Caltrans Facilities																
5	Broadway from 19th Street to Grand Avenue	NB	2	1,800	B	606	0.34	C	1,042	0.58	B	617	0.34	C	1,114	0.62
		SB	2	1,800	A	517	0.29	B	710	0.39	B	551	0.31	B	717	0.40
6	Telegraph Avenue from 20th Street to 27th Street	NB	2	1,800	B	576	0.32	B	879	0.49	B	578	0.32	B	890	0.49
		SB	2	1,800	B	779	0.43	B	672	0.37	B	779	0.43	B	674	0.37
7	West Grand Avenue from Telegraph Ave. to S. Pablo Ave.	EB	2	1,800	C	1,241	0.69	B	841	0.47	D	1,300	0.72	B	844	0.47
		WB	2	1,800	B	791	0.44	C	1,011	0.56	B	796	0.44	C	1,046	0.58
8	Grand Avenue from Broadway to Harrison Street	EB	2	1,800	B	803	0.45	B	891	0.49	B	877	0.49	B	891	0.49
		WB	2	1,800	B	758	0.42	C	917	0.51	B	758	0.42	C	917	0.51
9	Grand Avenue from Harrison St. to El Embarcadero	EB	2	1,800	B	807	0.45	F	1,998	1.11	B	807	0.45	F	2,060	1.14
		WB	2	1,800	D	1,455	0.81	C	1,014	0.56	E	1,584	0.88	C	1,038	0.58
10	Harrison Street / Oakland Avenue from I-580 to 27th Street	NB	2	1,800	D	1,453	0.81	F	1,939	1.08	D	1,480	0.82	F	2,054	1.14
		SB	2	1,800	C	1,225	0.68	B	821	0.46	D	1,301	0.72	B	835	0.46
11	Harrison Street from 27th Street to Grand Avenue	NB	3	2,700	B	922	0.34	B	1,326	0.49	B	957	0.35	C	1,490	0.55
		SB	3	2,700	B	1,057	0.39	A	666	0.25	B	1,144	0.42	A	682	0.25
12	Harrison Street from 20th Street to 14th Street	NB	2	1,800	B	559	0.31	C	947	0.53	B	569	0.32	C	952	0.53
		SB	2	1,800	B	570	0.32	A	342	0.19	B	570	0.32	A	351	0.20

Bold indicates significant impact.

SOURCE: AECOM, 2009.

segment would be less than significant because the addition of Project-generated traffic (Phase I) would not cause an increase in v/c ratio greater than the three percent threshold of significance.

Impact TRANS-4a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-4a: Implement Mitigation Measure TRANS-2b.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2b, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Intersection Impacts

Impact TRANS-5: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-5a through TRANS-5j)

Near-Term (2015) plus Project (Phase I and Phase II) Conditions traffic volumes are illustrated in **Figure IV.L-17. Table IV.L-14** summarizes the peak hour LOS at the 51 study intersections under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Average delay at some intersections would decrease under Near-Term (2015) plus Project (Phase I and II) Conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table IV.L-14, the following intersections would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I and Phase II) Conditions:

Outside Downtown Area

1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (LOS E in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street / Bay Place (LOS F in PM peak hour)

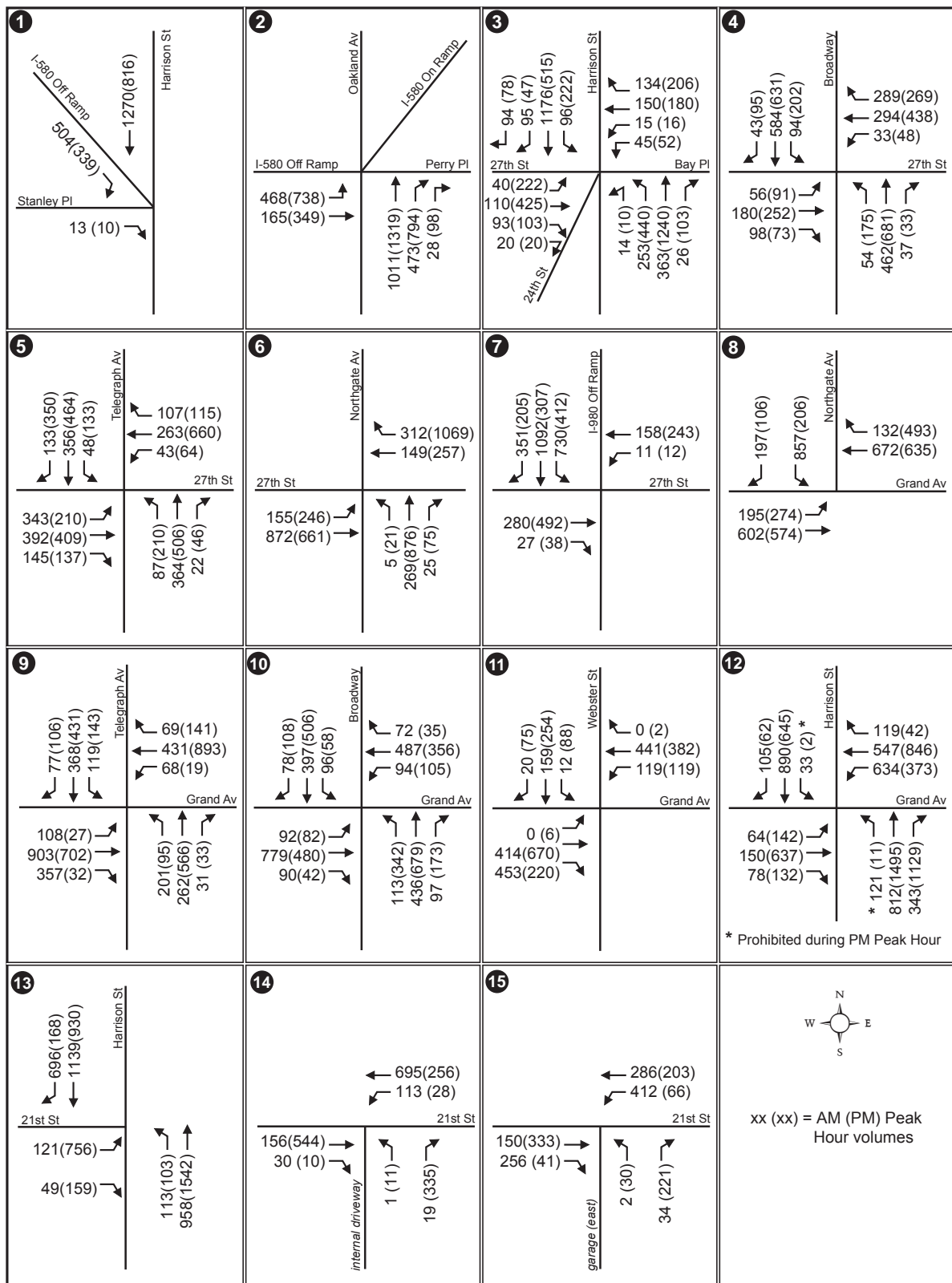
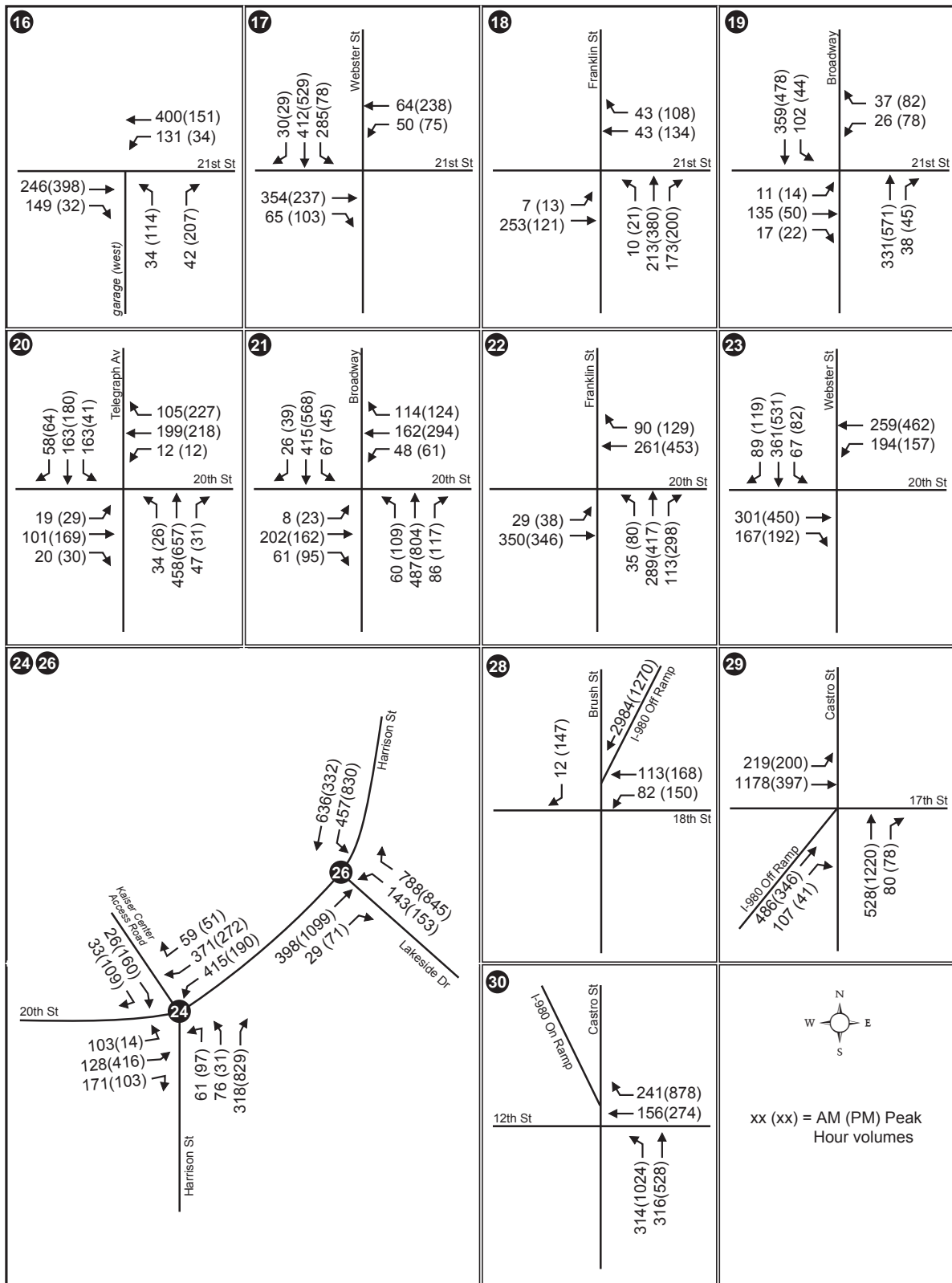
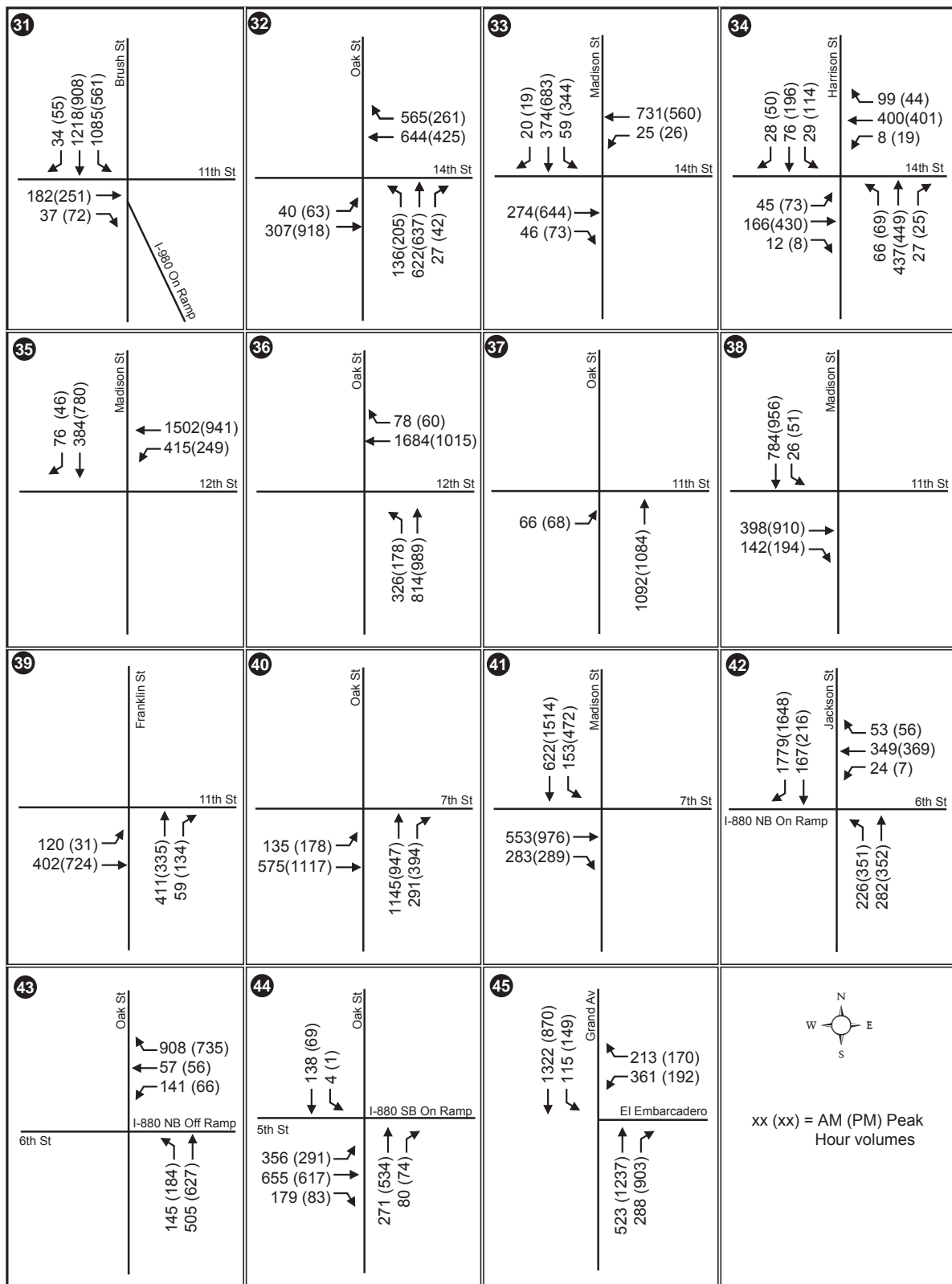
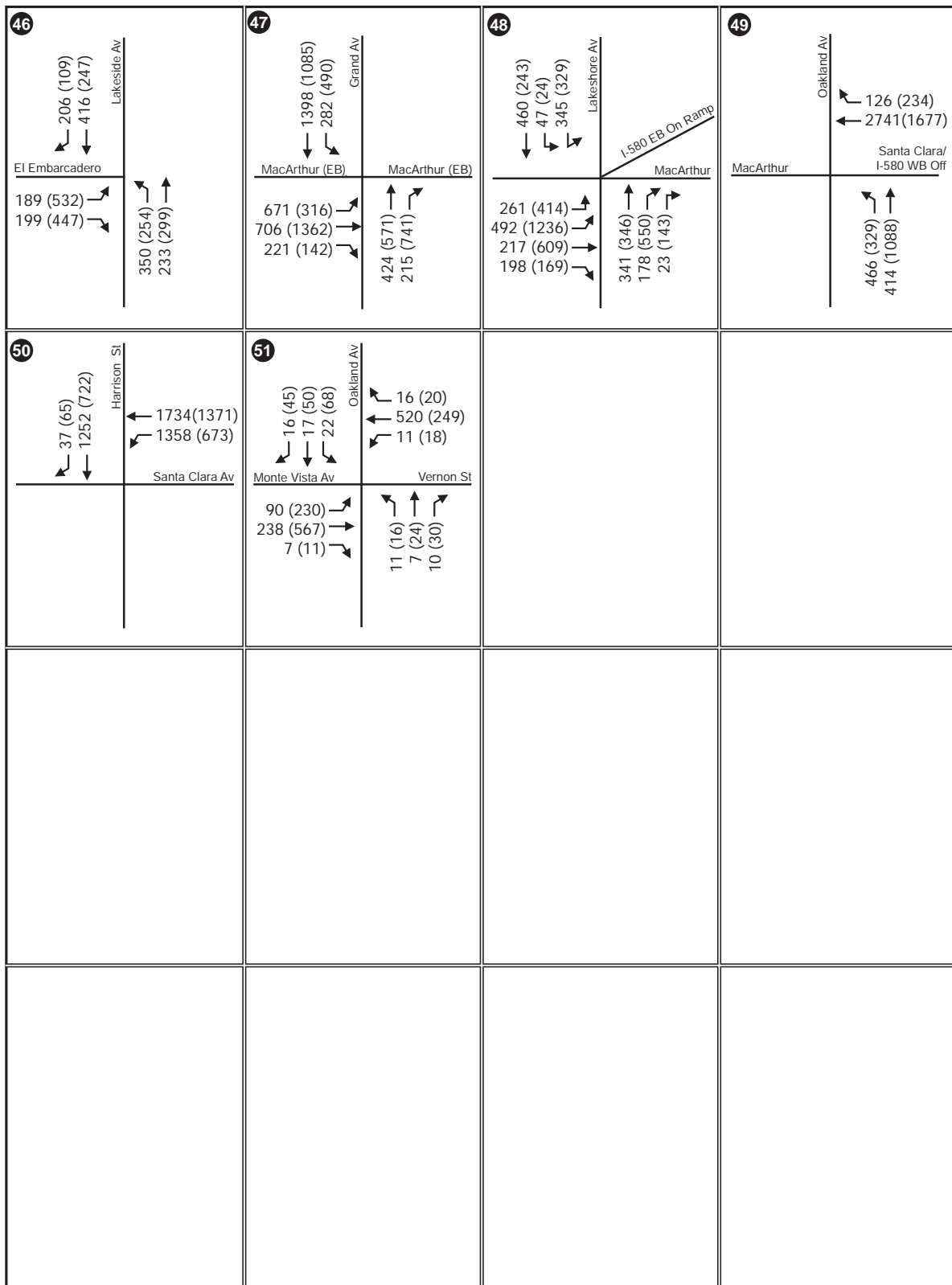


Figure IV.L-17a
Near Term (2015) Plus Project (Phase I&II) Traffic Volumes
AM (PM) Peak Hour







SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-17d
Near Term (2015) Plus Project (Phase I&II) Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-14
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

No.	Intersection	Traffic Control ^a	Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	SSSC	D	28.3	B	14.2	E	45.4	B	14.6
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	C	32.8	F	>120	D	45.8	F	>120
3	Harrison Street / 27th Street / 24th Street	Signal	C	27.5	E	59.3	C	33.3	F	102.1
4	Broadway / 27th Street	Signal	B	16.0	C	20.3	B	16.6	C	22.7
5	Telegraph Avenue / 27th Street	Signal	B	19.5	D	37.9	B	19.6	E	60.9
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	B	10.7	B	12.3	B	11.2	B	16.6
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	13.4	B	11.7	B	14.6	B	11.7
45	Grand Avenue / El Embarcadero	Signal	C	20.0	F	>120	B	19.8	F	>120
46	Lakeshore Avenue / El Embarcadero	Signal	B	17.4	B	17.3	B	17.4	B	19.0
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	41.3	F	>120	D	41.1	F	>120
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	27.7	F	>120	C	27.7	F	>120
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	E	59.7	B	16.4	F	82.7	B	17.0
50	Harrison Street / MacArthur Blvd. (WB)	Signal	D	46.6	B	17.9	D	52.0	B	18.1
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	14.7	C	21.3	C	17.1	D	33.3
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	23.2	B	17.1	C	24.7	B	17.8
9	Telegraph Avenue / West Grand Avenue	Signal	C	26.6	D	36.3	C	29.6	D	52.4
10	Broadway / Grand Avenue	Signal	C	20.9	B	18.0	C	21.9	C	20.4
11	Webster St. / Grand Ave.	Signal	C	29.8	C	25.6	C	31.2	C	26.3
12	Harrison St. / Grand Ave.	Signal	C	29.6	F	84.9	D	52.4	F	115.1
13	Harrison St. / 21st St.	Signal	A	7.2	B	15.0	B	10.2	D	51.3
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	11.7	B	11.4	B	10.2	D	34.6
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	12.6	B	11.8	B	13.2	C	17.1
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	12.0	B	11.6	C	16.8	B	13.2
17	Webster St. / 21st St.	Signal	B	13.5	B	18.7	B	14.9	B	18.6

See next page for table footnotes.

TABLE IV.L-14 (Continued)
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

No.	Intersection	Traffic Control ^a	Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
18	Franklin St. / 21st St.	Signal	B	10.3	B	11.1	A	9.8	B	10.7
19	Broadway / 21st Street	Signal	B	10.3	B	11.3	B	10.9	B	11.4
20	Telegraph Ave. / 20th St.	Signal	B	12.1	B	11.7	B	12.5	B	11.3
21	Broadway / 20th Street	Signal	B	13.8	B	19.9	B	14.0	C	20.2
22	Franklin St. / 20th St.	Signal	B	11.6	B	14.9	B	14.4	B	14.8
23	Webster St. / 20th St.	Signal	C	24.2	C	22.5	C	21.5	C	23.1
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	Signal	C	26.5	C	20.9	D	38.6	F	93.6
25	Kaiser Ctr. Access Rd. / 20th Street ^c	SSSC	A	9.8	B	10.1	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	B	18.3	C	24.2	B	17.1	C	26.0
27	Lakeside Dr. / 20th St. ^d	Signal	--	--	--	--	--	--	--	--
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	6.2	A	9.1	A	6.2	A	9.3
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	C	29.1	C	25.3	C	30.0	C	25.3
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	21.3	B	17.3	C	21.3	B	17.3
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	D	37.9	B	16.3	D	37.8	B	16.3
32	Oak Street / 14th Street	Signal	C	24.3	D	45.2	C	25.3	D	45.1
33	Madison St. / 14th St.	Signal	B	10.1	B	10.89	B	10.1	B	10.9
34	Harrison St. / 14th St.	Signal	A	9.5	B	10.0	A	9.6	B	10.1
35	Madison St. / 12th St.	Signal	A	8.4	A	7.8	A	8.4	A	8.4
36	Oak Street / 12th Street	Signal	B	13.7	B	13.4	B	13.8	B	13.4
37	Oak Street / 11th Street	SSSC	B	10.9	B	11.1	B	11.0	B	11.1
38	Madison St. / 11th St.	Signal	B	12.2	B	10.3	B	12.1	B	10.0
39	Franklin St. / 11th St.	Signal	B	14.1	B	14.6	B	13.7	B	14.5
40	Oak Street / 7th Street	Signal	A	9.5	B	15.1	A	9.7	B	15.2
41	Madison St. / 7th St.	Signal	A	9.1	B	15.1	A	9.2	B	17.2
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak Street / 6th Street / I-880 NB Off-Ramp	Signal	B	18.0	B	13.0	C	20.1	B	13.1
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	117.5	F	>120	F	>120	F	>120

Bold indicates significant impact.

^a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

^b The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

^c The Project would eliminate this intersection.

^d After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2009.

5. Telegraph Avenue / 27th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in PM peak hour)
24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

The Project would not result in a significant impact at the following intersection:

- #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM)
Although the side-street service level at this unsignalized intersection would degrade from LOS D to LOS E during the AM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions, the intersection would not satisfy the California MUTCD peak-hour signal warrant.
- #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM)
Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.

Impacts due to the Project at the remaining intersections above are discussed below.

Impact TRANS-5a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection operates with a v/c ratio of 1.18 under Near-Term (2015) without Project Conditions and would operate with a v/c ratio of 1.35 under Near-Term (2015) plus Project (Phase I and II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 17 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5a: Implement Mitigation Measure TRANS-1a.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015)*. (Significant)

Mitigation Measure TRANS-5b: Implement Mitigation Measure TRANS-1b.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

As discussed for Mitigation Measure TRANS-1b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion. As a result, this impact is conservatively deemed significant and unavoidable.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5c: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at *Intersection #5 (Telegraph Avenue / 27th Street) (2015)*. (Significant)

Mitigation Measure TRANS-5c: Implement the following measures at the Telegraph Avenue / 27th Street intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.
- Redesign the signal plan to give the northbound left-turn movement protected-permitted phasing.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

Significance after Implementation of Mitigation: Less than significant.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5d: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue) (2015)*, which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-5d: Implement Mitigation Measure TRANS-3c.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5e: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015)*. (Significant)

Mitigation Measure TRANS-5e: Implement Mitigation Measure TRANS-1c.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant. If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I and II) impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5f: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880)*

Southbound On-Ramp) (2015), which would operate at an unacceptable LOS F during both peak hours under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic during the PM peak hour was instead evaluated. The intersection would operate with a v/c ratio of 1.60 under Near-Term (2015) without Project Conditions and 1.66 under Near-Term (2015) plus Project (Phase I and II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5f: Implement Mitigation Measure TRANS-1d.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1d, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5g: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 0.94 under Near-Term (2015) without Project Conditions and 1.00 under Near-Term (2015) plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5g: Implement Mitigation Measure TRANS-1e.

After implementation of this measure, the intersection (located outside the Downtown area) would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than significant under Near-Term (2015) without Project conditions, mitigating the Project's impacts at this intersection.

Significance after Implementation of Mitigation: Less than significant.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5h: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.31 under Near-Term (2015) without Project Conditions and 1.37 under Near-Term (2015) plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5h: Implement Mitigation Measure TRANS-1f.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1f, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5i: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.19 under Near-Term (2015) without Project Conditions and 1.24 under Near-Term (2015) plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 5 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5i: Implement the following measures at the Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane along Lakeshore Avenue. However, this improvement could present safety issues for pedestrians in the east crosswalk and would conflict with improvements currently being constructed as part of the Lakeshore Avenue Complete Streets Project, which would install a bulbout on the southeast corner of the intersection. Therefore, there are no feasible measures to completely mitigate the Project's impacts and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5j: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015)*. (Significant)

Mitigation Measure TRANS-5j: Implement Mitigation Measure TRANS-3e.

After implementation of the mitigation measure, the intersection would operate at LOS C in the AM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I) Conditions.

Roadway Impacts

Impact TRANS-6: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would worsen level of service conditions on area roadway segments. (Significant at intersections described below under Impacts TRANS-6a and TRANS-6b)

Table IV.L-15 summarizes peak hour LOS for the study roadway segments under Near-Term (2015) plus Project (Phase I and Phase II) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-15, the Non-Caltrans roadway segments on eastbound Grand Avenue (#9, Harrison Street to El Embarcadero), and on northbound Harrison Street / Oakland Avenue (#10, 27th Street to I-580) would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and II) Conditions.

**TABLE IV.L-15
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE**

No.	Roadway Segment	Dir.	Ln.	Capacity (veh/h)	Near-Term (2015) without Project Conditions						Near-Term (2015) plus Project (Phase I and Phase II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
					LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
1	SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880	NB	2	3,400	E	3,386	1.00	D	2,906	0.85	E	3,391	1.00	D	2,909	0.86
		SB	2	3,400	C	2,108	0.62	D	2,950	0.87	C	2,110	0.62	D	2,951	0.87
2	I-880 from Market Street to I-980	EB	4	8,000	B	3,303	0.41	B	3,234	0.40	B	3,397	0.42	B	3,251	0.41
		WB	4	8,000	B	3,939	0.49	B	3,610	0.45	B	3,952	0.49	B	3,696	0.46
3	I-880 from Oak Street to 5th Avenue	EB	4	8,000	D	5,705	0.71	D	6,401	0.80	D	5,720	0.72	D	6,495	0.81
		WB	4	8,000	D	6,312	0.79	D	5,727	0.72	D	6,416	0.80	D	5,747	0.72
4	I-980 from 27th Street to 29th Street	NB	3	6,000	B	1,821	0.30	C	3,973	0.66	B	1,857	0.31	C	4,206	0.70
		SB	3	6,000	D	5,280	0.88	B	2,208	0.37	E	5,433	0.91	B	2,235	0.37
Non-Caltrans Facilities																
5	Broadway from 19th Street to Grand Avenue	NB	2	1,800	B	606	0.34	C	1,042	0.58	B	646	0.36	C	1,195	0.66
		SB	2	1,800	A	517	0.29	B	710	0.39	B	582	0.32	B	724	0.40
6	Telegraph Avenue from 20th Street to 27th Street	NB	2	1,800	B	576	0.32	B	879	0.49	B	582	0.32	C	913	0.51
		SB	2	1,800	B	779	0.43	B	672	0.37	B	793	0.44	B	680	0.38
7	West Grand Avenue from Telegraph Ave. to S. Pablo Ave.	EB	2	1,800	C	1,241	0.69	B	841	0.47	D	1,368	0.76	B	848	0.47
		WB	2	1,800	B	791	0.44	C	1,011	0.56	B	804	0.45	C	1,094	0.61
8	Grand Avenue from Broadway to Harrison Street	EB	2	1,800	B	803	0.45	B	891	0.49	C	972	0.54	C	911	0.51
		WB	2	1,800	B	758	0.42	C	917	0.51	B	774	0.43	C	919	0.51
9	Grand Avenue from Harrison St. to El Embarcadero	EB	2	1,800	B	807	0.45	F	1,998	1.11	B	811	0.45	F	2,139	1.19
		WB	2	1,800	D	1,455	0.81	C	1,014	0.56	E	1,683	0.93	C	1,061	0.59
10	Harrison Street / Oakland Avenue from I-580 to 27th Street	NB	2	1,800	D	1,453	0.81	F	1,939	1.08	D	1,511	0.84	F	2,211	1.23
		SB	2	1,800	C	1,225	0.68	B	821	0.46	D	1,462	0.81	B	861	0.48
11	Harrison Street from 27th Street to Grand Avenue	NB	3	2,700	B	922	0.34	B	1,326	0.49	B	995	0.37	C	1,680	0.62
		SB	3	2,700	B	1,057	0.39	A	666	0.25	B	1,313	0.49	A	709	0.26
12	Harrison Street from 20th Street to 14th Street	NB	2	1,800	B	559	0.31	C	947	0.53	B	581	0.32	C	958	0.53
		SB	2	1,800	B	570	0.32	A	342	0.19	B	585	0.33	A	360	0.20

Bold indicates significant impact.

SOURCE: AECOM, 2009.

Impact TRANS-6a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-6a: Implement Mitigation Measure TRANS-2a.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-6b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-6b: Implement Mitigation Measure TRANS-2b.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2b, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Cumulative (2030) without Project Traffic Conditions

This section evaluates traffic operations at the study intersections under Cumulative (2030) without Project Conditions, for which traffic volumes were forecasted using the June 2007 release of the ACCMA Travel Demand Model, with refinements to the volume forecasts within the City of Oakland to allow for more accurate representation of projected travel demand within city

limits. The model was calibrated and validated to Spring 2007 travel conditions (the most up-to-date conditions possible using ABAG Projections 2005 land use data) within Oakland. More information on model assumptions surrounding land use and other developments in the Project vicinity is included in **Appendix G.6**.

Planned Roadway and Intersection Geometry Changes

The same roadway and intersection geometry changes assumed to be in place for Near-Term (2015) without Project Conditions were also assumed in place for Cumulative (2030) without Project Conditions.

Cumulative (2030) without Project Intersection Operating Conditions

Growth factors between the ACCMA Travel Demand Model's traffic volumes for base (2005) and future (2030) conditions were calculated for each intersection approach. These growth factors were applied to Existing Conditions traffic volumes to derive Cumulative (2030) without Project Conditions traffic volumes. The volumes were then compared to the City of Oakland Measure DD Implementation Project Environmental Impact Report approved in April 2008 to ensure consistency. Cumulative (2030) without Project Conditions traffic volumes at the 51 study intersections are illustrated in **Figure IV.L-18**.

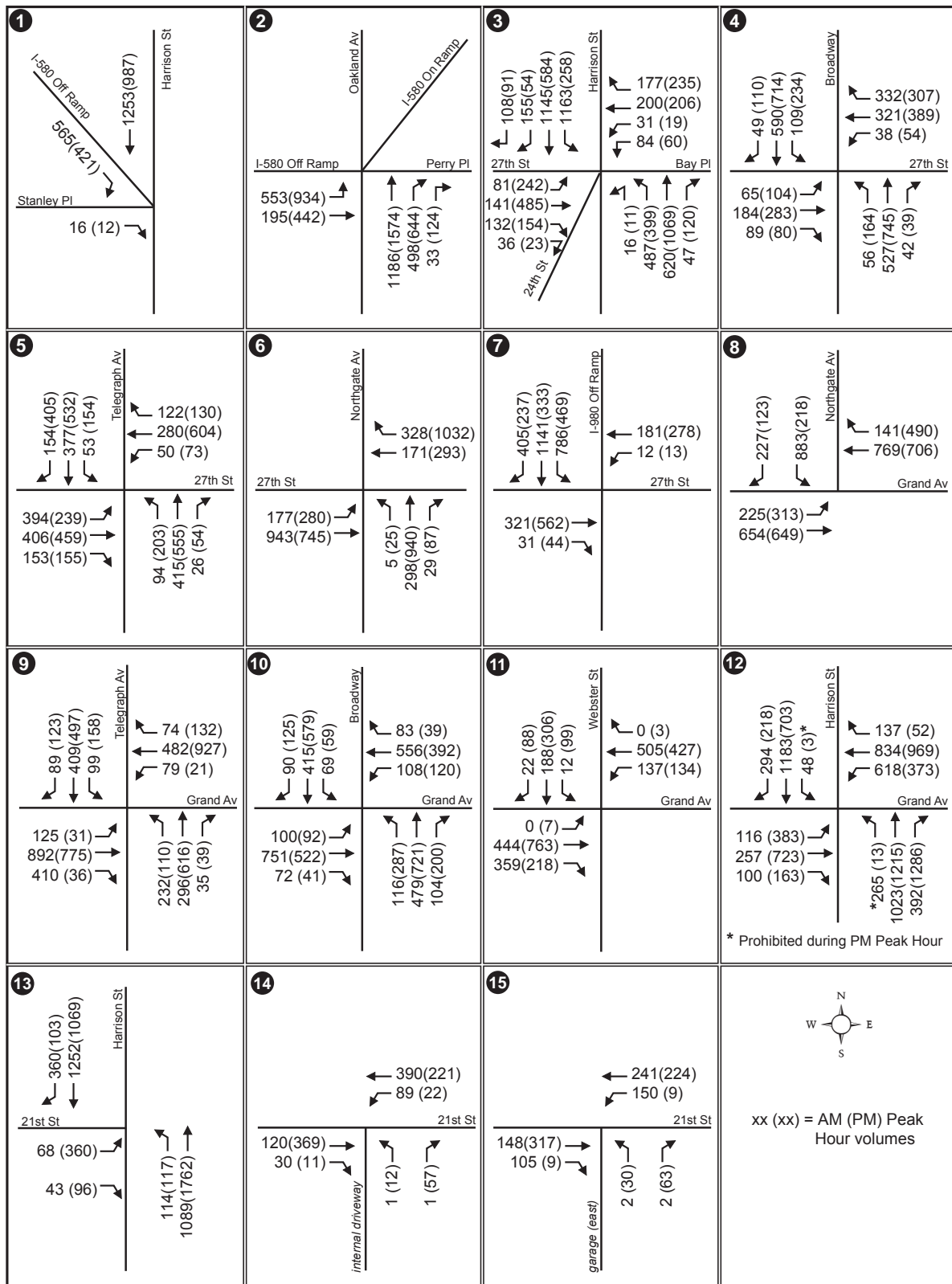
The following study intersections would operate at unacceptable conditions under Cumulative (2030) without Project Conditions:

Outside Downtown Area

1. Harrison Street / Stanley Place / I-580 EB Off-Ramp (LOS F in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS E in AM peak hour, and LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS F in AM peak hour, and LOS E in PM peak hour)
5. Telegraph Avenue / 27th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in AM peak hour, and LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)
50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (LOS F in AM peak hour)
51. Oakland Avenue / Monte Vista Avenue / Vernon Street (LOS F in PM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in AM and PM peak hours)
32. Oak Street / 14th Street (LOS F in PM peak hour)
40. Oak Street / 7th Street (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)



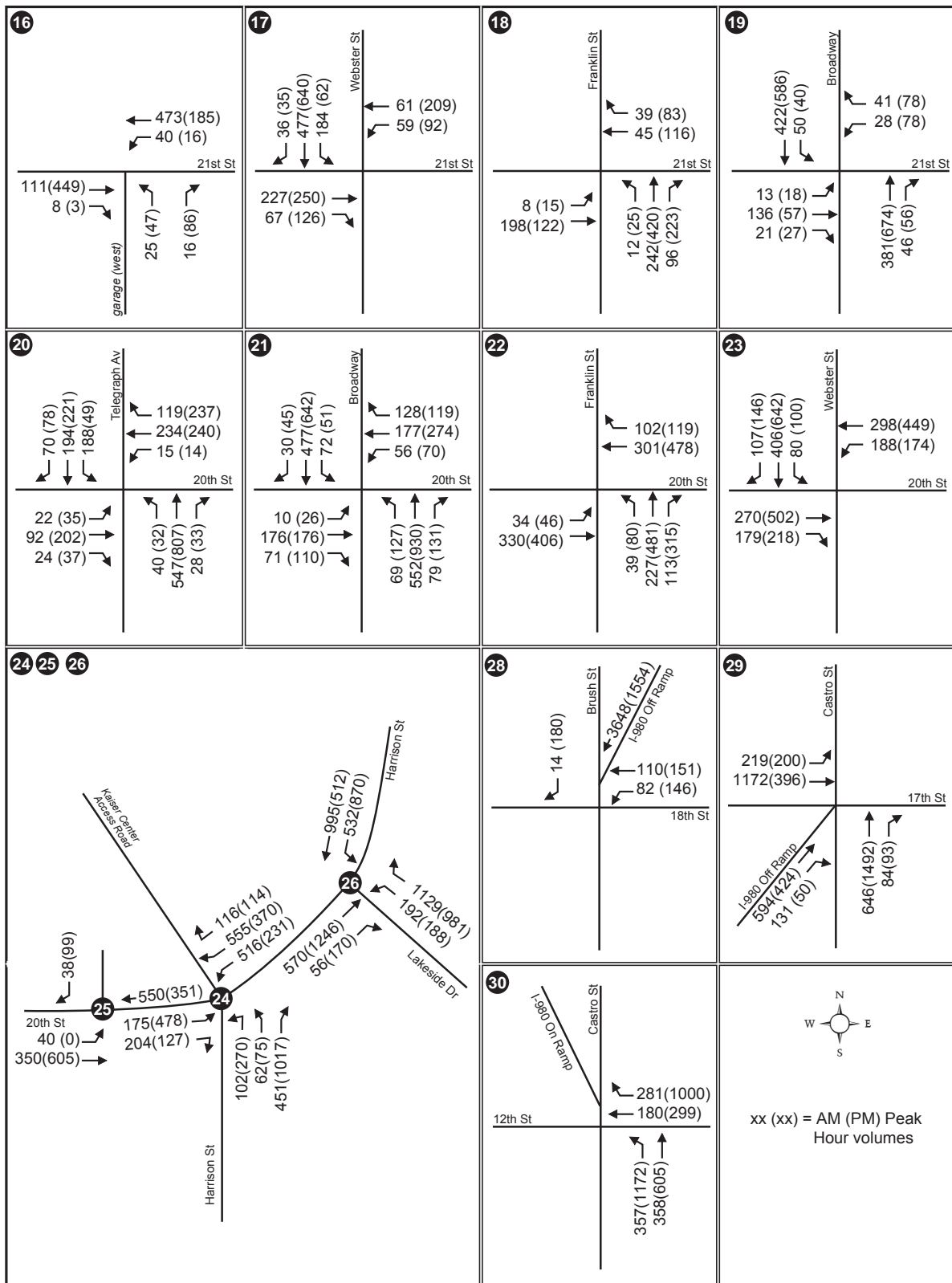


Figure IV.L-18b
Cumulative (2030) Without Project Traffic Volumes
AM (PM) Peak Hour

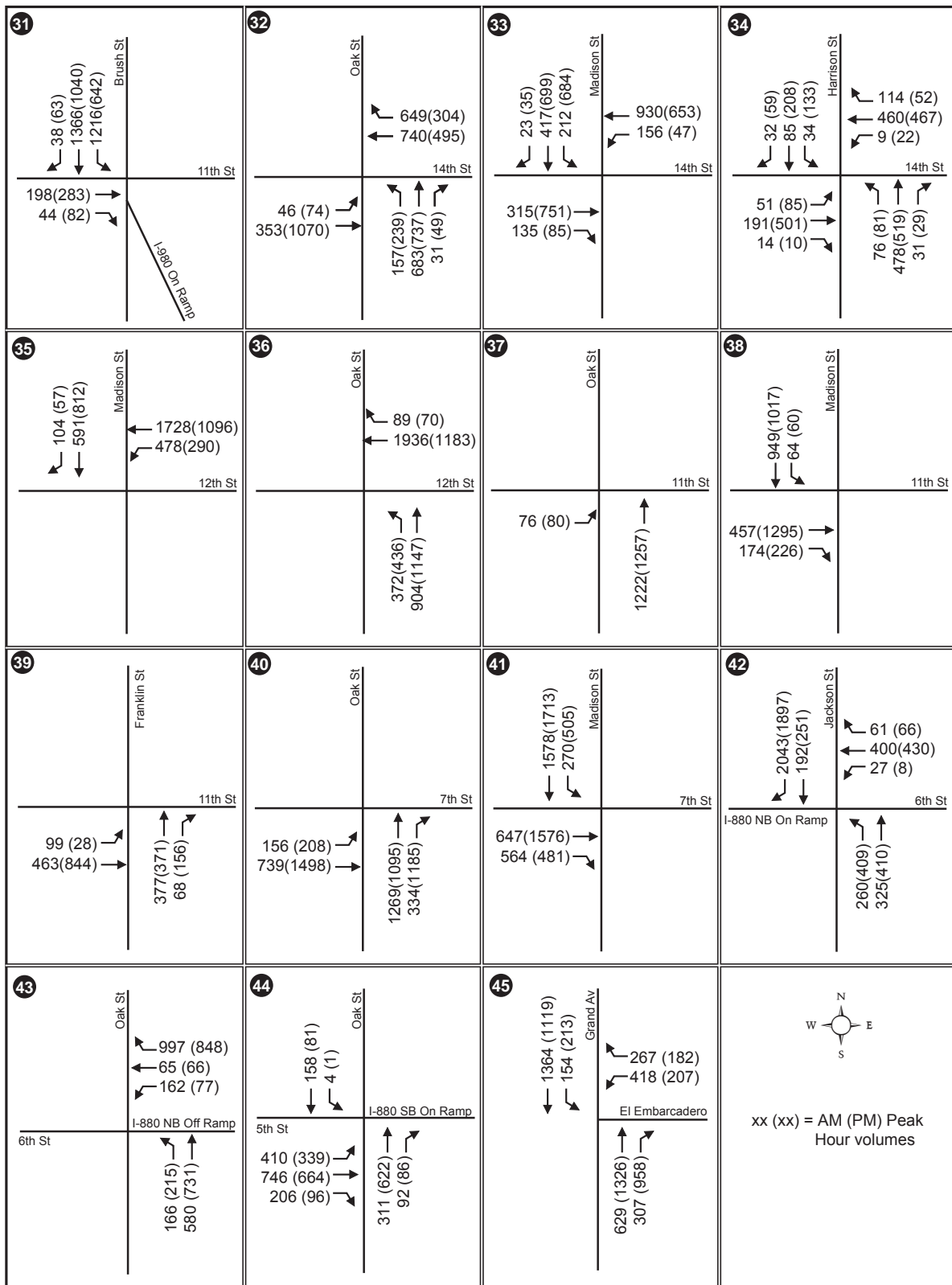
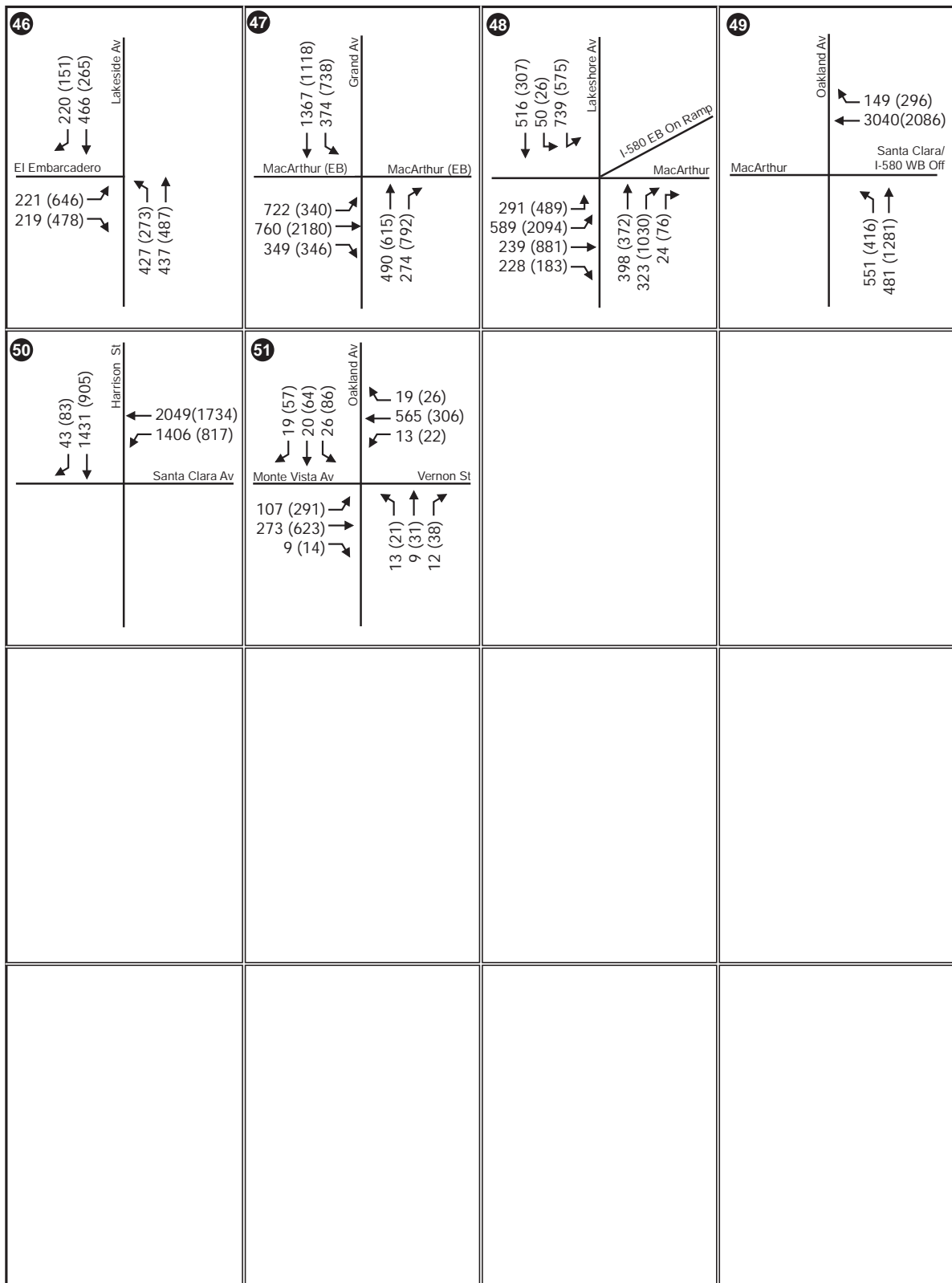


Figure IV.L-18c
 Cumulative (2030) Without Project Traffic Volumes
 AM (PM) Peak Hour



For some peak hours, intersection delays at Intersection #45 (Grand Avenue / El Embarcadero) and Intersection #46 (Lakeshore Avenue / El Embarcadero) are lower in Near-Term (2015) without Project Conditions than in Existing Conditions because the Existing Conditions analysis uses counts conducted before the Measure DD improvements were constructed. As construction of the improvements at these locations and adjacent roadways is still ongoing, drivers have yet to adjust to new traffic patterns and travel behavior. Once all construction is complete and drivers have adjusted, however, volumes are expected to be reduced, particularly along Lakeshore Avenue, which is being reduced to one travel lane in each direction.

Average delay at some intersections would decrease under Cumulative (2030) without Project Conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

Cumulative (2030) without Project Roadway Operating Conditions

A roadway facility operating at LOS F indicates that the facility is over-capacity (i.e., v/c ratio is greater than 1.00). The following four of the 11 roadway segments would operate at LOS F under Cumulative (2030) without Project Conditions; detailed calculations for the roadway segment analysis are included in **Appendix G.9**:

- Caltrans roadways
 1. SR 260 (Posey / Webster Tubes), from Alameda city limits to I-880 (*northbound, AM and PM peak hours; southbound, PM peak hour*)
 4. I-980, from 27th Street to 29th Street (*southbound, AM peak hour*)
- Non-Caltrans roadways
 9. Grand Avenue, from Harrison Street to El Embarcadero (*eastbound, PM peak hour*)
 10. Harrison Street, from I-580 to 27th Street (*northbound, PM peak hour*)

Cumulative (2030) plus Project (Phase I and Phase II) Conditions

Intersection Impacts

Impact TRANS-7: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-7a through TRANS-7l)

Cumulative (2030) plus Project (Phase I and Phase II) Conditions traffic volumes are illustrated in **Figure IV.L-19**. **Table IV.L-16** summarizes the peak hour LOS at the 51 study intersections under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Average delay at some intersections would decrease under Cumulative (2030) plus Project (Phase I and Phase II) Conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

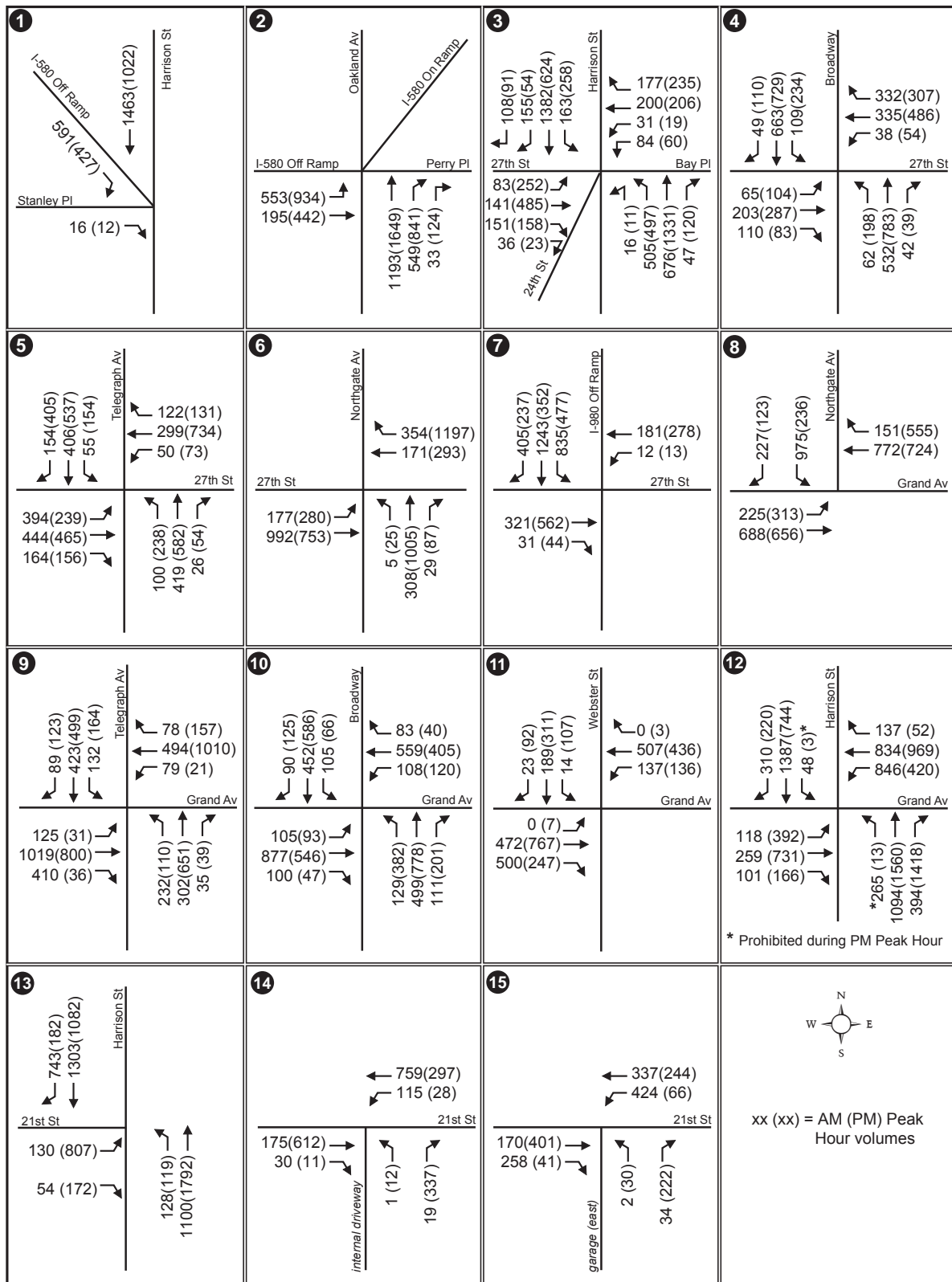


Figure IV.L-19a
Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
AM (PM) Peak Hour

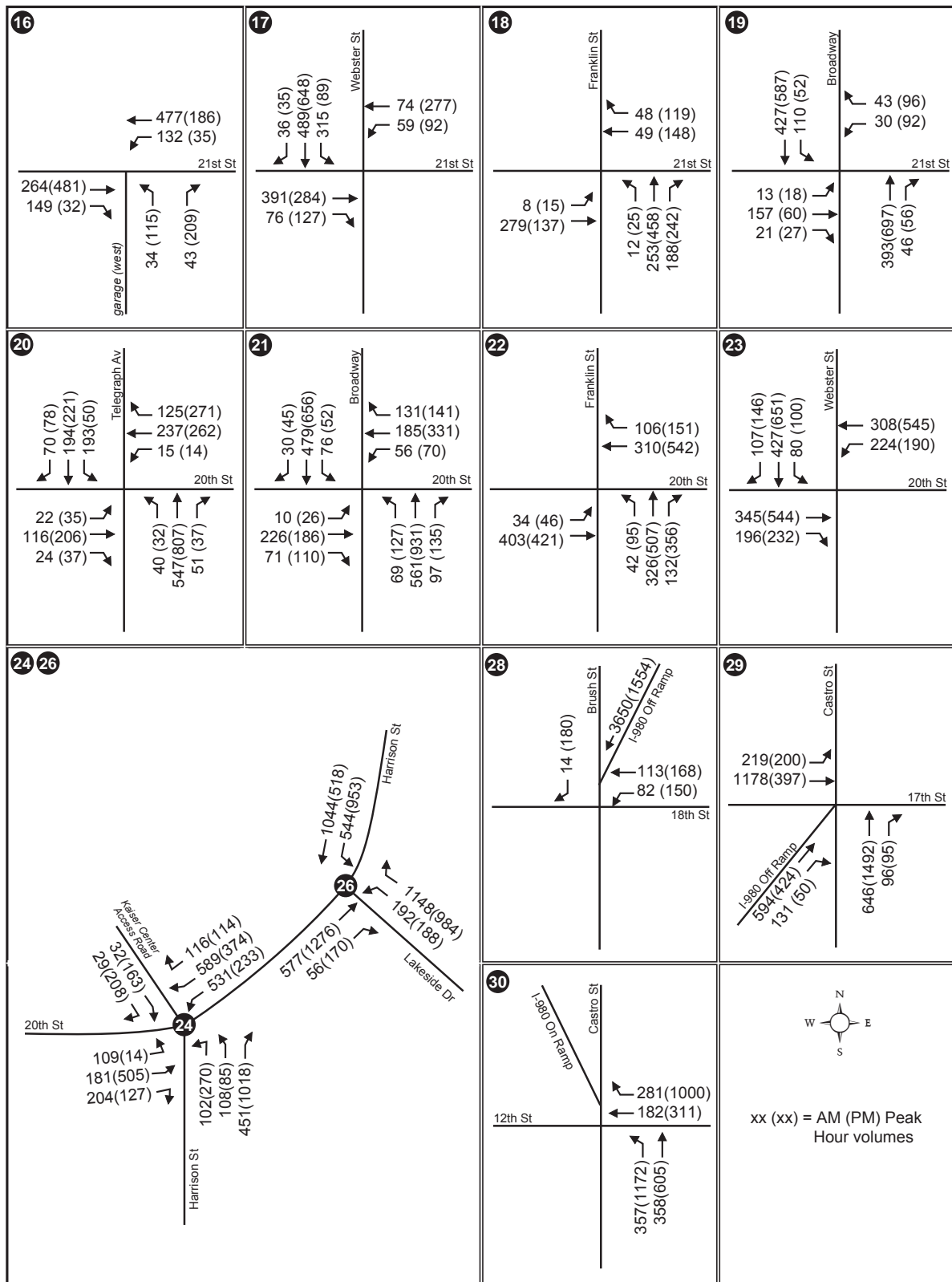


Figure IV.L-19b
Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
AM (PM) Peak Hour

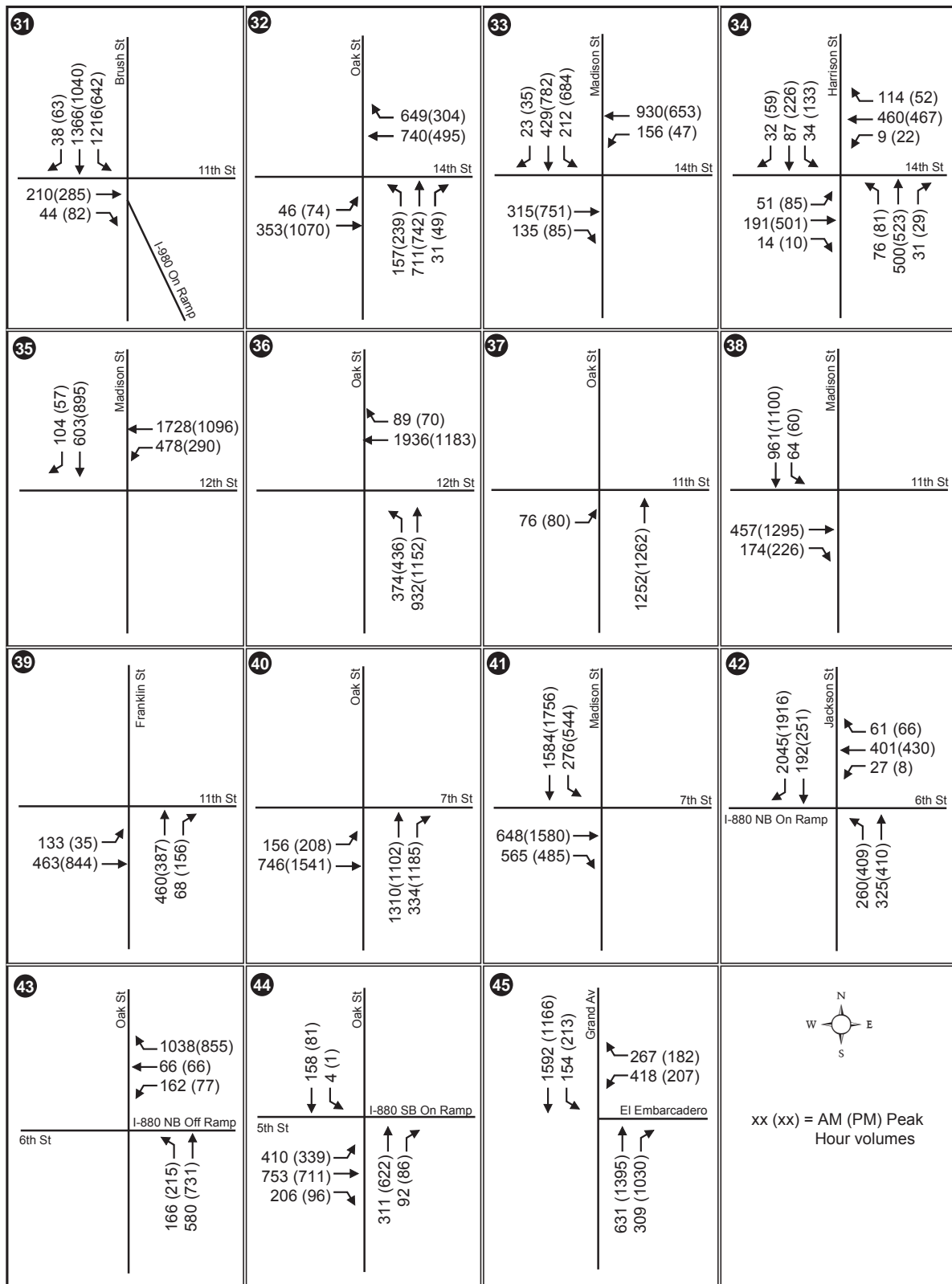
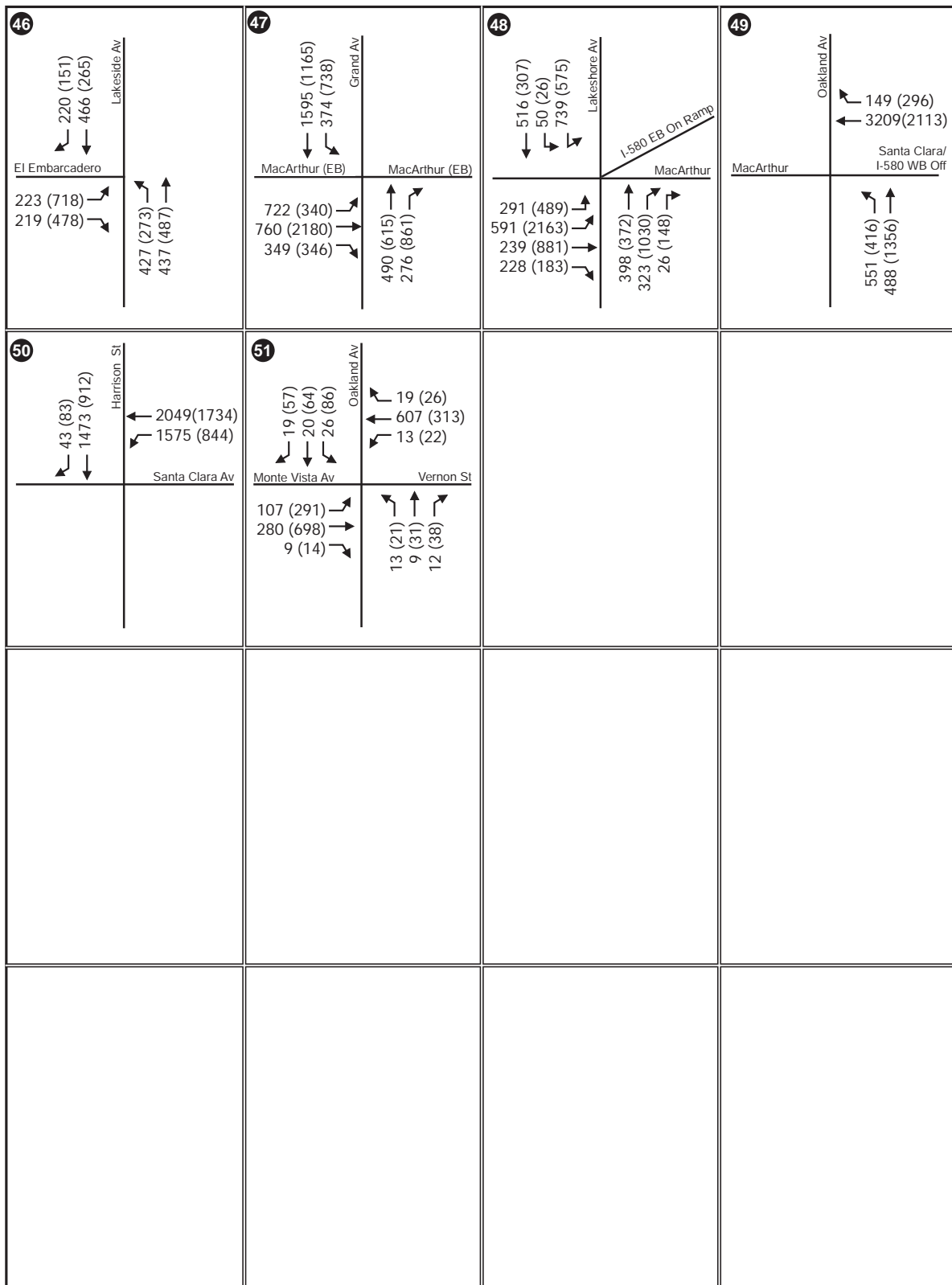


Figure IV.L-19c
 Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
 AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-19d
Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-16
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

No.	Intersection	Traffic Control ^a	Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	TWSC	F	68.7	C	20.6	F	>120	C	21.8
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	E	65.9	F	>120	F	83.7	F	>120
3	Harrison Street / 27th Street / 24th Street	Signal	F	97.0	E	78.9	F	>120	F	>120
4	Broadway / 27th Street	Signal	B	17.5	C	32.2	B	18.2	D	39.4
5	Telegraph Avenue / 27th Street	Signal	C	20.5	E	67.9	C	20.9	F	103.0
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	B	12.3	B	15.8	B	13.3	C	28.6
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	15.7	B	12.1	B	18.2	B	12.1
45	Grand Avenue / El Embarcadero	Signal	C	23.4	F	>120	C	23.9	F	>120
46	Lakeshore Avenue / El Embarcadero	Signal	C	23.3	C	26.0	C	23.3	D	36.5
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	E	68.3	F	>120	E	68.6	F	>120
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	F	94.5	F	>120	F	94.4	F	>120
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	F	>120	C	21.0	F	>120	C	28.3
50	Harrison Street / MacArthur Blvd. (WB)	Signal	F	83.2	C	21.3	F	102.1	C	21.5
51	Oakland Avenue / Monte Vista Avenue	AWSC	C	22.9	F	61.2	D	29.3	F	88.8
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	26.8	C	20.5	C	29.9	C	22.3
9	Telegraph Avenue / West Grand Avenue	Signal	C	31.5	D	52.6	D	40.5	E	71.4
10	Broadway / Grand Avenue	Signal	C	22.5	C	21.4	C	24.4	D	35.9
11	Webster St. / Grand Ave.	Signal	C	29.9	C	29.4	C	31.6	C	30.9
12	Harrison St. / Grand Ave.	Signal	F	93.8	F	>120	F	>120	F	>120
13	Harrison St. / 21st St.	Signal	A	7.5	B	19.9	B	11.5	F	98.7
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	12.4	B	12.3	B	10.5	E	48.8
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	13.6	B	12.9	B	14.0	C	20.1
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	12.8	B	12.7	C	18.8	B	14.9
17	Webster St. / 21st St.	Signal	B	14.4	B	19.2	B	15.6	B	19.0

See next page for table footnotes.

TABLE IV.L-16 (Continued)
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

No.	Intersection	Traffic Control ^a	Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b	LOS	Delay ^b
18	Franklin St. / 21st St.	Signal	B	10.3	B	11.0	A	9.8	B	10.8
19	Broadway / 21st Street	Signal	B	10.8	B	12.4	B	11.6	B	12.7
20	Telegraph Ave. / 20th St.	Signal	B	13.1	B	13.0	B	13.5	B	13.1
21	Broadway / 20th Street	Signal	B	14.5	C	34.5	B	14.7	D	35.4
22	Franklin St. / 20th St.	Signal	B	11.6	B	14.8	B	14.1	B	14.5
23	Webster St. / 20th St.	Signal	C	24.0	C	24.6	C	21.3	C	25.0
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	25.7	D	42.3	E	74.0	F	>120
25	Kaiser Ctr. Access Rd. / 20th Street ^c	SSSC	B	10.5	B	10.1	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	C	21.3	D	49.0	C	20.9	E	58.4
27	Lakeside Dr. / 20th St. ^d	Signal	--	--	--	--	--	--	--	--
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	7.6	A	8.4	A	7.6	A	8.6
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	E	58.0	D	43.9	E	61.1	D	44.3
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	20.9	B	19.0	C	20.9	B	19.2
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	E	58.5	B	17.4	E	58.3	B	17.4
32	Oak Street / 14th Street	Signal	D	44.7	F	89.8	D	46.2	F	89.7
33	Madison St. / 14th St.	Signal	B	19.6	B	19.3	B	19.5	B	19.2
34	Harrison St. / 14th St.	Signal	A	9.8	B	10.7	A	9.9	B	10.8
35	Madison St. / 12th St.	Signal	A	9.7	A	10.0	A	9.7	B	10.2
36	Oak Street / 12th Street	Signal	B	14.7	B	16.0	B	14.8	B	16.1
37	Oak Street / 11th Street	SSSC	B	11.4	B	11.7	B	11.5	B	11.8
38	Madison St. / 11th St.	Signal	B	11.6	B	11.7	B	11.4	B	11.4
39	Franklin St. / 11th St.	Signal	B	14.2	B	14.1	B	13.9	B	14.1
40	Oak Street / 7th Street	Signal	B	11.5	F	92.3	B	11.9	F	92.6
41	Madison St. / 7th St.	Signal	B	13.2	C	32.9	B	13.4	D	41.1
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak Street / 6th Street / I-880 NB Off-Ramp	Signal	C	26.5	B	15.7	C	30.5	B	15.9
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120

Bold indicates significant impact.

^a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

^b The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

^c The Project would eliminate this intersection.

^d After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2009.

As shown in Table IV.L-16, the following intersections would operate at unacceptable conditions under Cumulative (2030) plus Project (Phase I and Phase II) Conditions:

Outside Downtown Area

1. Harrison Street / Stanley Place / I-580 EB Off-Ramp (LOS F in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in AM and PM peak hours)
3. Harrison Street / 27th Street / 24th Street (LOS F in AM and PM peak hours)
5. Telegraph Avenue / 27th Street (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in AM peak hour, and LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in AM and PM peak hours)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)
50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (LOS F in AM peak hour)
51. Oakland Avenue / Monte Vista Avenue / Vernon Street (LOS F in PM peak hour).

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in AM and PM peak hours)
13. Harrison Street / 21st Street (LOS F in PM peak hour)
24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
32. Oak Street / 14th Street (LOS F in PM peak hour)
40. Oak Street / 7th Street (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

The Project (Phase I and II) would not result in a significant impact at the following intersections:

- #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM)
Although the side-street service level at this unsignalized intersection would operate at LOS F during the AM peak hour under Near-Term (2030) plus Project (Phase I and Phase II) Conditions, the intersection would not satisfy the California MUTCD peak-hour signal warrant.
- #32: Oak Street / 14th Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.

- #40: Oak Street / 7th Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.
- #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.
- #51: Oakland Avenue / Monte Vista Avenue / Vernon Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the intersection is expected to be already meet the peak hour signal warrant under Cumulative (2030) without Project Conditions. Therefore, the Project would not result in a significant impact at this intersection.

Impacts due to the Project at the remaining intersections above are discussed below.

Impact TRANS-7a: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.43 under Cumulative (2030) without Project Conditions and 1.59 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 16 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7a: Implement Mitigation Measure TRANS-1a.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7b: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-7b: Implement Mitigation Measure TRANS-1b, and also prohibit westbound left turns during the AM peak hour (in addition to the PM peak hour).

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the AM peak hour. In the PM peak hour, the intersection would operate at an unacceptable LOS E, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the Project's impacts at this intersection.

As discussed for Mitigation Measure TRANS-1b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion as well as safety concerns. As a result, this impact is conservatively deemed significant and unavoidable.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7c: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #5 (Telegraph Avenue / 27th Street)* (2030). (Significant)

Mitigation Measure TRANS-7c: Implement Mitigation Measure TRANS-5c.

After implementation of the mitigation measure, the intersection would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the Project's impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7d: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue)* (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.32 under Cumulative (2030) without Project Conditions and 1.45 under Cumulative (2030) plus Project (Phase I and II) Conditions in the AM peak hour. Because the increase in v/c ratio would be 13 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7d: Implement Mitigation Measure TRANS-3c, and also prohibit southbound left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches.

These measures alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7e: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour at *Intersection #13 (Harrison Street / 21st Street)* (2030). (Significant)

Mitigation Measure TRANS-7e: Implement the following measures at the Harrison Street / 21st Street intersection:

- Prohibit eastbound right turns from 21st Street to Harrison Street during the PM peak period, which will increase capacity on the critical eastbound left-turn movement

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

The vehicles making these right-turn movements during the PM peak hour would be expected to find alternative routes with less delay and more capacity, such as westbound 21st Street to southbound Webster Street. To help enforce the prohibition, extinguishable message signs should be installed on the eastbound approach. However, these measures alone would not be sufficient to mitigate the Project's impacts at this intersection.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane at Harrison Street / Grand Avenue to reduce the spillback queuing that ultimately causes the delays at this intersection. As these improvements would result in substantial secondary impacts such as pedestrian / bicycle safety and driver visibility issues,

there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (2030). (Significant)

Mitigation Measure TRANS-7f: Implement Mitigation Measure TRANS-1c.

After implementation of the mitigation measure, the intersection (located within the Downtown area) would operate at an acceptable LOS E in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant. If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Cumulative (2030) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Cumulative Phase I and II) impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain an less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7g: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880 SB On-Ramp)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.17 in the AM peak hour and 1.86 in the PM peak hour under Cumulative (2030) without Project Conditions and would operate with a v/c ratio of 1.18 in the AM peak hour and 1.93 in the PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Because the increase in v/c ratio during the PM peak hour

would be 7 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7g: Implement Mitigation Measure TRANS-1d.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1d, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7h: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.10 under Cumulative (2030) without Project Conditions and 1.16 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7h: Implement Mitigation Measure TRANS-1e.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound through lane along Grand Avenue. As these improvements would counteract the recent geometric improvements at this intersection as part of Measure DD, there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7i: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.88 under Cumulative (2030) without Project Conditions and 1.94 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7i: Implement Mitigation Measure TRANS-1f.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1f, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7j: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.91 under Cumulative (2030) without Project Conditions and 1.96 under Cumulative (2030) plus Project (Phase I and II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 5 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7j: Implement Mitigation Measure TRANS-5i.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-5i, there are no feasible mitigation measures to

completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7k: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the AM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 0.95 under Cumulative (2030) without Project Conditions and 0.99 under Cumulative (2030) plus Project (Phase I and II) Conditions in the AM peak hour. Because the maximum increase in v/c ratio would be 4 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7k: Implement Mitigation Measure TRANS-3e.

After implementation of the mitigation measure, the intersection (located outside the Downtown area) would operate at an unacceptable LOS E in the AM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the Project's impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7l: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-7l: Implement the following measures at the Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection (located within the Downtown area) would remain unacceptable, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as additional lanes on both the Harrison Street and MacArthur Boulevard (Westbound) approaches. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Roadway Impacts

Impact TRANS-8: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would worsen level of service conditions on area roadway segments. (Significant at intersections described below under Impacts TRANS-8a to TRANS-8c)

Table IV.L-17 summarizes peak hour LOS for the study roadway segments under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-17, the following roadway segments would operate at LOS F under Cumulative (2030) plus Project (Phase I and Phase II) Conditions:

- Caltrans Facilities
 - #1: SR 260 (Posey/Webster Tubes) from Alameda city limits to I-880 (Northbound, AM and PM peak hours; and Southbound, PM peak hour)
 - #3: I-880 from Oak Street to 5th Avenue (Westbound, AM peak hour; and Eastbound PM peak hour)
 - #4: I-980 from 27th Street to 29th Street (Southbound, AM peak hour)
- Non-Caltrans Facilities
 - #9: Grand Avenue from Harrison Street to El Embarcadero (Westbound, AM peak hour; and Eastbound, PM peak hour)
 - #10: Harrison Street / Oakland Avenue from 27th Street to Grand Avenue (Southbound, AM peak hour; and Northbound, PM peak hour)

The Project would not result in a significant impact on the following segments because the addition of Project-generated traffic would not cause an increase in v/c ratio greater than the three percent threshold of significance:

- #1: SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880
- #4: I-980 from 27th Street to 29th Street

TABLE IV.L-17
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE

No.	Roadway Segment	Dir.	Ln.	Capacity (veh/hr)	Cumulative (2030) without Project Conditions						Cumulative (2030) plus Project (Phase I and Phase II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
					LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
1	SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880	NB	2	3,400	F	4,084	1.20	F	3,885	1.14	F	4,089	1.20	F	3,888	1.14
		SB	2	3,400	E	3,327	0.98	F	4,329	1.27	E	3,329	0.98	F	4,330	1.27
2	I-880 from Market Street to I-980	EB	4	8,000	B	3,835	0.48	B	3,394	0.42	B	3,929	0.49	B	3,411	0.43
		WB	4	8,000	C	4,441	0.56	C	4,031	0.50	C	4,454	0.56	C	4,117	0.51
3	I-880 from Oak Street to 5th Avenue	EB	4	8,000	E	7,390	0.92	E	7,920	0.99	E	7,405	0.93	F	8,014	1.00
		WB	4	8,000	E	7,925	0.99	E	7,217	0.90	F	8,029	1.00	E	7,237	0.90
4	I-980 from 27th Street to 29th Street	NB	3	6,000	B	2,300	0.38	D	4,806	0.80	B	2,336	0.39	D	5,039	0.84
		SB	3	6,000	F	6,653	1.11	C	3,009	0.50	F	6,806	1.13	C	3,036	0.51
Non-Caltrans Facilities																
5	Broadway from 19th Street to Grand Avenue	NB	2	1,800	B	699	0.39	C	1,207	0.67	B	739	0.41	D	1,360	0.76
		SB	2	1,800	B	595	0.33	B	823	0.46	B	660	0.37	B	837	0.46
6	Telegraph Avenue from 20th Street to 27th Street	NB	2	1,800	B	688	0.38	C	1,080	0.60	B	694	0.39	C	1,114	0.62
		SB	2	1,800	B	897	0.50	B	779	0.43	C	911	0.51	B	787	0.44
7	West Grand Avenue from Telegraph Ave. to S. Pablo Ave.	EB	2	1,800	D	1,427	0.79	C	962	0.53	E	1,554	0.86	C	969	0.54
		WB	2	1,800	C	910	0.51	C	1,160	0.64	C	923	0.51	C	1,243	0.69
8	Grand Avenue from Broadway to Harrison Street	EB	2	1,800	C	924	0.51	D	1,269	0.71	C	1,093	0.61	D	1,289	0.72
		WB	2	1,800	D	1,393	0.77	C	1,199	0.67	D	1,409	0.78	C	1,201	0.67
9	Grand Avenue from Harrison St. to El Embarcadero	EB	2	1,800	C	936	0.52	F	2,284	1.27	C	940	0.52	F	2,425	1.35
		WB	2	1,800	E	1,782	0.99	D	1,326	0.74	F	2,010	1.12	D	1,373	0.76
10	Harrison Street / Oakland Avenue from I-580 to 27th Street	NB	2	1,800	E	1,718	0.95	F	2,342	1.30	E	1,776	0.99	F	2,614	1.45
		SB	2	1,800	E	1,571	0.87	C	987	0.55	F	1,808	1.00	C	1,027	0.57
11	Harrison Street from 27th Street to Grand Avenue	NB	3	2,700	B	1,276	0.47	C	1,650	0.61	B	1,349	0.50	D	2,004	0.74
		SB	3	2,700	C	1,361	0.50	B	924	0.34	C	1,617	0.60	B	967	0.36
12	Harrison Street from 20th Street to 14th Street	NB	2	1,800	B	643	0.36	D	1,362	0.76	B	665	0.37	D	1,373	0.76
		SB	2	1,800	B	720	0.40	A	399	0.22	B	735	0.41	A	417	0.23

Bold indicates significant impact.

SOURCE: AECOM, 2009.

The Project's potential impacts on each of the remaining segments are discussed below:

Impact TRANS-8a: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on *Segment #3 (I-880 from Oak Street to 5th Avenue)* (2030). (Significant)

It should also be noted that, in each case, while the Project would cause the segment to operate to LOS F (because the traffic volumes would exceed the 8,000 vehicles hourly capacity), the increase in v/c ratio would be only one percent, and rounded to the hundredths place (per standard practice). The v/c ratio is 1.00, which is LOS E.

Mitigation Measure TRANS-8a: There are no feasible measures to mitigate the Project's impact, given the existing alignment and constraints due to lack of right-of-way for both the roadway on the west end of the channel and possibly for support columns above the Union Pacific right-of-way. The segment of I-880 from Oak Street to 5th Avenue consists of two four-lane aerial structures, with the segment immediately west of Lake Merritt Channel bordered on the north by the Laney College parking lot and on the south by industrial uses. The aerial structure continues east of the channel, crossing over the existing Union Pacific railroad right-of-way. Increasing capacity on the freeway would likely require increasing the number of travel lanes. Also, any proposed mitigation measure would also require Caltrans project approval. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-8b: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on *Segment #9 (Grand Avenue from Harrison Street to El Embarcadero)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-8b: Implement Mitigation Measure TRANS-2a.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-8c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-8c: Implement Mitigation Measure TRANS-2b.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2b, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Site Access and Circulation

Vehicular access to the Project Site would be provided via 21st Street, which offers two separate entrances to the Kaiser Center Garage and additional access to an internal garage entrance via the Access Road adjacent to the existing Kaiser Center Tower. Given the location of the Project, most vehicles would be expected to use the northwest entrance, which offers the most convenient access to the Project. 21st Street provides convenient east-west access from major arterials including Harrison Street, Lakeside Drive, Webster Street, Franklin Street, and Broadway.

While the Project would increase traffic on roadways in the vicinity, there is currently substantial capacity on these roadways, some of which offer three to four travel lanes. Localized areas in the immediate vicinity of the Project, such as 21st Street, would see increases in traffic volumes as a result of Project-generated traffic, but most of these Project trips would not be using 21st Street as a through-route, and only use it for access between major collectors (Franklin Street, Webster Street) or arterials (Harrison Street) and the Kaiser Center Garage. Both the Access Road and reversed porte cochere adjacent to the existing Kaiser Center Tower provide for circulation within the site reducing the need for Project-generated traffic to use lower-capacity roadways immediately adjacent to the site (such as 21st Street) for circulation.

The Project Site is accessible from adjacent roadways and would not result in less than two emergency access routes for streets exceeding 600 feet in length (the Kaiser Center Access Road is less than 600 feet in length and is accessible from both directions of Harrison Street, 20th Street, and 21st Street).

Impact TRANS-9: The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)

The proposed configuration of loading docks as shown in Figure IV.L-11a would consist of one dock on the southeast corner of the site on the Access Road and one dock on the northwest corner of the site adjacent to the West Exit of the Kaiser Center Garage on 21st Street. There is a potential for conflict between loading operations and garage access, as well as pedestrians in the sidewalk on the south side of 21st Street. The proposed loading area on the north side of the Project Site along 21st Street requires trucks to back into the loading docks, potentially inhibiting pedestrian access along the sidewalk and vehicular access along 21st Street.

Mitigation Measure TRANS-9: Prohibit delivery and service vehicles from accessing the loading docks during the AM and PM peak periods in order to minimize the impact of loading operations on access for the Kaiser Center Garage. The section of the Access Road from Harrison Street / 20th Street to the garage entrance should be restricted to delivery and service vehicles during off-peak hours. During off-peak periods, the Access Road approach onto Harrison Street / 20th Street should be separated off by bollards or other removable barriers to prevent passenger vehicles from crossing the site and expand pedestrian space in this immediate area. Adequate additional site management staff should be made available to direct loading maneuvers to improve the safety of pedestrians, bicyclists, and drivers during deliveries into and out of this dock. Concurrent with the submittal of a Final Development Plan, the Project Applicant shall prepare and submit a loading dock plan and operational analysis which demonstrates there are no conflicts with vehicular, pedestrian, and bicycle access to or adjacent to the site for City review and approval. The Project Applicant shall implement the approved plan.

Significance after Implementation of Mitigation: Less than Significant.

Pedestrian and Bicycle Impacts

Pedestrian Impacts

Project Pedestrian Improvements

The Project proposes new landscaping along the whole of the south, west, and north edges of the Project Site, creating an enhanced pedestrian realm and serving as a buffer protecting pedestrians from traffic along Webster Street and 20th Street. The reconfiguration of the Access Road at the intersection of Harrison Street / 20th Street also improves safety for pedestrians and reduces the potential for conflict at this location by eliminating the unusual “Y” configuration where the left-turn movement from eastbound 20th Street is a yield movement and not under signal control.

The proposed new roof garden access at the southeast corner of the Project Site would improve pedestrian circulation in and around the site, as pedestrians heading to and from the two towers would be able to use the sixth-floor lobbies to access the roof garden and proceed to street level. Instead of walking along 20th Street and Webster Street, pedestrians and the general public would be able to use the new access to reach the roof garden and enter the towers via the sixth-floor lobbies.

Project Pedestrian Trips

Transit trips generated by the Project Site are expected to result in the majority of the additional pedestrian traffic generated by the Project in the immediate vicinity of the site. As shown in Table IV.L-20 (in the *Transit* discussion further below), the Project would generate 453 BART trips and 135 AC Transit trips in the AM peak hour and 440 BART trips and 131 AC Transit trips in the PM peak hour. The majority of this pedestrian traffic would use 20th Street, which is the primary route connecting the Project Site to the 19th Street BART station and AC Transit bus stops for services along Broadway. In the AM peak period, this pedestrian traffic would be concentrated in platoons following the arrival of BART trains at the station, but would be more evenly distributed over time in the PM peak period, as transit passengers (both BART and AC Transit) generally arrive at a stop or station over a longer period of time.

As detailed in the Mode Split Memorandum provided in **Appendix G.5**, approximately four percent of all Project-generated trips would be walk-only pedestrian trips. This pedestrian traffic would be more evenly distributed than transit-related pedestrian traffic, and as such, would have a less substantial effect on the operations of pedestrian facilities.

Impact TRANS-10: The Project proposes vehicular site access out of an existing garage exit located along 21st Street (just east of Kaiser Plaza) which is currently designed in such a way that could be hazardous to pedestrians on the sidewalk. (Significant)

The proposed vehicular site access would use existing exits from the Kaiser Center Garage located along 21st Street: an East Exit just east of Kaiser Plaza, and a West Exit just east of the intersection of Webster Street / 21st Street. The wall on the West Exit adjacent to the exit lane is cut back to provide a sufficient sight distance triangle for drivers to check for pedestrians crossing the exit in the sidewalk. However, the East Exit as currently designed does not provide sufficient sight distance for drivers in vehicles exiting the garage to see pedestrians. With the expansion of the Kaiser Center Garage as part of the Proposed Project and the associated increase in garage traffic, this would represent a substantial hazard to pedestrians. Although installations of warning devices may alert pedestrians to arriving vehicles, they still do not permit the driver to see pedestrians.

Mitigation Measure TRANS-10: The Project Applicant shall redesign the East Exit of the Kaiser Center Garage along 21st Street to allow for sufficient distance and visibility for drivers to see pedestrians and stop. Redesign options shall include sidewalk widening, wherever feasible. In the event that this is structurally infeasible, the Project Applicant shall install audible and visible warning devices such as bells and lights to alert pedestrians, and a speed hump to force drivers exiting the garage to slow down and be more alert.

Significance after Implementation of Mitigation: Less than Significant.

Potential Additional Recommended Conditions

As discussed previously, site observations concluded that existing pedestrian facilities generally are insufficient:

- The unobstructed width of sidewalk along the north side of 20th Street between the 19th Street BART Station and Harrison Street is substantially reduced to 5 to 6 feet at some locations due to various obstacles and barriers.
- Approximately 90 percent of pedestrians queuing at the intersection of Franklin Street / 20th Street during the AM peak were observed to cross illegally due to long wait times and low cross traffic volumes. Illegal crossing was also observed at other intersections and locations.
- Curbs at some intersections (northeast corner of Franklin Street / 20th Street and southwest corner of Webster Street / 20th Street) are constructed with unnecessarily large radii, encouraging high turning speeds for vehicles, increasing pedestrian crossing distances, and reducing pedestrian storage areas.

Given these concerns, and the fact that the Project will add a significant number of new pedestrian trips, the following “Recommended Conditions” should be considered to improve operations of pedestrian facilities in the immediate vicinity of the Project and are consistent with the City’s Pedestrian Master Plan. Although not required by CEQA, these Recommended Conditions are recommended herein by City Staff to be included as Project specific conditions of approval. They are not necessary to address or mitigate any environmental impacts of the Project.

Recommendation TRANS-1: Increase sidewalk capacity on the north side of 20th Street between Broadway and Harrison Street.

In order to improve pedestrian flow, it is recommended that the sidewalk capacity along the north side of 20th Street between Broadway and Harrison Street be increased as follows:

- **Between Broadway and Franklin Street, remove parking and widen the sidewalk.** Currently, a limited amount of metered on-street parking is provided just east of the BART station entrance (three spaces on the north side of 20th Street and two spaces on the south side of 20th Street). The section on the north side directly east of the entrance is used as a de facto “kiss-and-ride” zone in the mornings and pickup zone in the afternoon and evenings. Several employee shuttles from the office buildings at 180 Grand, 155 Grand and 1 Kaiser Plaza also use this curb space to load and offload passengers. However, circulation space is limited because the sidewalk begins to narrow 30 feet east of the entrance. This section of curb also includes an exit driveway for the existing building on the northeast corner of the intersection of Franklin Street / 20th Street.

In the AM peak periods, pedestrian traffic exiting the BART station via the escalator (located on the north side of the station entrance) conflicts with pedestrian traffic entering the station attempting to access the stairwell (located on the south side of the station entrance). Employees attempting to board the special shuttles also cross against opposing pedestrian traffic in order to reach the shuttle boarding area.

By removing parking and widening the sidewalk, circulation space directly east of the entrance could be increased.

Once the three parking spaces on the north side of 20th Street are removed, the existing bus stop serving AC Transit Lines 11, 59, 59A, and 805 would then be moved out to the new curb line, resulting in a larger unobstructed width on the main part of the sidewalk. The extended curb could align with the existing “bulbout” for the BART station entrance and 20th Street restriped to remove the misalignment in the pavement markings. A bulbout could also be provided at the northwest corner of Franklin Street / 20th Street in the east-west direction. This would not require removal of any parking as that section of curb is already marked red, but would significantly increase queuing space for pedestrians waiting to cross.

Removal of three spaces would have a negligible impact on overall parking conditions in the area. It is important to note that the schematic is only a conceptual illustration, and implementation of any or all of the improvements would require further analysis and design.

It should also be noted that there are several AC Transit stops in close proximity along westbound 20th Street between Telegraph Avenue and Harrison Street:

- North side of 20th Street between Telegraph Avenue and Broadway (three stops occupying the full length of block);
- Northwest corner of Franklin Street / 20th Street; and,
- Northeast corner of Webster Street / 20th Street.

While most AC transit services do not use all three stops, some consolidation of stops could also be considered to streamline service, reduce transit vehicle travel times, and improve passenger connections.

- **Between Franklin Street and Webster Street, widen the sidewalk.**

This section of 20th Street is proposed for Class 2 bicycle facilities (bicycle lanes), which would require removal of the exclusive westbound right-turn lane. Additional space obtained as part of those improvements could be set aside for sidewalk widening along the north side of 20th Street, which has an extremely limited unobstructed width due to building frontage.

If the westbound right-turn lane were removed, the intersection of Franklin Street / 20th Street would still operate at LOS B (14.0 seconds of intersection average delay) during the weekday AM peak hour and LOS B (14.7 seconds of intersection average delay during the weekday PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Without removal of the westbound right-turn lane, the intersection would operate at LOS B under both peak hours, with intersection average delay at 14.1 seconds during the weekday AM peak hour and 14.5 seconds during the weekday PM peak hour. Therefore, removal of the

westbound right-turn lane would produce a negligible change in intersection operations and would not result in secondary impacts if implemented.

The northeast corner of Franklin Street / 20th Street could be redesigned so as to reduce the curb radius, shortening crossing distances for pedestrians and encouraging drivers to take their turns slower. A bulbout could also be provided at this corner to further reduce crossing distances.

- **Between Webster Street and Harrison Street, redesign the Project frontage to be pedestrian-friendly.** The portion of 20th Street abutting the site is split into two narrow paths as a result of landscaping and a slight grade from the edge of the existing buildings to the curb. The path closest to the curb is extremely narrow and is partially restricted by the AC Transit bus stop east of the intersection of Webster Street / 20th Street. The path closer to the existing building is restricted by outdoor cafe seating.

The sidewalk could be redesigned to reduce or eliminate the grade difference and better position the landscaping so as to buffer the sidewalk from the roadway as opposed to divide the sidewalk in two. Given the wide curb lane, the sidewalk closest to the intersection with Webster Street could be widened in a similar fashion to the section of 20th Street between Broadway and Franklin Street. The existing bus stop would be moved out to the new curb line. This may, however, restrict some through capacity along westbound 20th Street, as vehicles could queue up behind stopped transit vehicles, unable to pass around them.

Bulbouts could be provided at the northwest and northeast corners of this intersection in the east-west direction, shortening crossing distances and increasing queuing space on the major pedestrian route to and from BART.

Recommendation TRANS-2: Reduce cycle times of signals at the intersections of Franklin Street / 20th Street and Webster Street / 20th Street.

Due to long cycle lengths, one-way traffic, and relatively low traffic volumes, there is a high occurrence of pedestrians on the north side of 20th Street crossing Franklin Street and Webster Street illegally. Reducing the cycle length of these signals would shorten wait times for pedestrians attempting to cross, improving safety for all road users, including drivers, bicyclists, and pedestrians. Currently, these intersections operate with 80-second cycle lengths, but these could be reduced to 60- or 70-second cycle lengths to reduce waiting times for pedestrians attempting to cross.

Bicycle Impacts

Although the existing bikeway network is limited, the network improvements currently being constructed or undergoing design would make bicycling safer and a more attractive mode of transportation. Based on the four percent walk / bicycle / other mode share presented in the Mode Split Findings Memorandum (see **Appendix G.5**), the Project is expected to result in a minor increase in bicycle traffic on the roadway networks.

The existing Class 2 and Class 3 bicycle facilities in the vicinity of the Project have excess capacity to handle the increase in bicycles as a result of the Project. The Project proposes no

features which would be unsafe to bicycle travel, and therefore, there would be no significant adverse impacts on bicycle conditions as a result of the Project.

Project Bicycle Facilities

Table IV.L-18 specifies the City of Oakland Municipal Code requirements for the provision of short- and long-term bicycle parking facilities, as well as shower and locker facilities, for the Proposed Project. The 136 long-term bicycle spaces should be secure and serve office workers who may leave their bicycles at the same location all day or overnight, and should be provided in the form of bicycle lockers or bicycle cages.

**TABLE IV.L-18
BICYCLE FACILITY REQUIREMENTS**

Facility / Land Use	Amount (KSF) ^a	Municipal Code Provision	Facility Requirement
Bicycle Parking			
Office	1,320	1 long-term space per 10 KSF 1 short-term space per 20 KSF	132 long-term spaces 66 short-term spaces
Retail	46	1 long-term space per 12 KSF 1 short-term space per 5 KSF	4 long-term spaces 9 short-term spaces
Total			136 long-term spaces 75 short-term spaces
Bicycle Showers and Lockers			
Office	1,320	2 showers per gender, plus one shower per gender for each 150 KSF above 150 KSF	10 showers per gender (20 total)
		4 lockers per shower	80 lockers
Retail	46	No locker or shower requirements (less than 150 KSF)	--
Total			10 showers per gender (20 total) 80 lockers

^a KSF = 1,000 sq. ft.

SOURCE: AECOM, 2009.

The 75 short-term bicycle racks would accommodate visitors who leave their bikes for a reasonably short period of time and should be provided in areas that provide shelter and, ideally, a high level of passive security from surrounding pedestrians. Other visible security measures such as security cameras may also be considered.

Potential Additional Recommended Conditions

Project-generated vehicles would increase traffic volumes on roadways in the immediate vicinity of the Project Site, which could reduce the attractiveness of bicycling as a mode of transport for trips in this area. Although not required to mitigate a significant impact, the following

recommendation should be considered to improve bicycle conditions in the immediate vicinity of the Project:

Recommendation TRANS-3: Construct the 20th Street bikeway between Broadway and Harrison Street.

As discussed in the Existing Bicycle Conditions section, the section of 20th Street between Harrison Street and Franklin Street is proposed for Class 2 bicycle facilities (bicycle lanes). Given the high volumes expected on this roadway in Near-Term Conditions and Cumulative Conditions, in order to encourage use of alternative modes of travel such as bicycling and provide greater safety for bicyclists, it is recommended that this section of the bikeway network be completed.

AC Transit Travel Time

Travel time along the following corridors was evaluated in order to determine the impacts of Project-generated traffic on the operations of key AC Transit trunk lines in Downtown Oakland:

1. 11th Street (eastbound) from Brush Street to Oak Street
2. 12th Street (westbound) from Oak Street to Brush Street
3. 20th Street (eastbound) from Telegraph Avenue to Harrison Street
4. 20th Street (westbound) from Harrison Street to Telegraph Avenue
5. Broadway (southbound) from 27th Street to 20th Street
6. Broadway (southbound) from 20th Street to 11th Street
7. Broadway (northbound) from 11th Street to 20th Street
8. Broadway (northbound) from 20th Street to 27th Street
9. Grand Avenue between MacArthur Boulevard and Harrison Street – (westbound AM and eastbound PM)
10. Harrison Street between MacArthur Boulevard and Grand Avenue (southbound AM and northbound PM)
11. Telegraph Avenue between 20th Street and 27th Street (southbound AM and northbound PM)

Corridors #1 through #8 were analyzed in both directions during both the AM and PM peak hours. Corridors #9, #10, and #11 were analyzed for only one direction during each peak hour, as traffic on these segments is highly directional.

Table IV.L-19 and **Table IV.L-20** summarize the results of the travel time analysis for the AM and PM peak hours. Observations of corridor travel times were taken for Existing Conditions and travel time differentials obtained from the Synchro networks used in the intersection LOS

analysis. A minimum of three field runs were conducted in each direction for each corridor in September 2008.

It should be noted that the travel times presented here only represent the time it takes automobiles to travel the length of the corridor. Obtaining a travel time estimate for transit vehicles traveling through corridors can be difficult considering that the travel time for transit vehicles is much more variable than that for automobiles. This variability is due to a wide variety of factors, but primarily involves schedule adherence and on-time performance. A transit vehicle that is already behind schedule can quickly get further behind schedule due to accumulating passenger demand at transit stops, resulting in longer than usual dwell times to allow passengers to board and alight. In addition, because transit vehicles must follow the same route, there is less flexibility than with automobiles in events such as accidents or unexpected congestion, increasing delays further. Given these considerations, the values in Table IV.L-19 and Table IV.L-20 should be viewed as the incremental increase in transit travel time from one analysis scenario to the next.

As shown in Table IV.L-19 and Table IV.L-20, the Project would increase peak hour travel times along most corridors, mostly as a result of increases in intersection average delay. Some corridors would see average travel time decrease slightly between existing and future-year scenarios and between baseline and Project scenarios, primarily as a result of geometry changes or better-performing movements at intersections. Travel time on westbound 20th Street, for example, is lower under Near-Term (2015) without Project Conditions than under Existing Conditions, partially as a result of reduced delays due to Measure DD modifications at this intersection.

The following corridors are expected to be most affected by the Project:

- Corridor #9: Grand Avenue EB (Harrison Street to MacArthur Boulevard) – PM; and,
- Corridor #10: Harrison Street between MacArthur Boulevard and Harrison Street – southbound AM and northbound PM.

Under Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the Project would cause an increase in corridor travel time of 37 seconds along Corridor #9 in the PM peak hour and increases of 257 seconds in the AM peak hour (southbound) and 165 seconds in the PM peak hour (northbound) directions along Corridor #10. Other corridors such as Broadway would also experience substantial increases in travel time in the future, but the Project's contribution to these increases would be minimal.

**TABLE IV.L-19
TRANSIT CORRIDOR TRAVEL TIMES – AM PEAK HOUR**

		Corridor Travel Time (Incremental Increase in Seconds)						
No.	Route	Existing Conditions	Existing plus Project (Phase I and Phase II) Conditions	Near-Term (2015) without Project Conditions	Near-Term (2015) plus Project (Phase I) Conditions	Near-Term (2015) plus Project (Phase I and Phase II) Conditions	Cumulative (2030) without Project Conditions	Cumulative (2030) plus Project (Phase I and Phase II) Conditions
Weekday AM Peak Hour								
1	11th Street EB Brush Street to Oak Street	3:35	(- 1)	+ 3	+ 3	+ 1	+ 5	+ 4
2	12th Street WB Oak Street to Brush Street	3:19	+ 0	+ 3	+ 3	+ 3	+ 5	+ 5
3	20th Street EB Telegraph Avenue to Harrison Street	2:17	+ 23	+ 18	+ 10	+ 12	+ 25	+ 10
4	20th Street WB Harrison Street to Telegraph Ave.	1:40	+ 6	(- 23)	(- 13)	(- 11)	(- 23)	(- 5)
5	Broadway SB 27th Street to 20th Street	2:21	+ 4	+ 5	+ 6	+ 8	+ 10	+ 15
6	Broadway SB 20th Street to 11th Street	2:28	+ 0	+ 7	+ 8	+ 8	+ 16	+ 17
7	Broadway NB 11th Street to 20th Street	2:19	+ 0	+ 3	+ 5	+ 7	+ 19	+ 24
8	Broadway NB 20th Street to 27th Street	1:03	+ 1	+ 3	+ 3	+ 4	+ 7	+ 8
9	Grand Avenue WB MacArthur Blvd. to Harrison Street	3:30	+ 2	(- 3)	+ 0	+ 5	+ 15	+ 35
10	Harrison Street SB MacArthur Blvd. to Grand Avenue	3:28	+ 20	+ 77	+ 89	+ 107	+ 390	+ 647
11	Telegraph Street SB 27th Street to 20th Street	2:23	+ 2	+ 5	+ 5	+ 4	+ 4	+ 2

SOURCE: AECOM, 2009.

**TABLE IV.L-20
TRANSIT CORRIDOR TRAVEL TIMES – PM PEAK HOUR**

		Corridor Travel Time						
No.	Route	Existing Conditions	Existing plus Project (Phase I and Phase II) Conditions	Near-Term (2015) without Project Conditions	Near-Term (2015) plus Project (Phase I) Conditions	Near-Term (2015) plus Project (Phase I and Phase II) Conditions	Cumulative (2030) without Project Conditions	Cumulative (2030) plus Project (Phase I and Phase II) Conditions
Weekday PM Peak Hour								
1	11th Street EB Brush Street to Oak Street	4:40	+ 0	+ 2	+ 2	+ 2	+ 5	+ 5
2	12th Street WB Oak Street to Brush Street	3:28	+ 0	+ 3	+ 5	+ 5	+ 14	+ 14
3	20th Street EB Telegraph Avenue to Harrison Street	2:18	+ 28	(- 0)	+ 1	+ 2	+ 6	+ 5
4	20th Street WB Harrison Street to Telegraph Avenue	3:29	+ 9	(- 41)	(- 23)	(- 22)	(- 32)	(- 10)
5	Broadway SB 27th Street to 20th Street	2:18	+ 1	+ 2	+ 2	+ 3	+ 9	+ 11
6	Broadway SB 20th Street to 10th Street	2:58	+ 0	+ 45	+ 45	+ 44	+ 163	+ 164
7	Broadway NB 11th Street to 20th Street	3:33	+ 3	+ 80	+ 79	+ 80	+ 204	+ 209
8	Broadway NB 20th Street to 27th Street	1:45	+ 1	+ 42	+ 42	+ 44	+ 101	+ 104
9	Grand Avenue EB Harrison Street to MacArthur Blvd.	4:21	+ 37	+ 35	+ 51	+ 70	+ 138	+ 175
10	Harrison Street NB Grand Avenue to Perry Place	3:44	+ 133	+ 23	+ 81	+ 168	+ 79	+ 244
11	Telegraph Street NB 20th Street to 27th Street	2:03	+ 1	+ 0	+ 1	+ 1	+ 6	+ 9

SOURCE: AECOM, 2009.

Given that these are major corridors with significant vehicle traffic traveling to and from freeway ramps, transit vehicles on these routes already experience some delay during the peak periods and would continue to do so in Near-Term (2015) without Project Conditions and Cumulative (2030) without Project Conditions. As these are both key transit and vehicle corridors, diverting transit service off these roadways would be undesirable, even though doing so would likely improve travel times.

It should be noted, however, that some of the major vehicle corridors for Project-generated trips do not coincide with the transit corridors in Downtown Oakland. Broadway is the major north-south transit corridor in Downtown Oakland, but most Project-generated traffic heading to and from I-880 and Alameda would use Madison Street and Oak Street, which do not have transit service at all. Even on 20th Street, which carries a significant amount of east-west transit traffic and is directly adjacent to the Project Site, as well as for Jackson Street and the 11th Street / 12th Street couplet, the increase in traffic would be minimal. Furthermore, outside of the peak periods, the effect of the Project on transit travel times in these corridors is expected to be minimal, as most employees would arrive in the AM peak period and leave in the PM peak period.

Mitigation: None required.

Although not required to mitigate a significant impact, the following recommended improvements should be considered to improve transit conditions in the immediate vicinity of the Project:

Recommendation TRANS-4: Improve bus waiting areas on 20th Street directly adjacent to the Project Site.

As discussed in Recommendation TRANS-1, it is recommended that the sidewalk be widened at certain locations to improve pedestrian flow and reduce sidewalk congestion. As part of these proposed improvement measures, the two bus stops on the north side of 20th Street just east of Webster Street and west of Franklin Street would be moved out to the new curb line to open up sidewalk space. Currently, however, the stops are designed as simple benches, without shelters or other covered waiting areas.

It is therefore recommended that when these bus stops are relocated that the stops be redesigned as shelters featuring amenities for waiting passengers such as the following:

- A large, visible system map (currently only a small area map is provided for the immediate vicinity surrounding the stop) and comprehensive area map showing bus stop locations for other lines in the area;
- Bus schedules; and,
- Real-time arrival information.
- Wayfinding signage to transit facilities should also be provided on major pedestrian routes, such as 20th Street to and from the 19th Street BART Station.

Construction Period Impacts

Impact TRANS-11: Potential short-term construction impacts generated by the Proposed Project would include the impacts associated with the delivery of construction materials

**and equipment, removal of construction debris, and parking for construction workers.
(Less than Significant).**

Table IV.L-21 provides a summary of Project construction traffic activity. During the construction period, temporary and intermittent transportation impacts would result from truck movements as well as construction worker vehicles traveling to and from the Project Site. The construction-related traffic would result in a temporary reduction to the capacities of Project area streets because of the slower movements and larger turning radii of construction trucks compared to passenger vehicles. Truck traffic that occurs during the peak commute hours (7:00 a.m. to 9:00 a.m., and 4:00 p.m. to 6:00 p.m.) could result in worse levels of service and higher delays at local intersections than during off-peak hours. Also, if parking of construction workers' vehicles cannot be accommodated within the Project Site, it would temporarily increase parking occupancy levels in the area. Project construction could also adversely affect the operations of AC Transit, and bicycle and pedestrian circulation.

**TABLE IV.L-21
SUMMARY OF PROJECT CONSTRUCTION TRAFFIC ACTIVITY**

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Construction Vehicle Type / Number of Trips		
Off Haul Trucks (excavation materials)	3,100 truck loads	100 truck loads
Debris Box Trucking	260 loads	300 loads
Delivery Trucks	5,500 trucks	6,000 trucks
Passenger Vehicles (incl. construction employees)	140 cars per day average, 250 cars peak	140 cars per day average, 250 cars peak
Mobile Cranes	Intermittent use	Intermittent use
Construction Traffic Routes		
Interstate 580 ^a	To Harrison Street to job site	To Harrison Street to job site
Interstate 880	To Harrison Street to job site	To Harrison Street to job site
Interstate 980	To 27th Street to Harrison Street to job site	To 27th Street to Harrison Street to job site
Staging Areas/Lane or Street Closures		
Street	Close one lane (no parking) of 20th Street and one lane (parking) of Webster Street	Close one lane (parking) of Webster Street and one lane (parking) of 21st Street
Sidewalk	Close 20th Street and Webster Street sidewalks (adjacent to Project Site)	Close Webster Street and 21st Street sidewalks (adjacent to Project Site)
Construction Workers/Day		
Average number of workers	212	212
Peak	380	380
Parking	Existing onsite garage or surface lots in the vicinity	Existing onsite garage or surface lots in the vicinity
Estimated Cut/Fill; Mass Excavation	31,000 cubic yards	Minimal (existing building demolition)
Number of Truck Trips (Off Haul) (subset of Construction Vehicle Type/Number of Trips, above)		
Demolition Debris	800 truck loads	1,000 truck loads
Excavated Material	3,100 trucks	100 trucks

^a Trucks over 9,000 pounds gross weight are prohibited from using Interstate 580 between Grand Avenue in Oakland and the city limits of the San Leandro, which means that only construction workers would use northbound I-580 to access the job site.

SOURCE: Turner Construction, 2009

Implementation of SCA TRANS-1 would ensure that construction period impacts are reduced to a less-than-significant level and require consultation with AC Transit about construction activity.

Mitigation: None required.

Planning-Related Non-CEQA Issues

The following section discusses transportation-related planning issues that do not constitute physical environmental impacts under CEQA, but that are evaluated to inform decision makers and the public about these issues.

Transit Impacts

This discussion evaluates the Project's potential to do any of the following:

- Increase the average ridership on AC Transit lines by three percent at bus stops where the average load factor in place would exceed 125 percent over a peak 30- minute period;
- Increase traffic congestion resulting in substantially increased travel times for AC Transit buses; or,
- Increase the peak hour average ridership on BART by three percent where the passenger volume would exceed the standing capacity of BART trains.

Based on the 30 percent transit mode share assumed for the trip generation analysis, the Project (Phase I and Phase II) would generate about 588 transit trips in the weekday AM peak hour and 571 transit trips in the weekday PM peak hour. Given that the Project would consist primarily of office space, these trips would almost exclusively be inbound during the AM peak hour and outbound during the PM peak hour. The expected distribution of transit trips was developed based on the trip distributions derived from the ACCMA Travel Demand Model.

For origins and destinations with both BART and AC Transit service, the split of Project-generated new transit riders on BART and AC Transit was based on a transit mode split of 7 percent AC Transit and 23 percent BART (for a total transit share of 30 percent) presented in the *Downtown Transportation and Parking Plan* (2003) for the Old Oakland / Metro Center / County Center Downtown subareas. The results of this analysis are summarized in **Table IV.L-22**.

AC Transit Loading

As shown in Table IV.L-22, the most substantial increase in transit ridership as a result of the Project would occur on the NL route, which would carry about 30 new riders in both the AM and PM peak hours. With 15-minute headways, this increase in ridership is equivalent to about eight new riders per bus. Given that the peak direction for the NL is westbound (towards Downtown Oakland and San Francisco) in the AM peak period and eastbound in the PM peak period, the Project would increase ridership in the "reverse commute" direction, which has substantial capacity to accommodate additional riders.

**TABLE IV.L-22
PROJECT WEEKDAY PEAK-HOUR TRANSIT TRIPS**

Origin / Destination	Transit Routes				Transit Routes
	AM Peak Hour		PM Peak Hour		
	BART	AC	BART	AC	
San Francisco	122	31	119	30	BART, NL
Hayward / Fremont	118	29	114	29	BART, 1, 1R, 40
West Oakland	39	26	38	25	BART, 13, 14, 19, NL
East Oakland	54	23	52	22	BART, 1, 1R, 11, 14, 18, 40, NL
North Oakland / Berkeley / Albany / El Cerrito / Richmond	62	26	60	26	BART, 1, 1R, 15, 18, 51, 72, 72R, 72M, 88
Walnut Creek / Pleasant Hill	59	0	57	0	BART
Total	454	135	440	132	

SOURCE: AECOM, 2009.

The Project would also cause increases of 20 to 30 passengers in the AM and PM peak hours to and from other origins and destinations, but these areas are served by multiple AC Transit bus lines. Project transit ridership would likely only result in a maximum increase of two to three passengers per bus on these lines.

Given this increase in AC Transit ridership, it is not expected that the Project would increase the average ridership on AC Transit lines by three percent at bus stops where the average load factor in place would exceed 125 percent over a peak 30-minute period

Mitigation: None required.

BART Loading

As shown in **Table IV.L-22**, the most substantial increase in transit ridership as a result of the Project would occur on the San Francisco and Fremont corridors of the BART network, which would see increases of about 120 passengers each in both the AM and PM peak hours. The existing peak hour capacity utilization—i.e., the ratio of ridership to capacity—for BART trains serving 19th Street Station is summarized in **Table IV.L-23**, given across a series of stations in and around Downtown Oakland for each line and direction. A capacity utilization over 100 percent would indicate exceedance of the standing capacity of the train.

Based on BART fleet statistics, the maximum capacity of a BART car was assumed to be 150 passengers, with an average of 68 to 72 seats in each car. Therefore, cars would have only standing room available at about 45 to 48 percent capacity utilization.

**TABLE IV.L-23
EXISTING BART TRAIN CAPACITY UTILIZATION**

Line	Train Length (cars)	As Train Enters	Half-Hour Capacity Utilization			
			AM Peak Hour		PM Peak Hour	
			8:00-8:30	8:30-9:00	5:00-5:30	5:30-6:00
Fremont – Richmond	6	Lake Merritt	82%	72%	20%	24%
		Oakland City Center / 12th Street	74%	65%	22%	26%
		19th Street	54%	52%	49%	63%
		MacArthur	36%	37%	54%	68%
Richmond – Fremont	6	MacArthur	59%	63%	35%	46%
		19th Street	35%	33%	30%	38%
		Oakland City Center / 12th Street	29%	28%	45%	58%
		Lake Merritt	22%	20%	59%	77%
		Fruitvale	19%	16%	64%	80%
Richmond – Colma	8-9	MacArthur	50%	58%	14%	19%
		19th Street	53%	62%	15%	19%
		Oakland City Center / 12th Street	52%	62%	19%	22%
		West Oakland	49%	59%	24%	26%
Colma – Richmond	8-9	Oakland City Center / 12th Street	21%	24%	41%	58%
		19th Street	15%	16%	43%	59%
		MacArthur	11%	12%	45%	60%
		Ashby	11%	9%	39%	54%
Pittsburg / Bay Point – Daly City	9-10	19th Street	61%	76%	14%	19%
		Oakland City Center / 12th Street	59%	74%	16%	24%
		West Oakland	56%	72%	20%	30%
Daly City – Pittsburg / Bay Point	9-10	Oakland City Center / 12th Street	11%	15%	43%	77%
		19th Street	8%	10%	41%	73%
		MacArthur	7%	8%	43%	76%
		Rockridge	6%	7%	41%	74%

SOURCE: BART, 2007; AECOM, 2007.

It should be noted that the data presented from Table IV.L-23 is from 2007 and does not completely account for service changes that took place in January 2008. However, the 2008 service changes primarily affected line terminals (service to SFO was reinstated on the Pittsburg / Bay Point line instead of the Dublin / Pleasanton line, and the Richmond line was extended to Millbrae), and did not affect peak hour frequencies at the core of the system (San Francisco, Oakland, and Berkeley). Therefore, the overall effect of these service changes on train capacity utilization in Downtown Oakland, which is part of the core of the system, would be minimal.

As shown in Table IV.L-23, the Fremont – Richmond trains in the AM peak period and the Richmond – Fremont trains in the PM peak period exhibit the highest capacity utilization (approximately 80 percent). This is due to the relatively shorter trains as compared to those on other lines. BART's other lines generally operate eight- to ten-car trains during the peak periods, but the Fremont – Richmond and Richmond – Fremont services operate with six-car trains. Given

these considerations, it was determined that the most critical increase in BART ridership as a result of the Project would occur on these trains, warranting additional analysis.

Under Existing plus Project (Phase I and Phase II) Conditions, ridership would increase by about 30 passengers per train for these lines during the peak hours, or about five passengers per car. At most, this is equivalent to a three percent increase in capacity utilization for these lines, bringing maximum capacity utilization on Fremont – Richmond trains in the AM peak hour to 85 percent and on Richmond – Fremont trains in the PM peak hour to 83 percent. However, the Project would not cause BART passenger volumes to exceed the standing capacity of trains.

Trains on other lines would see similar increases, but because they currently operate at well under 100 percent capacity utilization, these trains have capacity to accommodate additional Project-generated riders without exceeding standing capacity.

Mitigation: None required.

BART Faregate Queuing

Faregate queuing is most critical during the AM peak period exiting 19th Street Station, because passengers disembark from trains at approximately the same time, within the span of a few seconds. Queuing during the PM peak period is less critical because passengers entering the station tend to be more uniformly distributed over a span of several minutes leading up to the arrival of their train.

Based on the schedule of arrivals at 19th Street Station, the maximum queues occur when the Fremont – Richmond and SFO – Pittsburg / Bay Point trains arrive at the station at the same time as a result of the timed transfer at Oakland City Center / 12th Street Station. This timed transfer is scheduled to occur at the Oakland City Center / 12th Street station every 15 minutes and results in both trains also being scheduled to arrive at the 19th Street station at the same time. Observations of faregate queuing at the 19th Street Station during the peak period verified that the maximum queues occurred during this period.

It is assumed that all Project-generated BART ridership would use the faregate array leading to the station entrance at the northeast corner of the intersection of Broadway / 20th Street. Located at the northeastern corner of the station, this is the most convenient faregate array for access to the Kaiser Center block. There are actually two separate arrays of faregates at the north end of the station:

- The northeast array, which consists of a total of five faregates, which are configured to provide three exit faregates during the AM peak period; and,
- The northwest array, which consists of a total of three faregates, which are configured to provide two exit faregates during the AM peak period.

Observations indicate that the majority of passengers exiting and entering on the north end of the station use the northeast array, which is more conveniently located for access to the offices in and

around the Kaiser Center area. The northwest array is not well-utilized, likely because there is substantially less office space west of Broadway. Observations indicated that the maximum queues at the northeast array are about 12 people in length at each of the three exit faregates and the maximum delays experienced by passengers waiting in the queues are about 16 to 18 seconds. This situation is defined as the “peak queuing scenario” for the 19th Street Station.

It should be noted, however, that queues of any significance only formed when both the Richmond-bound train and the Pittsburgh / Bay Point-bound train actually arrive at the same time. While the timed transfer schedules both trains to arrive at the same time, this scenario rarely occurs given fluctuations in arrival and departure times at Oakland City Center / 12th Street Station. Accordingly, when these two trains arrive at 19th Street Station even thirty seconds to one minute apart, the queues generated at the faregates are significantly shorter in length.

In addition, the maximum observed queue delay is not equivalent to the average queue delay. Because of the large volume of passengers over a short span of time, it is difficult to obtain a measure of average queue delay based simply on visual observations. However, average queue delay is expected to be significantly lower than maximum queue delay, considering that passengers who arrive at the faregates before or after the peak queues would experience little to no queue delay at all.

Based on the estimates of Project BART ridership in Table IV.L-22, the Project would add about 45 passengers during the peak queuing scenario (30 passengers from the Fremont – Richmond train and 15 passengers from the SFO – Pittsburgh / Bay Point train). Based on a BART faregate capacity of 25 passengers per minute and assuming that these additional Project-generated riders all arrive at the faregates at the same time, the Project would theoretically increase the maximum faregate queues by 15 passengers to 27 passengers in length. The service time required to handle the additional 15 passengers is about 36 seconds, increasing the theoretical maximum queue delays to 52 to 54 seconds.

However, this methodology represents an extremely conservative model of faregate delay, as it assumes that all Project-generated riders arrive at the array at the same time, which doesn’t take into account (1) the walking speed of the passenger; (2) the walking distance (i.e., location of the train doors in relation to concourse level access points and locations of stairs and escalators in relation to the faregate arrays); and (3) the means of concourse access (i.e., stair vs. escalator).

Because of these factors, it is likely that the Project would increase maximum queue delay by five to ten seconds at the most, but still keeping the maximum queue delay well under the one minute performance standard of the City of Oakland. Average queue delay would increase by even less, because it is much less than the maximum queue delay.

In addition, the northwest array is currently substantially under-utilized because it offers less convenient access to the northeast station entrance. Maximum queue delays at this array were observed to be several seconds, and many exiting passengers experienced no queue delay at all. If passengers find queues at the northwest array to be problematic, they will likely use the northeast array, which will offer quicker service times for minimal additional walking distance. With

increasing use of BART's contactless smart card technology (i.e., the EZ Rider Card) among regular passengers, the potential for queue delays would also be substantially reduced.

Furthermore, the direction of faregates can also be modified to accommodate additional passenger demand. Given the lighter passenger demand entering 19th Street Station in the AM peak hour, an additional exit faregate at the array could be provided by simply switching one of the two entry faregates to the exit direction.

Mitigation: None required.

Intersection Queuing Analysis

Queuing analysis was carried out for all of the "with project" scenarios using the Synchro software. The software calculates the expected queue using a formula that extrapolates the length of queue based on two cycle lengths. This methodology provides reasonable results for locations operating in the LOS A through D, but can misrepresent conditions as intersection operations approach capacity. In these instances, the software output denotes the condition with a letter / symbol adjacent to the analysis output worksheet.

Signalized intersections operating at unacceptable conditions as shown in Table IV.L-10, Table IV.L-12, Table IV.L-14, and Table IV.L-16 were selected for evaluation as the Project is expected to have its largest effect on 95th percentile queues at these intersections. In all cases, the storage capacity is taken as the distance to the nearest intersection, major driveway, or pedestrian crossing.

Instances where the Project trips would add 25 or more feet to the baseline (without project) 95th percentile queue if the baseline 95th percentile queue was already over the available storage length, or where Project trips would extend the queue over the available storage length, were identified. The findings are summarized below and detailed analysis and tables are provided in **Appendix G.7** of this EIR.

Existing plus Project (Phase I and II) Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – Grand Avenue NER.

Near-Term (2015) plus Project (Phase I) Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #12: Harrison Street / Grand Avenue (PM) – Harrison Street NBR;

- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – Grand Avenue NER; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – Lakeshore Avenue NETR.

Near-Term (2015) plus Project (Phase I and II) Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #5: Telegraph Avenue / 27th Street (PM) – Telegraph Avenue NBL and 27th Street WBT;
- Intersection #12: Harrison Street / Grand Avenue (PM) – Harrison Street NBR and SBTR;
- Intersection #42: Jackson Street / 6th Street / I-880 NB On-Ramp (PM) – Jackson Street SBR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – Grand Avenue NER;
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – Lakeshore Avenue NETR; and,
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (AM) – MacArthur Boulevard (WB) NWTR.

Cumulative (2030) plus Project (Phase I and II) Conditions

- Intersection #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM) – I-580 EB Off-Ramp EBR;
- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (AM / PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (AM / PM) – Harrison Street SBTR (AM) and NBTR (PM);
- Intersection #5: Telegraph Avenue / 27th Street (PM) – Telegraph Avenue NBL and SBL, and 27th Street WBT;
- Intersection #12: Harrison Street / Grand Avenue (AM / PM) – Harrison Street NBT / NBR (PM) and SBTR (AM / PM), and Grand Avenue WBL (AM);
- Intersection #13: Harrison Street / 21st Street (PM) – Harrison Street NBT;
- Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM) – Harrison Street NBLTR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (AM / PM) – Grand Avenue SWT (AM) and NER (PM);
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – Lakeshore Avenue NETR;

- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (AM) – MacArthur Boulevard (WB) NWTR; and,
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – Harrison Street SWT.

It should be noted, however, that most of these locations have already been proposed for mitigation measures as a result of intersection LOS impacts. These measures, which include optimization of signal timing and phasing and upgrading of traffic signal hardware, would mitigate some of the Project's intersection LOS impacts at these locations, and would generally improve 95th percentile queues. In cases where the proposed mitigation measures would not completely mitigate the Project's intersection LOS impacts, further improvements to reduce 95th percentile queues would generally be infeasible, as these are typically geometrically-constrained locations, or locations where further improvements would conflict with policies for other modes such as transit, pedestrians, or bicycles, or with ongoing planning efforts.

Mitigation: None required.

Although not required to mitigate a significant impact, the following recommended improvement should be considered to reduce queuing:

Recommendation TRANS-5: Close the Stanley Place approach at Intersection #1 (Harrison Street / Stanley Place / I-580 EB Off-Ramp).

Closure of the Stanley Place minor approach would slightly reduce the 95th percentile queue under Cumulative (2030) plus Project (Phase I and II) Conditions, although not below a 25-foot increase over Cumulative (2030) without Project Conditions. This measure would have the added benefit of reducing delay for traffic using the I-580 Eastbound Off-Ramp and reducing the potential for collision by eliminating the conflict resulting from two adjacent minor-street approaches. Pedestrian access along the north side of Harrison Street would also be improved as a result.

The queues on the Kaiser Center Access Road approach at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) would be confined within the Project Site and would not cause spillback that would affect roadways outside the site.

Traffic Control

The California Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant was satisfied at the following intersections under Project scenarios:

- Intersection #51: Oakland Avenue / Monte Vista Avenue / Vernon Street.

However, this intersection would already satisfy the MUTCD peak hour signal warrant under baseline scenarios. While the Project would add traffic to this intersection, the minor street approaches at this location would already operate with substantial levels of delay even without Project-generated traffic.

Mitigation: None required.

Collision History

Historical collision data were examined at study intersections for a recent period of six years and three months (October 1, 2002 to December 31, 2008). All collisions involving vehicles, bicycles, and/or pedestrians were noted, and collision rates (collisions per one million entering vehicles) were determined. Average daily traffic volumes are assumed to be ten times the PM peak hour volume. As shown in **Table IV.L-24**, the intersection of Brush Street / 18th Street / I-980 Westbound Off-Ramp has the highest collision rate, at 1.61 collisions per million entering vehicles, while the average rate for study intersections is 0.48 collisions per million entering vehicles.

In addition, the primary causal factors (e.g., right-of-way violation, unsafe speed, improper turning) of each incident were examined to determine the cause of the collisions. **Table IV.L-25** outlines the results for each intersection. Collision summary data can be found in **Appendix G.8**.

Mitigation: None required.

**TABLE IV.L-24
INTERSECTION COLLISION SUMMARY**

#	Intersection	Involved with				Total	Injuries	Peak Hour Vol.	Collision Rate ^d
		Veh.	Bicycle ^a	Ped. ^b	Other ^c				
1	Harrison/Stanley/I-580 Ramp	0	0	1	1	2	0	826	0.22
2	Oakland/Perry/I-580 Ramps	7	0	0	1	8	0	2,336	0.23
3	Harrison / 27th St./24th St.	27	0	0	2	29	8	3,048	0.65
4	Broadway / 27th St.	10	1	2	1	14	4	2,482	0.39
5	Telegraph Ave. / 27th St.	12	2	1	1	16	2	2,632	0.42
6/7	Northgate/27th/I-980 Ramp	38	1	0	2	41	26	3,962	0.71
8	Northgate / West Grand	7	0	0	0	7	3	1,864	0.34
9	Telegraph / West Grand	13	2	2	3	20	10	2,557	0.54
10	Broadway / Grand Ave.	10	1	0	1	12	12	2,332	0.35
11	Webster St. / Grand Ave.	5	0	0	0	5	1	1,468	0.23
12	Harrison St. / Grand Ave.	8	1	0	0	9	5	4,159	0.15
13	Harrison St. / 21st St.	7	0	0	0	7	0	2,514	0.19
17	Webster St. / 21st St.	2	0	0	1	3	1	888	0.23
18	Franklin St. / 21st St.	5	0	0	1	6	5	672	0.61
19	Broadway / 21st Street	6	0	1	1	8	8	1,013	0.54
20	Telegraph Ave. / 20th St.	10	0	1	1	12	3	1,248	0.66
21	Broadway / 20th Street	5	0	0	1	6	2	1,961	0.28
22	Franklin St. / 20th St.	10	1	0	1	12	2	1,209	0.68
23	Webster St. / 20th St.	2	0	0	0	2	0	1,401	0.10
24	Harrison St. / 20th St.	5	0	0	0	5	2	1,527	0.22
26	Harrison St. / Lakeside Dr.	8	0	0	0	8	3	2,492	0.29
27	Lakeside Dr. / 20th St.	3	0	0	0	3	0	1,568	0.13
28	Brush/18th/I-980 WB Ramp	41	0	0	0	41	19	1,397	1.61
29	Castro/17th/I-980 EB Ramp	32	0	0	0	32	10	1,903	0.92
30	Castro/12th/I-980 EB Ramp	35	0	0	0	35	4	2,310	1.04
31	Brush/11th/I-980 WB Ramp	10	0	0	1	11	3	1,580	0.48
32	Oak Street / 14th Street	5	0	0	0	5	3	2,127	0.16
33	Madison St. / 14th St.	9	0	0	2	11	1	1,893	0.40
34	Harrison St. / 14th St.	23	0	1	2	26	16	1,552	1.15
35	Madison St. / 12th St.	5	0	1	0	6	4	1,614	0.25
36	Oak Street / 12th Street	7	0	2	1	10	4	1,869	0.83
37	Oak Street / 11th Street	0	0	0	1	1	0	958	0.07
38	Madison St. / 11th St.	3	0	0	0	3	0	1,694	0.12
39	Franklin St. / 11th St.	5	0	0	2	7	1	1,003	0.48
40	Oak Street / 7th Street	7	0	0	1	8	4	2,160	0.25
41	Madison St. / 7th St.	13	0	0	0	13	5	2,640	0.34
42	Jackson/6th/I-880 NB Ramp	32	0	0	0	32	10	2,488	0.88
43	Oak/6th/I-880 NB Ramp	4	0	0	1	5	0	1,388	0.25
44	Oak/5th/I-880 SB Ramp	12	0	0	1	13	2	1,355	0.66
45	Grand / El Embarcadero	22	0	1	2	25	7	3,158	0.43
46	Lakeshore / El Embarcadero	15	1	1	0	17	2	2,563	0.36
47	Grand / MacArthur Blvd. (EB)	21	0	2	3	26	6	3,634	0.39
48	Lakeshore / MacArthur (EB)	40	2	1	10	53	6	3,414	0.85
49	Oakland / MacArthur (WB)	43	1	0	4	48	17	2,372	1.11
50	Harrison / MacArthur (WB)	21	0	0	4	25	2	2,057	0.67
51	Oakland / Monte Vista Ave.	0	0	0	0	0	0	917	0.00
Average									0.48

^a Detection (usually video detection) for bicycles is typically a consideration for intersections with collisions involving bicycles.

^b Pedestrian countdown signals are typically a consideration for intersections with collisions involving pedestrians.

^c Includes collisions with objects and collisions marked as "Not Stated," "Fixed Object," or "Unknown."

^d Incident rates in collisions per million vehicles entering the intersection.

SOURCE: City of Oakland, October 2002-December 2008; AECOM, 2009.

**TABLE IV.L-25
INTERSECTION COLLISION PRIMARY CAUSAL FACTORS**

#	Intersection	Factors					Unknown / Other / Not Stated
		Auto R/W Violation	Traffic Signals and Signs	Unsafe Speed	Other Hazardous Movement	Improper Turning	
1	Harrison/Stanley/I-580 Ramp	0%	0%	50%	0%	50%	0%
2	Oakland/Perry/I-580 Ramps	0%	25%	38%	0%	38%	0%
3	Harrison/27th/24th	24%	17%	10%	3%	28%	17%
4	Broadway / 27th Street	36%	21%	14%	0%	7%	21%
5	Telegraph Ave. / 27th St.	0%	25%	25%	13%	19%	19%
6/7	Northgate/27th/I-980 Ramps	0%	63%	15%	0%	17%	5%
8	Northgate/West Grand	17%	0%	17%	17%	33%	17%
9	Telegraph/West Grand	35%	15%	10%	0%	15%	25%
10	Broadway / Grand Avenue	33%	50%	0%	0%	0%	17%
11	Webster / West Grand	20%	40%	0%	0%	40%	0%
12	Harrison St. / Grand Ave.	0%	22%	44%	0%	22%	11%
13	Harrison St. / 21st St.	0%	29%	14%	0%	14%	43%
17	Webster St. / 21st St.	0%	0%	0%	0%	67%	33%
18	Franklin St. / 21st St.	0%	0%	33%	0%	50%	17%
19	Broadway / 21st Street	25%	50%	0%	0%	13%	13%
20	Telegraph Ave. / 20th St.	8%	17%	8%	0%	25%	42%
21	Broadway / 20th Street	33%	33%	0%	0%	0%	33%
22	Franklin St. / 20th St.	8%	33%	0%	0%	25%	33%
23	Webster St. / 20th St.	0%	50%	0%	0%	50%	0%
24	Harrison St. / 20th St.	0%	0%	20%	20%	20%	40%
26	Harrison St. / Lakeside Dr.	0%	25%	38%	0%	13%	25%
27	Lakeside Dr. / 20th St.	0%	0%	67%	0%	33%	0%
28	Brush/18th/ I-980 WB Ramp	2%	56%	15%	0%	10%	17%
29	Castro/17th/ I-980 EB Ramp	3%	50%	3%	3%	13%	28%
30	Castro/12th/ I-980 EB Ramp	6%	29%	0%	14%	31%	20%
31	Brush/11th/ I-980 WB Ramp	0%	18%	0%	18%	45%	18%
32	Oak Street / 14th Street	20%	20%	20%	0%	20%	20%
33	Madison St. / 14th St.	0%	0%	18%	18%	45%	18%
34	Harrison St. / 14th St.	8%	62%	8%	0%	8%	15%
35	Madison St. / 12th St.	0%	67%	0%	0%	17%	17%
36	Oak Street / 12th Street	0%	71%	6%	6%	6%	12%
37	Oak Street / 11th Street	0%	0%	0%	0%	100%	0%
38	Madison St. / 11th St.	0%	67%	0%	0%	33%	0%
39	Franklin St. / 11th St.	0%	29%	43%	0%	14%	14%
40	Oak Street / 7th Street	0%	75%	13%	0%	13%	0%
41	Madison St. / 7th St.	0%	46%	23%	0%	23%	8%
42	Jackson/6th/ I-880 NB Ramp	3%	84%	6%	0%	3%	3%
43	Oak/6th/ I-880 NB Ramp	0%	20%	20%	20%	20%	20%
44	Oak/5th/ I-880 SB Ramp	0%	69%	0%	8%	15%	8%
45	Grand / El Embarcadero	12%	8%	44%	4%	4%	28%
46	Lakeshore / El Embarcadero	12%	35%	24%	0%	6%	24%
47	Grand / MacArthur (EB)	4%	15%	19%	0%	27%	35%
48	Lakeshore / MacArthur. (EB)	15%	26%	15%	2%	11%	30%
49	Oakland / MacArthur (WB)	4%	48%	10%	2%	15%	21%
50	Harrison / MacArthur (WB)	0%	54%	21%	0%	13%	13%

SOURCE: City of Oakland, January 2003-September 2007; AECOM, 2009.

Parking and Loading

Proposed Parking and Loading Supply

The Project would remove 155 spaces in the existing Kaiser Center Garage and construct 852 spaces for a net increase of 697 spaces in the Kaiser Center Garage, broken down by phase as follows:

- Phase I of the Project would construct 467 new spaces, but would not demolish any existing spaces, resulting in a net increase of 467 spaces; and,
- Phase II of the Project would demolish 155 existing spaces and construct 385 new spaces, resulting a net increase of 230 spaces.

After completion of the Project, the Kaiser Center Garage would have a capacity of 2,037 spaces and be operated as a single garage shared between the existing Kaiser Center tower and the Project.

For the purposes of this analysis, all existing spaces in the Kaiser Center Garage, including spaces that would be removed and replaced as part of the Project, are not considered part of the Project's proposed parking supply. The proposed parking supply is equivalent to the net new parking as a result of the Project—in this case, 697 spaces.

The Project proposes a total of six loading berths. Three loading berths would be located in a single dock on the north side of the Project Site, accessible via 21st Street, serving the North Tower. An additional three berths would be located in a single dock on the east side of the Project Site, with access from the Access Road running through the Kaiser Center block. These berths would serve the South Tower and are shown in Figures IV.L-11a and L-11b.

Parking Supply and Demand Evaluation

The Court of Appeal has held that parking is not part of the permanent physical environment, that parking conditions change over time as people change their travel patterns, and that unmet parking demand created by a project need not be considered a significant environmental impact under CEQA unless it would cause significant secondary effects.⁹ Similarly, the December 2009 amendments to the State CEQA Guidelines (which were effective March 18, 2010) removed parking from the State's Environmental Checklist (Appendix G of the State CEQA Guidelines) as an environmental factor to be considered under CEQA. Parking supply/demand varies by time of day, day of week, and seasonally. As parking demand increases faster than the supply, parking prices rise to reach equilibrium between supply and demand. Decreased availability and increased costs result in changes to people's mode and pattern of travel. However, the City of Oakland, in its review of the proposed project, wants to ensure that the project's provision of additional parking spaces along with measures to lessen parking demand (by encouraging the use of non-auto travel modes) would result in minimal adverse effects to project occupants and visitors, and that any secondary effects (such as on air quality due to drivers searching for parking spaces) would be minimized. As such, although not required by CEQA, parking conditions are evaluated in this document.

⁹ San Franciscans Upholding the Downtown Plan v. the City and County of San Francisco (2002) 102 Cal.App.4th 656.

Parking deficits may be associated with secondary physical environmental impacts, such as air quality and noise effects, caused by congestion resulting from drivers circling as they look for a parking space. However, the absence of a ready supply of parking spaces, combined with available alternatives to auto travel (e.g., transit service, shuttles, taxis, bicycles or travel by foot), may induce drivers to shift to other modes of travel, or change their overall travel habits. Any such resulting shifts to transit service, in particular, would be in keeping with the City's "Transit First" policy.

Additionally, regarding potential secondary effects, cars circling and looking for a parking space in areas of limited parking supply is typically a temporary condition, often offset by a reduction in vehicle trips due to others who are aware of constrained parking conditions in a given area. Hence, any secondary environmental impacts that might result from a shortfall in parking in the vicinity of the proposed project are considered less than significant.

This [EIR] evaluates if the project's estimated parking demand (both project-generated and project-displaced) would be met by the project's proposed parking supply or by the existing parking supply within a reasonable walking distance (five minutes or approximately 900 feet) of the project site. Project-displaced parking results from the project's removal of standard on-street parking, City or Redevelopment Agency owned/controlled parking and/or legally required off-street parking (non-open-to-the-public parking which is legally required).

A consideration when evaluating the Project's proposed parking supply is the City of Oakland Municipal Code requirements for off-street parking. It should be noted that code requirements are not used to determine parking impacts; a comparison of parking supply versus estimated parking demand (discussed later) is used to determine potential impacts. An estimate of parking demand was obtained through use of the Institute of Transportation Engineers' *Parking Generation* (Third Edition). **Table IV.L-26** summarizes vehicle parking code requirements and estimated parking demand for the Project. Because the proposed retail space is assumed to be a one-to-one replacement of existing retail space at the Project Site, the proposed retail space is omitted from the code requirement and demand calculations.

TABLE IV.L-26
PARKING CODE REQUIREMENTS AND DEMAND

Land Use ^a	Size (KSF) ^b	Code Requirement	Parking Demand		
			ITE	Downtown Transportation and Parking Plan	Spaces Proposed (Net)
Office					
South Tower (Phase I)	552	0	1,325	773	467
North Tower (Phase II)	768	0	1,843	1,075	230
Total	1,320	0	3,168	1,848	697

^a For office use (Land Use 701 – Office Building, Urban):
Average Peak Period Parking Demand: 2.40 vehicles per 1,000 sq. ft. GFA

^b KSF = 1,000 sq. ft.

SOURCE: City of Oakland *Municipal Code* 17.116.080; Institute of Transportation Engineers (ITE), *Parking Generation* (3rd Edition), 2003; AECOM, 2009.

According to the City of Oakland Municipal Code, the Project is not required to provide any off-street parking because of its location in a C-55 / S-17 zoning district.

According to national Institute of Transportation Engineers (ITE) statistics, land uses similar in size and type to the Proposed Project would generate a parking demand of 3,168 spaces. The available capacity on-site and in the surrounding area would be about 1,610 spaces:

- 697 spaces are proposed as the Project's net new parking supply;
- 419 spaces in average existing capacity available at the Kaiser Center Garage, based on occupancy data as of July 2010 (Table IV.L-7, page IV.L-35); and,
- 494 spaces in average existing capacity available at off-street parking facilities in the vicinity of the Project, based on occupancy surveys as of October 2008 (Table IV.L-7, all facilities other than the Kaiser Center Garage).

Based on this available capacity and ITE parking demand estimates, the Project would result in a parking shortfall of about 1,558 spaces¹⁰.

It should be noted, however, that the estimated parking demand rate of 2.4 vehicles per 1,000 square feet represents an average for suburban locations where private automobiles are the primary mode of travel, and is therefore not entirely applicable for areas with comprehensive transit service such as Downtown Oakland. The *Downtown Transportation and Parking Plan*, compiled by Dowling Associates for the City of Oakland Redevelopment Agency and the Community and Economic Development Agency (CEDA) in October 2003, recommended off-street parking ratios of 1.4 vehicles per 1,000 square feet for locations in Downtown outside of the City Center area, within two blocks of BART. Based on these calculations, the Project would generate a parking demand of about 1,848 spaces, which would still result in a shortfall of about 238 spaces.¹¹

Given the wide availability of high-quality transit alternatives such as BART and AC Transit, however, the Project is not expected to result in substantial effects on parking conditions in the vicinity of the Project Site. In fact, providing more parking could instead increase the automobile mode share for Project-generated trips and facilitate increased vehicle trips or increased frequency of auto use, and would counteract the City's Transit First policy and TDM programs implemented by the Project sponsor or future tenants within the Project buildings. See page IV.L-42 for a discussion of the City of Oakland's SCA TRANS-1 (Parking and Transportation Demand Management), which requires that prior to issuance of a final inspection of the building permit, the applicant shall submit for review and approval by the Planning and Zoning Division a TDM plan containing strategies to reduce on-site parking demand and single occupancy vehicle travel.

The City of Oakland Municipal Code has specific requirements for parking stall size (18 feet by 8.5 feet for regular stalls, and 16 feet by 7.5 feet for compact stalls). The code limits the amount of compact spaces to 33 percent of the total parking supply.

¹⁰ $3,160 - [697 + 419 + 494] = 1,558$.

¹¹ $1,848 - [697 + 419 + 494] = 238$.

Based on preliminary site plans, the Project's parking supply would need to meet the code requirements on parking stall dimensions and supply of compact spaces. If the Project's proposed parking supply does not satisfy code requirements, the Project sponsor would be required to obtain a variance from CEDA.

Loading Supply Evaluation

While the City of Oakland does not provide specific thresholds of significance with regards to loading, a shortfall in the provision of loading berths could result in delivery and service vehicles double-parking and obstructing circulation in the area, leading to an increased potential for collisions. Given these considerations, the Project's proposed supply of loading berths was compared against the loading supply requirements from the City of Oakland Municipal Code. Because the proposed retail space is assumed to be a one-to-one replacement of existing retail space at the Project Site, the proposed retail space is omitted from the code requirement and demand calculations.

Based on the Project's gross area of office space, the Project is required to provide three loading berths for each phase of the development—a total of six berths. Because the Project is proposing three berths for each tower, the Project's proposed supply of loading berths would meet code requirements.

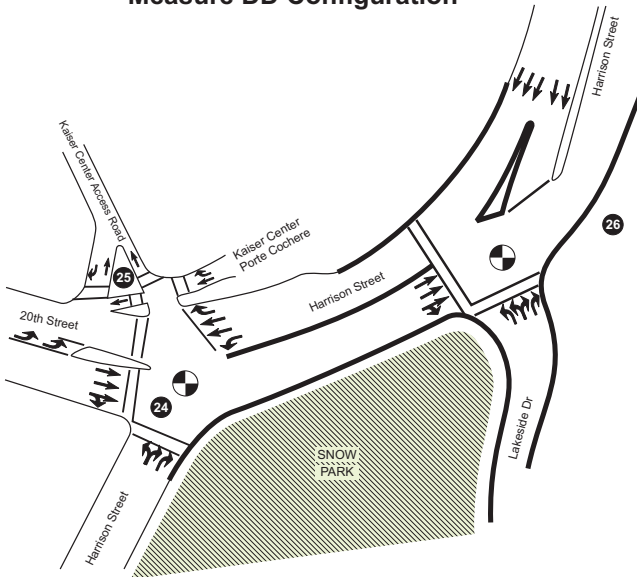
The design of the proposed spaces must meet the code requirements on loading berth dimensions (33 feet long, 12 feet wide, and 14 feet high). If the Project's proposed loading berth designs do not satisfy code requirements, the Project sponsor would be required to obtain a variance from CEDA.

Alternative Measure DD Intersection Configuration Analysis

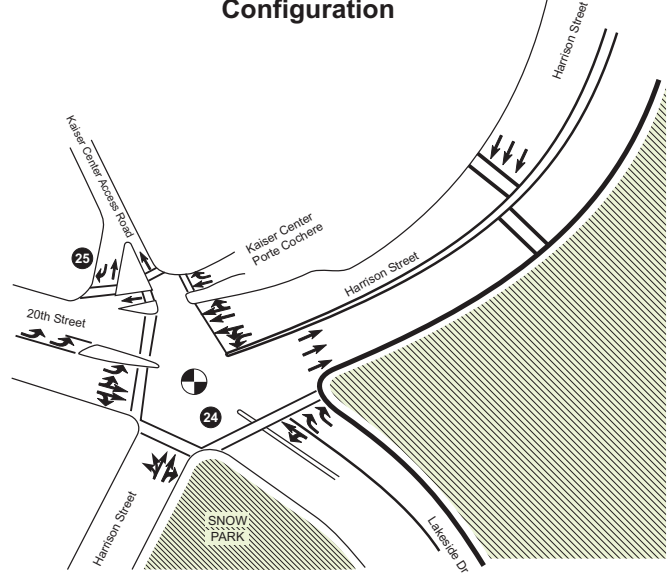
This section discusses a possible alternative configuration for the Harrison Street / Lakeside Drive / 20th Street "triangle" directly adjacent to the Kaiser Center block and summarizes findings concerning intersection delay and queuing for both the Measure DD configuration and the alternative configuration ("Alternative Measure DD").

As discussed in the Near-Term (2015) without Project Conditions analysis, Measure DD proposes improvements to the Harrison Street / Lakeside Drive / 20th Street "triangle" which are not yet constructed. These improvements include the removal of the 20th Street leg of the triangle, which would then be converted to open space as part of an expanded Snow Park. The intersection of Harrison Street / Lakeside Drive would be reconfigured into a "T" intersection (this would require the realignment of Lakeside Drive). These improvements would enhance pedestrian access to Lake Merritt by simplifying routes for pedestrians and reducing the number of crossings. These proposed changes are illustrated in **Figure IV.L-20**.

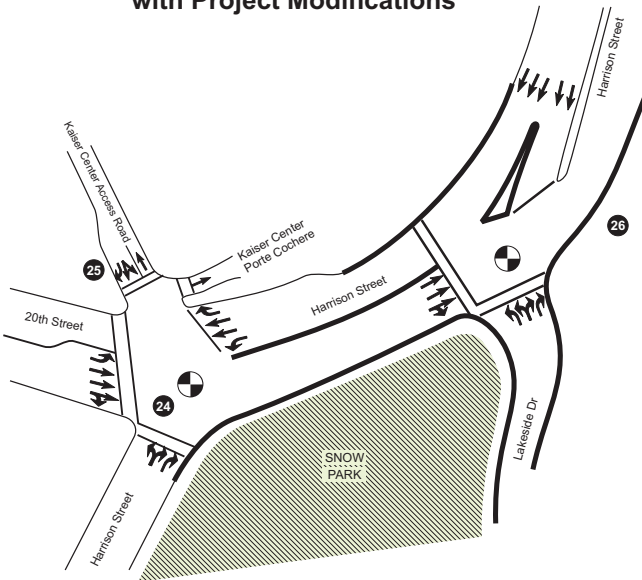
Measure DD Configuration



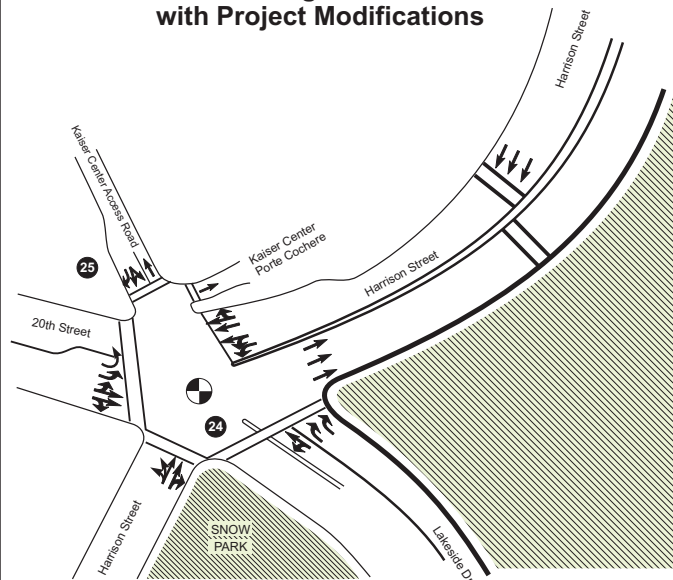
Alternative Measure DD Configuration



Measure DD Configuration with Project Modifications



Alternative Measure DD Configuration with Project Modifications



Traffic Signal

However, because of the proximity of the intersections of Harrison Street / 20th Street and Harrison Street / Lakeside Drive under the Measure DD configuration and the resulting potential for queuing impacts, a preliminary microsimulation analysis of the roadways and intersections in the immediate vicinity of the Project was conducted. The microsimulation analysis concluded the following:

- Substantial queuing would occur on the following movements with the Measure DD configuration:
 - All movements on the northbound approach on Harrison Street at 20th Street;
 - All movements on the south eastbound approach (Kaiser Center Access Road) at Harrison Street / 20th Street; and,
 - Eastbound-through movement on Harrison Street at Lakeside Drive, leading to spillback queuing affecting throughput at Harrison Street / 20th Street.
- The removal of the eastern 20th Street leg at Harrison Street / 20th Street introduces traffic flow conflicts between northbound Harrison Street vehicles bound for Grand Avenue and I-580 and eastbound 20th Street vehicles attempting to access southbound Lakeside Drive to reach 11th / 12th Streets and I-880. This increases the potential for collisions as vehicles attempt to weave into the appropriate lane or make sudden lane changes and turning movements over short distances.

Based on the microsimulation analysis, the reconfiguration of the Harrison Street / Lakeside Drive / 20th Street Triangle as originally proposed by Measure DD would result in substantial queuing issues and weaving conflicts as detailed above. These issues would be further complicated by the addition of Project-generated traffic. However, with Mitigation Measure TRANS-1c (signal retiming of Intersection #24 [Harrison Street / 20th Street / Kaiser Center Access Road] there would be less than significant CEQA impact under all scenarios (Existing Plus Buildout, 2015 Plus Phase 1, 2015 Plus Buildout, 230 Plus Buildout).

To address the non-CEQA queuing and weaving conflicts, the transportation consultant for the EIR proposed that the Lakeside Drive section of the triangle be removed instead. A conceptual illustration of this alternative configuration is illustrated in Figure IV.L-20. The existing configuration (before any improvements) is illustrated in Figure IV.L-14.

Although the alternative configuration would require changes to lane striping and configuration and signal timing and phasing, it would provide the following benefits:

- Complete removal of one intersection from the roadway network, streamlining traffic flows. The reconfiguration as originally proposed by Measure DD would have removed the 20th Street section of the Triangle, but the intersection of Harrison Street / 20th Street would still have remained because of the presence of conflicting movements;
- Elimination of the intersection queuing and associated spillback queuing impacts at the intersection of Harrison Street / Lakeside Drive. The alternative configuration would result in about 600 feet of unobstructed queuing storage along the westbound Harrison Street approach to Lakeside Drive;

- Elimination of the weaving conflicts and potential for collisions discussed previously, as eastbound-through vehicles from 20th Street would no longer have to use Harrison Street to access Lakeside Drive;
- More effective placement of open space. The original proposal called for Snow Park to be expanded, but the new open space would still be separated from Lake Merritt by Lakeside Drive. The alternative configuration removes the Lakeside Drive section of the Triangle and allows existing open space abutting the Lake to be expanded to the west. This reduces the number of crosswalks by one for pedestrians attempting to access the lakeshore from 20th Street west of Harrison Street and enhances the attractiveness of the shoreline area as a lunchtime or recreational spot for employees in nearby office buildings;
- Improved options for Project-related traffic, as the alternative configuration with project modifications improves connections to Lakeside Drive for vehicles coming to and from the Access Road; and,
- Improved pedestrian access to the Lake by allowing for possible signalized midblock (pedestrian-actuated) crossings along Harrison Street between 20th Street and 21st Street and Lakeside Drive between 20th Street and Jackson Street.

It should be noted that the alternative configuration would also likely result in higher delays and worse level of service at the intersection of Harrison Street / 20th Street than the original reconfiguration. Given, however, that it would produce the benefits described above, particularly the improvement of non-auto access to open space—a primary goal of Measure DD—it was recommended that a supplementary analysis be conducted assuming the alternative configuration for the following scenarios:

- Near-Term (2015) without Project Conditions;
- Near-Term (2015) plus Project (Phase I) Conditions;
- Near-Term (2015) plus Project (Phase I and Phase II) Conditions;
- Cumulative (2030) without Project Conditions; and,
- Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

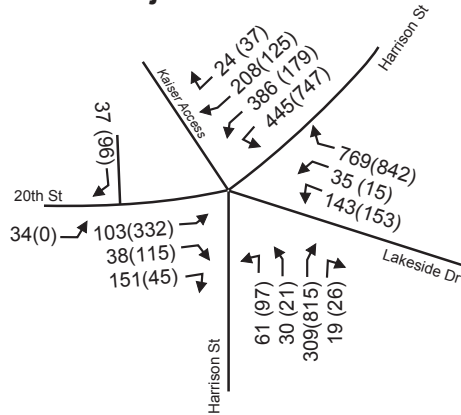
Additionally, a Cumulative (2030) plus Project (Phase I) Conditions is presented in the supplementary Phase I Only, South Tower Only analysis in **Appendix H** to this EIR.

Intersection Operations

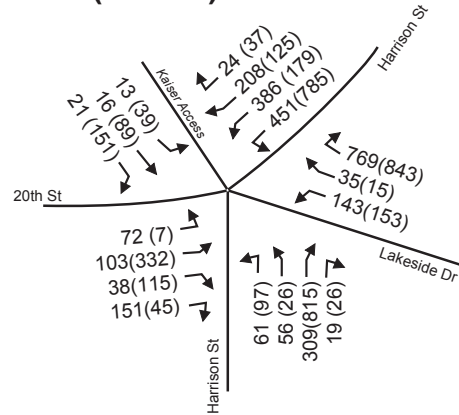
Near-Term (2015) without Project Conditions

Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. **Table IV.L-27** summarizes the intersection level of service for the Alternative Measure DD configuration under Near-Term (2015) without Project Conditions. As shown in the table, the intersection of Harrison Street / 20th Street / Kaiser Center Access Road under the Alternative Measure DD configuration would operate comparably to the original Measure DD configuration in the AM peak hour, but worse in the PM peak hour. However, the intersection would still operate at acceptable levels of service (LOS E or better) under the Alternative Measure DD configuration during the PM peak hour.

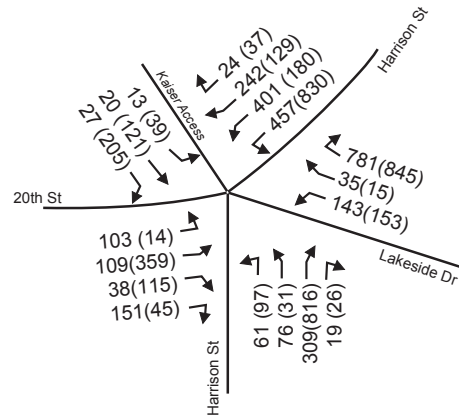
**Near-Term (2015) without
Project Conditions**



**Near-Term (2015) plus Project
(Phase I) Conditions**

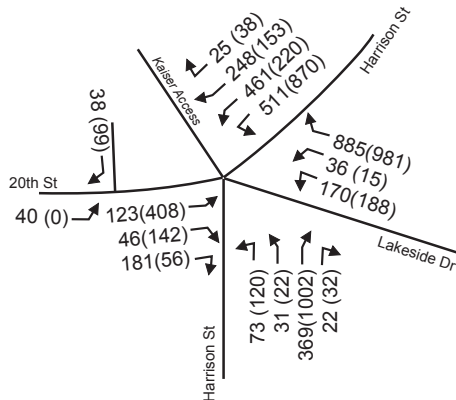


**Near-Term (2015) plus Project
(Phase I and Phase II) Conditions**



xx (xx) = AM (PM) Peak
Hour volumes

**Cumulative (2030) without
Project Conditions**



**Cumulative (2030) plus Project
(Phase I and Phase II) Conditions**

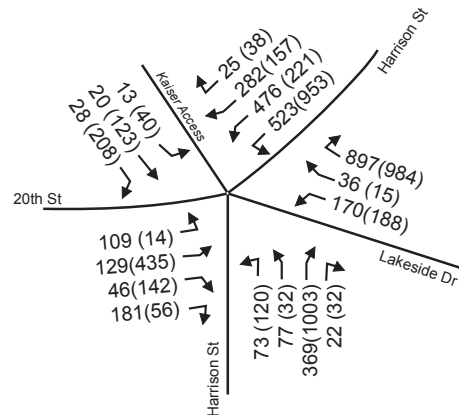


TABLE IV.L-27
NEAR-TERM (2015) INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

No.	Intersection	Traffic Control	Near-Term (2015) without Project Conditions (Original Measure DD)				Near-Term (2015) without Project Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	26.5	C	20.9	C	28.6	E	58.2
26	Harrison Street / Lakeside Drive	Signal	B	18.3	C	24.2	--	--	--	--
Combined Delay			D	44.8	D	45.1	C	28.6	E	58.2

Bold indicates intersections operating at LOS F.

^a The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

It should be noted however, that the two configurations are not directly comparable on an intersection-by-intersection basis. For drivers passing through both intersections at Harrison Street / 20th Street / Kaiser Center Access Road and Harrison Street / Lakeside Drive, for example, the Alternative Measure DD configuration would result in less average delay during the AM peak hour and only slightly worse average delay during the PM peak hour.

Cumulative (2030) without Project Conditions

Table IV.L-28 summarizes the intersection level of service for the Alternative Measure DD configuration under Cumulative (2030) without Project Conditions. Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. +

As shown in the table, the intersection of Harrison Street / 20th Street / Kaiser Center Access Road under the Alternative Measure DD configuration would operate worse in both the AM and PM peak hour. The intersection would operate at unacceptable conditions during the PM peak hour.

For drivers passing through both intersections at Harrison Street / 20th Street / Kaiser Center Access Road and Harrison Street / Lakeside Drive, the Alternative Measure DD configuration would result in less average delay during the AM peak hour, but worse average delay during the PM peak hour.

TABLE IV.L-28
CUMULATIVE (2030) INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

No.	Intersection	Traffic Control	Cumulative (2030) without Project Conditions (Original Measure DD)				Cumulative (2030) without Project Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	25.7	D	42.3	D	39.8	F	107.4
26	Harrison Street / Lakeside Drive	Signal	C	21.3	D	49.0	--	--	--	--
Combined Delay			D	47.0	F	91.3	D	39.8	F	107.4

Bold indicates significant impact.

^a The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

Near-Term (2015) plus Project (Phase I) Conditions

Table IV.L-29 summarizes the intersection level of service for the Alternative Measure DD configuration under Near-Term (2015) plus Project (Phase I) Conditions. Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. As shown in the table, the following intersection would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD):

TABLE IV.L-29
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

No.	Intersection	Traffic Control	Near-Term (2015) without Project Conditions (Alternative Measure DD)				Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	Signal	C	28.6	E	58.2	D	39.4	F	97.5
25	Kaiser Ctr. Access Rd. / 20th Street ^b	SSSC	A	9.8	B	10.1	--	--	--	--

Bold indicates significant impact.

^a The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

^b The Project would combine this intersection with Intersection #24.

SOURCE: AECOM, 2009.

- Within Downtown (LOS F)
 - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

Potential impacts at each of the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-1 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I): Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation Measure ALT DD TRANS-1: In addition, the Project applicant shall add an additional lane and reconfigure the northbound Harrison Street approach as a shared left-through lane (to westbound 20th Street and Kaiser Center Access Road) and two exclusive right-turn lanes (one lane to northbound Harrison Street, the other to northbound Harrison Street and eastbound 20th Street / Lakeside Drive). This would require curb setback of about 10 feet and a corresponding reduction in park space and removal of up to five on-street parking spaces along the west side of Snow Park.

In addition, the left turns from the Kaiser Center Access Road to eastbound 20th Street / Lakeside Drive would need to be prohibited in order to allow the northbound movement along Harrison Street to run concurrently with the Access Road phase.

To implement these measures, the Project Applicant shall submit to City of Oakland's Transportation Services Division for review and approval a PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction.

The Project Applicant shall fund, prepare, and install the approved plans and improvements.

Also, implement Mitigation Measure TRANS-1c.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable; if additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable.

After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However,

measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts.

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Table IV.L-30 summarizes the intersection level of service for the Alternative Measure DD configuration under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. As shown in the table, the following intersection would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD):

- Within Downtown (LOS F)
 - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

**TABLE IV.L-30
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II)
INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD**

No.	Intersection	Traffic Control	Near-Term (2015) without Project Conditions (Alternative Measure DD)				Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a
Outside Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	28.6	E	58.2	D	49.7	F	111.6
25	Kaiser Ctr. Access Rd. / 20th Street ^b	SSSC	A	9.8	B	10.1	--	--	--	--

Bold indicates significant impact.

^a The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

^b The Project would combine this intersection with Intersection #24.

SOURCE: AECOM, 2009.

Potential impacts at each of the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-2 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I and Phase II), Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection

would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation Measure ALT DD TRANS-2: Implement Mitigation Measure ALT DD TRANS-1 and Mitigation Measure TRANS-1c.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable; if additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project (2015) plus Project (Phase I and Phase II) impacts at this location would be Significant and Unavoidable.

Cumulative (2030) plus Project (Phase I and Phase II) Conditions

Table IV.L-31 summarizes the intersection level of service for the Alternative Measure DD configuration under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. As shown in the table, the following intersection would operate at unacceptable conditions under Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD):

- Within Downtown (LOS F)
 - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

**TABLE IV.L-31
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II)
INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD**

No.	Intersection	Traffic Control	Cumulative (2030) without Project Conditions (Alternative Measure DD)				Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	D	39.8	F	107.4	E	69.0	F	>120
25	Kaiser Ctr. Access Rd. / 20th Street ^b	SSSC	B	10.5	B	10.1	--	--	--	--

Bold indicates significant impact.

^a The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

^b The Project would combine this intersection with Intersection #24.

SOURCE: AECOM, 2009.

Potential impacts at the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-3- Project with Alternative Measure DD - Cumulative (2030) plus Project (Phase I and Phase II) Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure ALT DD TRANS-3: Implement Mitigation Measure ALT DD TRANS-1 and Implement Mitigation Measure TRANS-1c.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable; if additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Cumulative (2030) Plus Project (Phase I and Phase II) impacts at this location would be Significant and Unavoidable.

Microsimulation Analysis

A microsimulation analysis was conducted to better determine the operational performance of the Alternative Measure DD Configuration. Selected measures of effectiveness (MOEs) were then compared against the original Measure DD Configuration.

As shown in **Table IV.L-32**, which summarizes the movement delay for the original Measure DD Configuration and Alternative Measure DD Configuration, the northbound Harrison Street, eastbound 20th Street, and southbound Kaiser Center Access Road approaches to the intersection of Harrison Street / 20th Street / Kaiser Center Access Road would perform poorly (LOS F) under either configuration.

Queuing Conditions

As shown in **Table IV.L-33** and **Table IV.L-34**, which summarize the 95th percentile queues by lane for the original Measure DD Configuration and Alternative Measure DD Configuration, queues on the northbound Harrison Street approach at Harrison Street / 20th Street / Kaiser Center Access Road exceed available storage capacity in the PM peak hour for all Near-Term and Cumulative scenarios, regardless of configuration. Under the original Measure DD Configuration, queues on the eastbound Harrison Street approach at Harrison Street / Lakeside Drive exceed or approach the available storage capacity. The lack of storage between the two key intersections in the original Measure DD Configuration causes spillback queuing along northbound Harrison Street and eastbound 20th Street, hampering throughput on the northbound Harrison Street and

**TABLE IV.L-32
MICROSIMULATED MOVEMENT DELAY – ALTERNATIVE MEASURE DD**

No.	Intersection	Mvmt.	Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions				Near-Term (2015) plus Project (Phase I and Phase II) Conditions				Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.
24	Harrison Street / 20th Street / Kaiser Center Access Road <i>EB: EB 20th St. WB: SB Harrison St. NB: NB Harrison St. NW: WB 20th St. SB: Kaiser Center Access Road</i>	EBL ^a	--	--	--	--	E	84.8	F	>120	F	>120	F	>120	--	--	--	--	F	>120	F	>120
		EBT	B	17.3	E	82.3	C	24.4	F	>120	D	48.7	F	>120	B	19.7	E	92.5	E	113.5	F	>120
		EBR	B	11.9	B	16.0	B	12.6	C	21.4	B	16.1	C	24.5	A	10.0	B	14.6	D	45.9	C	22.5
		EBR2	A	7.5	B	14.0	B	13.6	B	19.7	B	17.3	B	18.3	A	9.0	B	12.7	E	103.2	C	20.2
		WBL2	D	51.3	E	88.6	D	43.2	E	78.0	D	48.4	E	80.3	C	26.6	E	97.4	D	52.5	E	93.1
		WBL	D	49.2	D	38.3	D	52.4	B	13.6	E	56.2	B	13.6	C	29.8	B	19.4	D	54.5	C	29.1
		WBT	D	40.8	D	36.9	D	44.6	C	32.3	E	61.6	D	42.2	D	45.9	D	36.0	E	101.4	D	48.4
		WBR	D	46.7	C	26.7	D	41.2	B	17.3	D	38.5	C	29.1	C	29.8	C	24.2	E	71.5	C	29.5
		NBL	D	54.4	F	>120	D	52.2	F	>120	E	74.2	F	>120	E	90.3	F	>120	F	>120	F	>120
		NBT	E	56.5	F	>120	D	46.3	F	>120	E	70.7	F	>120	E	96.0	F	>120	F	>120	F	>120
		NBR	E	55.8	F	>120	D	49.6	F	>120	E	83.4	F	>120	E	91.6	F	>120	F	>120	F	>120
		NBR2	D	35.6	F	>120	D	44.9	F	>120	E	80.6	F	>120	E	114.2	F	>120	F	>120	F	>120
		NWL	C	33.1	D	36.9	D	37.1	E	100.8	D	38.7	E	59.0	C	31.6	D	45.9	E	57.7	F	>120
		NWT	C	25.3	C	28.5	D	42.0	F	>120	C	33.6	D	49.6	C	27.2	D	37.9	D	54.2	F	>120
		NWR	A	9.4	B	17.5	A	9.2	B	18.9	A	10.0	B	15.2	B	10.1	B	16.0	B	10.8	C	33.6
		SBL ^a	--	--	--	--	D	40.6	F	>120	E	59.1	F	>120	--	--	--	--	E	104.5	F	>120
		SBT ^a	--	--	--	--	D	54.8	F	>120	E	56.0	F	>120	--	--	--	--	E	56.7	F	>120
		SBR ^a	--	--	--	--	A	9.6	F	>120	A	10.0	F	>120	--	--	--	--	B	16.4	F	>120
		All	C	33.3	F	>120	D	35.2	F	>120	D	52.8	F	>120	C	32.6	F	>120	E	84.0	F	>120
25	Kaiser Center Access Road / 20th Street	SBR ^b	A	2.4	A	3.2	--	--	--	--	--	--	--	--	A	2.3	A	2.5	--	--	--	--

Bold indicates approaches operating at LOS F.

^a Movement is only present in Project scenarios.

^b Movement is only present in baseline scenarios.

SOURCE: AECOM, 2009.

**TABLE IV.L-33
MICROSIMULATED 95TH PERCENTILE QUEUES – ORIGINAL MEASURE DD**

No.	Intersection	Mvmt.	Storage	95th Percentile Queue (ft)									
				Near-Term (2015) without Project Conditions		Near-Term (2015) plus Project (Phase I) Conditions		Near-Term (2015) plus Project (Phase I and Phase II) Conditions		Cumulative (2030) without Project Conditions		Cumulative (2030) plus Project (Phase I and Phase II) Conditions	
				AM Pk. Hr.	PM Pk. Hr.	AM Pk. Hr.	PM Pk. Hr.	AM Pk. Hr.	PM Pk. Hr.	AM Pk. Hr.	PM Pk. Hr.	AM Pk. Hr.	PM Pk. Hr.
24	Harrison Street / 20th Street / Kaiser Center Access Road	EBL ^a	100	--	--	108	17	109	91	--	--	115	22
		EBT	375	58	132	50	308	59	418	71	111	59	210
		EBT	375	62	131	47	373	58	462	71	123	63	364
		EBTR	375	110	120	86	541	120	555	112	122	114	551
	EB: EB 20th St. WB: SB Harrison St. NB: NB Harrison St. SB: Kaiser Center Access Road	WBL	200	119	103	108	90	108	107	119	101	110	98
		WBT	200	50	66	110	67	105	86	71	104	120	98
		WBT	200	41	69	99	74	80	90	88	110	109	95
		WBR	125	46	43	76	57	53	50	62	78	87	73
		NBLTR	575	95	672	130	>1,000	151	>1,000	165	>1,000	213	>1,000
		NBR	575	55	671	70	>1,000	59	>1,000	111	>1,000	122	>1,000
		SBT ^a	150	--	--	43	147	67	215	--	--	63	290
		SBR ^a	50	--	--	57	83	59	108	--	--	58	87
25	Kaiser Center Access Rd. / 20th St.	SBR ^b	160	48	72	--	--	--	--	50	61	--	--
26	Harrison Street / Lakeside Drive	EBT	150	87	162	84	169	84	163	95	144	101	151
		EBT	150	97	158	111	160	106	151	119	165	120	162
		EBTR	150	112	145	131	148	122	142	134	145	132	143
	EB: NB Harrison St. WB: SB Harrison St. NB: NB Lakeside Dr.	WBL	250	202	240	283	294	147	348	236	422	223	435
		WBL	250	220	264	514	300	434	376	263	432	494	450
		WBT	250	205	140	452	155	498	189	462	274	435	386
		WBT	250	45	53	359	56	311	45	335	81	303	79
		WBT	250	54	64	57	76	29	79	102	102	66	84
		NBL	460	73	70	137	62	78	84	103	99	135	117
		NBLR	460	176	149	191	171	183	138	210	210	228	209
		NBR	820	137	123	158	137	144	119	185	187	201	176

Bold indicates exceedance of storage capacity.

^a Movement is only present in Project scenarios.

^b Movement is only present in baseline scenarios.

SOURCE: AECOM, 2009.

TABLE IV.L-34
MICROSIMULATED 95TH PERCENTILE QUEUES – ALTERNATIVE MEASURE DD

No.	Intersection	Mvmt.	Storage	95th Percentile Queue (ft)									
				Near-Term (2015) without Project Conditions		Near-Term (2015) plus Project (Phase I) Conditions		Near-Term (2015) plus Project (Phase I and Phase II) Conditions		Cumulative (2030) without Project Conditions		Cumulative (2030) plus Project (Phase I and Phase II) Conditions	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
24	Harrison Street / 20th Street / Kaiser Center Access Road	EBL ^a	100	--	--	124	130	153	107	--	--	133	118
		EBT	375	71	121	83	576	512	599	72	133	570	563
		EBT	375	71	120	72	567	350	580	93	131	459	556
		EBR	375	88	130	130	164	144	207	104	121	173	310
		EB: EB 20th St.	WBL	600	218	254	263	265	228	237	289	300	249
		WB: SB Harrison St.	WBL	600	236	262	276	288	241	281	281	307	253
		NB: NB Harrison St.	WBL	600	248	160	334	319	173	314	178	327	190
		NW: WB 20th St.	WBL	600	248	160	334	319	173	314	178	327	190
		SB: Kaiser Center Access Road	WBTR	200	224	191	276	257	219	259	203	271	225
		NBLTR	575	233	>1,000	222	>1,000	317	>1,000	354	>1,000	628	>1,000
		NBR	575	242	>1,000	210	>1,000	329	>1,000	365	>1,000	628	>1,000
		NWT	800	172	162	183	325	169	195	159	204	213	514
		NWR	475	187	234	156	279	187	223	179	221	218	379
		NWR	475	195	237	163	277	190	221	186	232	227	331
25	Kaiser Center Access Rd. / 20th St.	SBLT ^a	150	--	--	46	259	61	261	--	--	102	268
		SBR ^a	50	--	--	47	109	62	108	--	--	54	100
				51	70	--	--	--	--	40	54	--	--

Bold indicates exceedance of storage capacity.

^a Movement is only present in Project scenarios.

^b Movement is only present in baseline scenarios.

SOURCE: AECOM, 2009.

eastbound 20th Street approaches at Harrison Street / 20th Street / Kaiser Center Access Road. These queues then stretch back to upstream intersections, affecting Harrison Street / 19th Street and Webster Street / 20th Street. Likewise, queues on the westbound Harrison Street approach to Harrison Street / Lakeside Drive also exceed the available storage capacity, causing spillback into the upstream intersection at Harrison Street / 21st Street.

Conclusions

Based on the results of the microsimulation analysis, the following conclusions were drawn with regard to the original Measure DD Configuration and Alternative Measure DD Configuration:

- Both configurations have significant queuing issues on the northbound Harrison Street and eastbound 20th Street approaches to the intersection of Harrison Street / 20th Street / Kaiser Center Access Road. This queuing affects throughput at the upstream intersections of Harrison Street / 19th Street (in the northbound direction), Webster Street / 20th Street (in the eastbound direction), and Harrison Street / 21st Street (in the southbound direction);
- The original Measure DD Configuration suffers from the “bottleneck” on the critical segments of Harrison Street: eastbound between 20th Street and Lakeside Drive and westbound between Lakeside Drive and 21st Street. In the Alternative Measure DD Configuration, this intersection is removed completely, increasing storage capacity and limiting spillback queuing and its effects on adjacent intersections;

The Alternative Measure DD Configuration offers potential benefits which may be difficult to replicate under the Original DD Configuration. Installing midblock pedestrian crossings as shown on Figure IV.L-18, for example, would be possible under the Alternative Measure DD Configuration, as there is sufficient queuing space to accommodate vehicles queues during the pedestrian signal phase for the midblock crossing. A complete crossing across Harrison Street between 20th Street and 21st Street would need a pedestrian phase of 35 to 40 seconds, but the start of the pedestrian phase could be offset such that it minimizes queue lengths and / or “meters” traffic entering the intersections of Harrison Street / 20th Street / Kaiser Center Access Road and Harrison Street / 21st Street. The pedestrian phase could be allowed to run every cycle—facilitating pedestrian access across Harrison Street to and from Lake Merritt—without causing significant impacts to traffic flows.

Given that the northbound and southbound flows “peak” at different times in the cycle, it may also be possible to physically offset the crossings and run two separate pedestrian phases with a 10-foot wide median or pedestrian refuge island. The crosswalk across northbound Harrison Street could be staggered with the crosswalk across southbound Harrison Street and the two could run at different times, with the median allowing pedestrians to move between the two crosswalks between pedestrian phases. This would permit the minimization of queues in both directions (pedestrian phases could be kept to about eight seconds of “walk” and twelve seconds of “flashing don’t walk” for a total of 20 seconds) while still preserving pedestrian access across both directions of Harrison Street. Given that the traffic flows on Lakeside Drive are significantly less than those on Harrison Street, a single crosswalk would likely suffice for the midblock crossing on Lakeside Drive. A staggered crosswalk also forces pedestrians walking inside the refuge to face the direction of on-coming traffic, increasing the safety of the crossing.

In order to provide a similar level of pedestrian access, the original Measure DD Configuration would likely require placement of crosswalks at the intersection of Harrison Street / 20th

Street / Kaiser Center Access Road or Harrison Street / Lakeside Drive. Crosswalks at Harrison Street / Lakeside Drive may be difficult, as it would interfere with the high turning-volumes, particularly from northbound Lakeside Drive to northbound Harrison Street.

A crosswalk at Harrison Street / 20th Street / Kaiser Center under the original Measure DD Configuration may be possible along the northeast portion of the intersection, which currently does not have a crosswalk, but would likely require major additional geometry and signal design to allow for concurrent vehicle phases and may result in increased delays to vehicular traffic at the intersection. In contrast, the mid-block crossing possible under the Alternative Measure DD configuration would provide this additional pedestrian access across Harrison Street without significant impacts to traffic operations.

Recommendation TRANS-6: Installation of a signalized mid-block crossing across Harrison Street between 20th Street and 21st Street.

Given the likelihood that the Project would generate substantial pedestrian traffic between the Project Site and Lake Merritt, it is recommended that the Project Applicant would fund, prepare, as well as install the approved plans and following improvements with the new midblock traffic signal:

- Optimize the traffic signal timing (i.e., adjust the allocation of green time for each intersection approach) for the AM, Midday and PM peak hour.
- Coordinate the signal timing at the new midblock traffic signal with the adjacent intersections that are in the same signal coordination group.

To implement these measures, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- PS&E to construct the new signal. All elements shall be designed to City standards in effect at the time of construction, and all new signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan
 - Signal timing plans for the signals in the coordination group.

Installation of a signalized mid-block pedestrian crossing across Harrison Street between 20th Street and 21st Street under the Alternative Measure DD Configuration would require signal coordination with adjacent traffic signals at Harrison Street / 21st Street, Harrison Street / 20th Street / Kaiser Center Access Road, and other signals in the same signal coordination group. Due to the coordination, the pedestrian phase could be timed to coincide with periods of low arriving traffic flow from upstream intersections such that no additional intersection delay would be created. Instead, the signalized mid-block crossing would potentially improve operations along this corridor by “metering” traffic entering the ultimate bottleneck intersections at Harrison Street / Grand Avenue and Harrison Street / 20th Street / Kaiser Center Access Road. As a result, the crossing itself would not result in secondary impacts to other modes.

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M. Utilities and Services Systems

This section describes existing public utilities on and in the vicinity of the Kaiser Center Redevelopment Project and evaluates the impact of the Proposed Project on the provision of public utilities and possible adverse physical impacts to the environment that could result from constructing new or expanded facilities. Topics analyzed in this section include public water supply, sanitary sewer (wastewater), stormwater drainage facilities, solid waste, and gas and electricity services. This section focuses on the effect the Proposed Project would have on the ability of the City of Oakland and other service providers to effectively deliver these services and utilities and identifies potential impacts.

Setting

Water Service

The East Bay Municipal Utility District (EBMUD), a publicly owned utility, supplies water and provides wastewater treatment to parts of Alameda and Contra Costa counties, including the city of Oakland. EBMUD supplies water to approximately 1.3 million people within its estimated 331-square-mile service area, and the city of Oakland comprises slightly less than one-third of EBMUD's customers.

Water Supply System

The EBMUD water supply system consists of a network of reservoirs, aqueducts, treatment plants, and distribution facilities. This network extends from its principal water source, the Mokelumne River Basin in the Sierra Nevada mountain range, to water treatment plants or to reservoirs¹ within its service area, and ultimately to residences and businesses in the East Bay. On average, 90 percent of the water delivered by EBMUD comes from the Mokelumne River watershed, with the remaining ten percent originating as runoff within the service area. EBMUD has water rights and facilities to divert up to a maximum of 325 million gallons of water per day (mgd), subject to the availability of Mokelumne River runoff and prior water rights of other users (EBMUD, 2005).

Water Demand

In mid-April 2008, EBMUD experienced an average demand of 223.3 mgd (EBMUD, 2008). In 2005, average daily water consumption among EBMUD customers was about 210 mgd. By 2030, EBMUD estimates that water demand will increase to approximately 281 mgd in its service area, although, with successful implementation of water recycling and conservation programs, this demand could be reduced to about 232 mgd (EBMUD, 2005).

As discussed in EBMUD's Urban Water Management Plan 2005, EBMUD adopted a long-term Water Supply Management Program (WSMP) in 1993. The WSMP serves as a planning guide for

¹ EBMUD's East Bay service area includes five reservoirs: Briones, Chabot, Lafayette, San Pablo, and Upper San Leandro.

the reliable provision of quality water to the EBMUD service area through 2020. The WSMP analysis indicates that during a severe drought,² the current water supply is not sufficient to meet customer demand. An estimated supplemental supply need of 87 mgd of additional water supply (representing a 42 percent deficiency) would be needed to limit the deficiency to 25 percent. To limit the water supply deficiency to 25 percent by 2020, a supplemental supply of 154 mgd (representing a 67 percent deficiency) would be needed. EBMUD anticipates that customer demand will continue to exceed supply during severe drought conditions until a supplemental water supply project is implemented and a dependable supply is guaranteed for existing and future needs.

To meet 2020 projected water needs and address deficient supply during severe droughts, EBMUD is working to identify supplemental water supplies, recycled water programs, and continued implementation of water conservation measures.

Water Supply Projects

In September 1995 (two years after adopting its long-term Water Supply Management Program), EBMUD authorized a Water Supply Action Plan to identify supplemental water supplies during multiple-year droughts by pursuing several water supply components concurrently. As a result, on December 8, 2000, the U.S. Bureau of Reclamation, EBMUD, and Sacramento parties mutually agreed to develop a joint water supply from the Sacramento River. Components of this action include a diversion one-mile north of the City of Freeport, pumping facilities, treatment facilities, and transmission pipes. A federal Record of Decision was issued in 2004, and the engineering design work is expected to be complete by the spring of 2006. Construction is expected to be complete and EBMUD will be able to receive water from the project by the end of 2009. Once completed, the Freeport Project will provide EBMUD with up to 100 mgd of water during dry years only, estimated to be three out of every 10 years, as a supplemental water source to complement existing conservation programs (FRWA, 2008).

Other resource options identified in the 1995 Water Supply Action Plan (and its 1996 revision) for meeting future water needs include the Bayside Groundwater Project, which involves storing an annual average of 1.0 million gallons a day (MGD) of water in the groundwater aquifer beneath the cities of San Lorenzo/San Leandro during wet years and withdraw an equal annual amount during years of drought to reduce the water rationing impacts to our customers during a drought. Environmental review for the project has been completed and the project is anticipated to begin operation in 2008, following Board approval and a one-year construction period.

After successfully operating this project for some time, EBMUD will consider a larger project in the area that would have a capacity of between 2 and 10 MGD, allowing for even greater drought protection. Before the larger project would be undertaken, EBMUD would first have to complete a separate environmental impact report with its associated public review, similar to this initial 1.0 MGD effort.

² Defined by EBMUD as the third consecutive year in a series of multiple dry years.

Sanitary Sewer Service

In addition to providing water supply, EBMUD provides sanitary sewer treatment services to approximately 640,000 people within an 88-square-mile area of Alameda and Contra Costa counties, including the City of Oakland. The City of Oakland and about eight other communities³ comprise the EBMUD Special District No. 1 sanitary sewer treatment service area.

Wastewater Collection and Treatment

EBMUD's main wastewater treatment plant is located southwest of the Interstate 580/Interstate 80 (I-580/I-80) interchange in Oakland, south of the San Francisco/Oakland Bay Bridge. Wastewater is collected by 29 miles of interceptor lines that move wastewater from about 1,400 miles of sewers owned and operated by the jurisdictions served. The permitted plant capacity for the dry weather season is 120 mgd and for the wet weather season is 320 mgd (RWQCB, 2010).

The City of Oakland owns, operates, and maintains a local sanitary sewer collection system covering approximately 48 square miles, approximately 1,000 miles of pipe, and seven pump stations. The City's sewer collection system is divided into basins and subbasins. Each numbered subbasin encompasses a specific physical area, and its sewer flows are assigned to a single discharge point from the City's collection system into the EBMUD's interceptor lines. City sewer pipes range from 6 to 72 inches in diameter, with most lines pre-dating 1938 and with some parts of the system over 100 years old. Most of the system is gravity-fed, and about five pump stations service the entire area. Some areas of Oakland, such as former military bases, cemeteries, large parks, and some hillside areas, are not part of the sewer service system. Over 90 percent of the sewer customers are residential users. Sanitary sewer facilities currently serve the Project Site.

Inflow/Infiltration Correction Program

A continuing issue with respect to sanitary sewer collection has been inflow and infiltration of stormwater into the EBMUD and Oakland sewer lines, resulting in high flow levels and overflow of untreated wastewater during wet weather events. Most of the stormwater enters sewer systems by infiltration (stormwater that passes through the soil and into deteriorated sewer pipes). Inflow originates from stormwater inlets and manholes that connect to the sanitary sewer system rather than the stormwater system. In 1986, with EBMUD as the lead agency, the Wet Weather Program was initiated to improve treatment capacity for wet weather flows and reduce the amount of inflow and infiltration throughout the EBMUD collection system. The cities of Alameda, Albany, Berkeley, Emeryville, Kensington, Oakland, Piedmont and portions of El Cerrito and Richmond participate in EBMUD's Wet Weather Program. The program has resulted in four new wet weather treatment facilities, two storage basins, 7.5 miles of new interceptors, and expansion of the main wastewater treatment plant. These new facilities accommodate an increase in peak wet weather treatment capacity from 290 mgd to 775 mgd. The City's long-range sewer improvements are anticipated to reduce peak regional flows from 1.1 billion gallons per day to 775 mgd.

³ EBMUD's main wastewater treatment plant treats municipal wastewater from the cities of Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont, El Cerrito, Kensington, and part of Richmond.

The City of Oakland has a 25-year inflow and infiltration collection maintenance and rehabilitation program that will help eliminate overflow by reducing inflow and infiltration of stormwater to upgrade the existing system. The City's collection system is comprised of local collection mains and a network of trunk systems. The City's system capacity improvements have targeted the trunk network only and assume that the remainder of the system – the local mains – has sufficient capacity. The entire system is divided into drainage basins and subbasins. Each subbasin has a projected allocation for base flow increase based on an anticipated growth rate during the period of the inflow and infiltration collection maintenance and rehabilitation program. Growth (base flow increase) within each subbasin must not exceed projections. If exceeded, the impact of the additional growth must be analyzed on the entire City collection, and trunk system and additional system improvements would be required. If redirection of allocation from other subbasins is needed to accommodate a development project, further review and approval from the City would be required in order to determine locations and the amount of potential reallocation. If growth does not exceed projection within each subbasin, then impact analysis may be limited to the study of local mains serving the development site.

Stormwater Drainage Facilities

In Oakland, stormwater runoff is collected from the southwesterly flows from the Oakland/Berkeley hills to the developed flatlands, where it then flows primarily through underground storm drains and culverts to the San Francisco Bay, via the Oakland Estuary (directly or by way of Lake Merritt) or through the City of Emeryville.

The Alameda County Flood Control and Water Conservation District constructs, operates, and maintains major trunk lines and flood-control facilities in Oakland, and the Oakland Public Works Agency is responsible for construction and maintenance of the local storm drainage system within Oakland's public areas and roads.

The City has prepared a comprehensive storm drainage master plan to identify existing deficiencies in the system and develop prioritized recommendations for rehabilitating the system in order to reduce localized flooding. Storm drain complaints are scattered throughout the City and are mostly related to commercial business uses. Based on these complaints, even without televised footage of actual pipes, the City has taken the position that the storm drain system is aged and would not be able to handle increased runoff flows. The City requires development projects to evaluate the onsite and offsite condition and capacity of the existing stormwater collection system and implement necessary improvements that are identified to accommodate the Project. Specifically, the City requires developments to detain stormwater to the extent feasible.

Solid Waste

Waste Management and Disposal

Non-hazardous waste in the City of Oakland is collected by Waste Management of Alameda County (WMAC), which provides curbside pickup for residential, commercial and industrial non-hazardous waste, and transports it to WMAC's Davis Street Transfer Station in the City of San Leandro. The Alameda County Waste Management Authority estimates that in 2005,

Oakland disposed of approximately 416,827 tons of solid waste or about 1,142 tons per day (CIWMB, 2008a). Transfer trucks haul waste to the Altamont Landfill and Resource Facility, located approximately 35 miles east of Oakland near Livermore. The Altamont Landfill has a permitted maximum daily disposal of 11,500 tons per day, seven percent of which is attributable to the City of Oakland (CIWMB, 2008b). Demolition and construction debris generated in Oakland is generally hauled by contractors and local construction companies to recycling facilities in the East Bay or to the Vasco Road Landfill near the City of Livermore. The Vasco Road Landfill, owned by Republic Services of California I, LLC, is estimated to have sufficient capacity through approximately 2015 (CIWMB, 2008c).

Waste Generation and Diversion

As required by enactment of the California Integrated Waste Management Act (AB 939) in 1989 (discussed in Regulatory Framework, below), the City has prepared a Source Reduction and Recycling Element (SRRE), which is a report that describes (1) the chief characteristics of each City's waste, (2) existing waste diversion programs and rates of waste diversion, and (3) the new or expanded programs the City intends to implement to achieve the mandated rates of diversion.⁴ The City of Oakland generated approximately 926,282 tons of solid waste in 2004. The City's waste diversion rate has increased from approximately 11 percent in 1990 to an estimated 55 percent in 2004. The City's waste diversion programs and requirements are discussed below under *Regulatory Framework*.

Energy Services

Electricity and gas service in the City of Oakland is provided primarily by Pacific Gas and Electric (PG&E), which owns the gas and electrical utility supply lines. Some users purchase energy services directly from alternate power providers. Throughout most of Oakland, electrical power is delivered via overhead distribution and transmission lines, and natural gas is distributed through underground piping. PG&E expands its services on an as-needed basis and requires the user to fund the extension of service.

Electricity Service Demand

As a result of problems related to energy supply and demand following restructuring of the electricity industry during the previous decade, the California Energy Commission (CEC) adopted the State of California Energy Action Plan in May 2003, to outline the development of new power generating facilities in the Bay Area and elsewhere in the state to establish adequate, reliable, and reasonably priced energy for Californians. In 2005, a second Energy Action Plan was adopted by both the Energy Commission and the California Public Utilities Commission (CPUC) to reflect the policy changes and actions of the ensuing two years. The state's energy policies have since been significantly influenced by the passage of Assembly Bill 32, the California Global Warming Solutions Act of 2006. As a result, the Energy Commission's 2007 Integrated Energy Policy Report (IEPR) has advanced policies aimed at enabling the state to meet

⁴ Waste diversion is defined as the total waste that a jurisdiction generates less the amount that is disposed at a landfill or transformation facility. Waste diversion occurs through reduction, reuse, recycling, and composting programs.

energy needs given anticipated carbon constraints. The report also provides a comprehensive set of recommended actions to achieve these policies (CEC, 2008).

The Project Site is currently fully developed and is served by existing electric and natural gas utilities which are available in all street frontages adjoining the site.

Regulatory Framework

Water Quality, Supply, and Distribution

Safe Drinking Water Act

The USEPA administers the Safe Drinking Water Act (SDWA), the primary federal law that regulates the quality of drinking water and establishes standards to protect public health and safety. The Department of Health Services (DHS) implements the SDWA and oversees public water system quality statewide. DHS establishes legal drinking water standards for contaminants that could threaten public health.

Senate Bill (SB) 610 / Senate Bill (SB) 221

Senate Bill (SB) 610, codified as Sections 10910-10915 of the California Public Resources Code, requires local water providers to conduct a water supply assessment for projects proposing over 500 housing units⁵, 250,000 square feet of commercial office space (or more than 1,000 employees), a shopping center or business establishment with over 500,000 square feet (or more than 1,000 employees), or equivalent usage. Local water suppliers must also prepare or have already prepared an Urban Water Management Plan to guide planning and development in the water supplier's service area, and specifically pursue efficient use of water resources.

Water Conservation in Landscaping Act (Assembly Bill 1881, 2006)

The Water Conservation in Landscaping Act of 2006 (Assembly Bill 1881, Laird) requires cities, counties, and charter cities and charter counties to adopt landscape water conservation ordinances by January 1, 2010. Pursuant to this law, the Department of Water Resources (DWR) has prepared a Model Water Efficient Landscape Ordinance (Model Ordinance) for use by local agencies. Most new and rehabilitated landscapes are subject to a water efficient landscape ordinance. Public landscapes and private development projects are subject to the Model Ordinance. However, the Ordinance does not apply to registered local, state, or federal historic sites, ecological restoration projects, mined-land reclamation projects, or plant collections.

Stormwater Drainage

Regulations related to the quality and quantity of stormwater runoff (i.e., Federal Clean Water Act / NPDES) are discussed in Section IV.G, *Hydrology and Water Quality*. As previously stated, this section focuses on whether the Proposed Project would result in the need for new or expanded stormwater drainage facilities.

⁵ Senate Bill (SB) 221 similarly amended the Subdivision Map Act to ensure confirmation that public water supply is sufficient to serve proposed development projects of 500 dwelling units or more.

Solid Waste

Assembly Bill (AB) 939

The California Integrated Waste Management Act of 1989, or Assembly Bill (AB) 939, established the Integrated Waste Management Board, required the implementation of integrated waste management plans and also mandated that local jurisdictions divert at least 50 percent of all solid waste generated (from 1990 levels), beginning January 1, 2000, and divert at least 75 percent by 2010. As required by AB 939, the City of Oakland has prepared a Source Reduction and Recycling Element (SRRE) which requires proposed development projects to undergo, as part of the required environmental review, an assessment of project impacts on the City's ability to maintain the mandated 50 percent waste diversion rates. Projects that would have an adverse effect on the City's waste diversion goals are required to include waste diversion mitigation measures to assist in reducing these impacts to less than significant levels.

Alameda County Waste Reduction and Recycling Initiative (Measure D)

In addition to AB 939, the 1990 Voter Initiative Measure D (Alameda County Waste Reduction and Recycling Initiative) mandates all cities in Alameda County to divert 75 percent of their solid waste from landfills by the year 2010.

Construction and Demolition Debris Waste Reduction and Recycling (Ordinance No. 12253 C.M.S.)

The City of Oakland's construction and demolition (C&D) debris waste reduction and recycling requirements are intended to further the goals of AB 939 and Alameda County's Measure D. As part of the application for a building permit, a project applicant is required to prepare and submit a Construction and Demolition Debris Waste Reduction and Recycling Plan (WRRP) to divert at least 50 percent of all construction and demolition debris generated by project development from landfill disposal.

Energy

Buildings constructed after June 30, 1977 must comply with standards identified in Title 24 of the California Code of Regulations. Title 24, established by the California Energy Commission (CEC) in 1978, requires the inclusion of state-of-the-art energy conservation features in building design and construction including the incorporation of specific energy conserving design features, use of non-depletable energy resources, or a demonstration that buildings would comply with a designated energy budget.

City of Oakland General Plan

The Land Use and Transportation Element of the Oakland General Plan includes the following policy related to the provision of utilities and infrastructure:

Policy N.12.4: Electrical, telephone, and related distribution lines should be undergrounded in commercial and residential areas, except where special local conditions such as limited visibility of the poles and wires make this unneeded. They should also be underground in appropriate institutional, industrial, and other areas, and generally along freeways, scenic

routes, and heavily traveled streets. Programs should lead systematically toward the eventual undergrounding of all existing lines in such places. Where significant utility extensions are taking place in these areas, such as in new subdivisions, utilities should be installed underground at the start.

City of Oakland Standard Conditions of Approval

The City of Oakland's SCA relevant to reducing impacts on utilities and service systems due to the Proposed Project are listed below. If the project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to utilities. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA UTIL-1: Waste Reduction and Recycling**

The project applicant will submit a Construction and Demolition WRRP and an Operational Diversion Plan (ODP) for review and approval by the Public Works Agency.

Chapter 15.34 of the Oakland Municipal Code outlines requirements for reducing waste and optimizing construction and demolition recycling. Affected projects include all new construction, renovations/alterations/modifications with construction values of \$50,000 or more (except R-3), and all demolition (including soft demo). The WRRP must specify the methods by which the development will divert construction and demolition debris waste generated by the proposed project from landfill disposal in accordance with current City requirements. Current standards, FAQs, and forms are available at www.oaklandpw.com/Page39.aspx or in the Green Building Resource Center. After approval of the plan, the project applicant shall implement the plan.

The ODP will identify how the project complies with the Recycling Space Allocation Ordinance, (Chapter 17.118 of the Oakland Municipal Code), including capacity calculations, and specify the methods by which the development will meet the current diversion of solid waste generated by operation of the proposed project from landfill disposal in accordance with current City requirements. The proposed program shall be implemented and maintained for the duration of the proposed activity or facility. Changes to the plan may be re-submitted to the Environmental Services Division of the Public Works Agency for review and approval. Any incentive programs shall remain fully operational as long as residents and businesses exist at the project site.

- **SCA UTIL-2: Stormwater and Sewer**

Confirmation of the capacity of the City's surrounding stormwater and sanitary sewer system and state of repair shall be completed by a qualified civil engineer with funding from the project applicant. The project applicant shall be responsible for the necessary stormwater and sanitary sewer infrastructure improvements to accommodate the proposed project. In addition, the applicant shall be required to pay additional fees to improve sanitary sewer infrastructure if required by the Sewer and Stormwater Division. Improvements to the existing sanitary sewer collection system shall specifically include, but are not limited to, mechanisms to control or minimize increases in infiltration/inflow to offset sanitary sewer increases associated with the proposed project. To the maximum extent practicable, the applicant will be required to implement Best Management Practices to reduce the peak stormwater runoff from the project site. Additionally, the project applicant shall be responsible for payment of the required installation or hook-up fees to the affected service providers.

Impacts and Mitigation Measures

Significance Criteria

The Project would have a significant impact related to utilities and services systems if it would:

1. Exceed wastewater treatment requirements of the San Francisco Bay Regional Water Quality Control Board;
2. Require or result in construction of new stormwater drainage facilities or expansion of existing facilities, construction of which could cause significant environmental effects;
3. Exceed water supplies available to serve the project from existing entitlements and resources, and require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects;
4. Result in a determination by the wastewater treatment provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new wastewater treatment facilities or expansion of existing facilities, construction of which could cause significant environmental effects;
5. Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs and require or result in construction of landfill facilities or expansion of existing facilities, construction of which could cause significant environmental effects;
6. Violate applicable federal, state, and local statutes and regulations related to solid waste;
7. Violate applicable federal, state and local statutes and regulations relating to energy standards; or
8. Result in a determination by the energy provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new energy facilities or expansion of existing facilities, construction of which could cause significant environmental effects.

Utility and Service Systems Impacts

Water Supply

Impact UTIL-1: The Proposed Project would not exceed water supplies available to serve the Project from existing entitlements and resources, nor require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)

Water Demand, Supply, and Capacity

Pursuant to Sections 10910-10915 (SB 610) of the California Water Code, the City of Oakland submitted a request to EBMUD to prepare a water supply assessment (WSA) for the Proposed

Project. In the WSA, which was prepared in response to the City's request, EBMUD determined that the Project's estimated water demand is accounted for in EBMUD's 2030 water demand projections (Kirkpatrick, 2008).

According to EBMUD, at buildout, the total water demand resulting from the Proposed Project would be approximately 142,000 gpd, an increase of approximately 119,000 gpd over the existing onsite demand of 25,000 gpd (BKF, 2008). If the proposed buildings are constructed to meet requirements of CALGreen standards (as indicated by the Project Objectives in Chapter III), the net increase in water demand would be approximately 20 percent less, or approximately 95,200 gpd (ICC, 2010). The Proposed Project would not change EBMUD's 2030 water demand projection and would not result in a new significant increase in water use.

EBMUD further recommends incorporating water conservation measures into the design and construction of all new development projects to ensure that sufficient water capacity is available through EBMUD's planning horizon year 2030. The Proposed Project would be required to comply with EBMUD's Section 31-Water Efficiency Requirements. Internal conservation measures required by Section 31 include incorporation of water-efficient equipment and devices, such as low-flush toilets, into building design; external conservation measures include the use of drought-resistant and native plants for landscaping and minimization of turf areas. The Project would be exempt from the Water Conservation in Landscaping Act (Assembly Bill 1881, 2006), which does not apply to registered historic sites (e.g., the Kaiser Center roof garden).

The existing water lines serving the Project Site include a 6-inch line in Webster Street, 6- and 8-inch lines in 21st Street, a 12-inch line in Harrison Street, and an 8-inch line in 20th Street. Based on preliminary water flow data from EBMUD, the static pressure is 75 psi (pounds per square inch) and the residual pressure with a flow of 1,138 gpm (gallons per minute) is 60 psi; at 20 psi the calculated flow is approximately 2,200 gpm.

The existing water distribution system would continue to serve the Project Site and be adequate to accommodate the Project's expected water demand. While the Project would require water line extensions to create service connections to new buildings on the Project Site, which would be coordinated and financed by the Project sponsor, the Project would not exceed existing or projected water supply or result in the need for new or expanded water facilities.

In January 2002, the City adopted a dual plumbing ordinance, which requires new development to use recycled water provided by EBMUD and the installation of a dual plumbing system if recycled water is anticipated to be available. The nearest recycled water line to the Project Site is located on 14th Street approximately 3,000 linear feet south of the Project Site. Due to the relative cost of providing recycled water service to the Project Site given the location of existing facilities and the Project Site location, compared to the projected demand from the Project, the use of recycled water is not anticipated by the Proposed Project. EBMUD does not recommend the use of recycled water service for the Proposed Project (Kirkpatrick, 2008).

Mitigation: None required.

Sanitary Sewer Service

Impact UTIL-2: The Proposed Project's projected wastewater generation would not result in the City of Oakland exceeding its citywide projected base flow allocation or its base flow allocation for Subbasin 52-05. (Less than Significant)

The loads on the sanitary sewer system are a factor of water use, in addition to the design, capacity, and condition of the sanitary sewer facilities. In general, the average dry-weather demand sewer flow is 90 percent of the average water use. The wet weather demand sewer flow adds a factor for inflow and infiltration of the system from stormwater and wet soils. Therefore during wet weather, peak sanitary sewer flows can be greater than dry weather flows.

According to BKF Engineers, the estimated wastewater flow as a result of the Proposed Project would increase by over 105,000 gpd, from 22,500 gpd to 127,856 gpd. If proposed buildings are constructed to meet CALGreen standards (as indicated by the Project Objectives in Chapter III) the Project's net wastewater generation would be reduced by approximately 20 percent, to approximately 84,000 gpd, an increase of approximately 61,500 gpd.

The Project Site is currently served by existing sewer infrastructure located beneath surrounding roadways. Existing infrastructure consists of 12- to 15-inch mains located in 21st Street, a 24-inch main located in Harrison Street, and a 5 foot by 5.5 foot concrete box located in 20th Street. The Project Site is situated in City of Oakland sewer Subbasin 52-05.

The City of Oakland has indicated that sewer flows for the Proposed Project would not impact the capacity of the existing local sewer main (BKF, 2008) and would not exceed the capacity of Subbasin 52-05. However, the City will need to review the wastewater flows to assess mitigation fees because the proposed flows exceed the existing flows by more than 20 percent. This is based on the City's infiltration/inflow correction program which consists of a 25-year capital improvement program to rehabilitate the existing system in cost-effective areas and add capacity where needed. This program anticipates a 20 percent growth rate throughout Oakland. Mitigation fees are assessed to all new development or redevelopment in subbasins that have a growth rate greater than 20 percent. This fee represents the Project's pro-rata share of the improvements identified by the 25-year plan in anticipation of the Project's exceedance of existing flows by more than 20 percent.

The existing sanitary sewer lines located under existing streets would continue to serve the Project Site. The Project does not propose any major replacement or improvement of existing sanitary sewer lines. Implementation of SCA UTIL-2 would require that the Project sponsor construct the necessary sewer infrastructure improvements to accommodate the Proposed Project. This condition also includes the payment of sewer mitigation fees required by the City's Public Works Agency.

Mitigation: None required.

Stormwater Drainage Facilities

Impact UTIL-3: The Proposed Project would not require or result in construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)

As evaluated in Section IV., Hydrology and Water Quality, overall stormwater runoff from the Project Site is not anticipated to change substantially with the Project due to the existing developed nature of the site. Approximately 5,270 square feet of building would be added to the existing impervious surface area and 4,280 square feet of pervious surface would be added as part of the roof garden. No new storm drain facilities are required (BKF, 2008).

Implementation of SCA UTIL-2 would require that the Project sponsor construct the necessary stormwater infrastructure improvements to accommodate the Proposed Project. The Project would also be required to implement SCA HYD-3 (as listed in Section IV.G, Hydrology and Water Quality), which requires compliance with Provision C.3 of the Alameda Countywide Clean Water Program. This provision regulates post-construction stormwater runoff. The Project would also be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) as described under SCA HYD-2 (as listed in Section IV.G, Hydrology and Water Quality).

The Proposed Project would have a less than significant impact to storm drainage facilities with implementation of the required plans and SCA.

Mitigation: None required.

Solid Waste Service

Impact UTIL-4: The Proposed Project would be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs, and would not require or result in construction of landfill facilities or expansion of existing facilities. (Less than Significant)

Project Construction

Project construction would generate construction waste and debris. Waste generated by construction of the Project is estimated to be approximately 2,659 tons (approximately 3.89 pounds per square foot of development) (US EPA, 1998).

The construction-generated waste would be removed from the Project Site and disposed of primarily at the Vasco Road Landfill, which is estimated to have sufficient capacity to serve existing users through approximately 2015 (CIWMB, 2008c). The Project will be subject to SCA UTIL-1, which requires the Project sponsor to submit a Construction and Demolition WRRP for review and approval by the Public Works Agency. The WRRP must specify the methods by which construction and demolition waste generated by the Proposed Project will be diverted from landfill disposal in accordance with City requirements.

Project Operations

CIWMB provides estimates for solid waste generation by land use category. Using an average waste generation rate for “large office buildings” of 1,998 pounds per 1,000 square feet of floor area per year, the office use of the Proposed Project would generate approximately 7,226 pounds of solid waste per day (2.6M pounds per year) (CIMWB, 2006). Using an average waste generation for “commercial/retail” uses of 2.5 pounds per 1,000 square feet of floor area per day, the ground-floor commercial/retail use would generate approximately 115 pounds of solid waste per day (41,975 pounds per year) (CIQMB, 2008d). Therefore, the total Project would generate approximately 7,341 pounds, or 3.7 tons, of solid waste per day (or 2.7M pounds, or 1,351 tons, per year)

In 2005, the City of Oakland disposed of approximately 416,827 tons of solid waste at the Altamont Landfill. Project-generated waste would result in an increase of less than one-percent of the total amount of waste processed annually at this facility. The landfill has adequate permitted capacity to accommodate the increase in solid waste disposal.

The Project would not impede the ability of the City to meet the waste diversion requirements of the California Integrated Waste Management Act or the Alameda County Waste Reduction and Recycling Initiative or cause the City to violate other applicable federal, state, and local statutes and regulations related to solid waste. In addition, the Project would be subject to SCA UTIL-1, which requires the preparation of an Operational Diversion Plan to identify how the Project would comply with the City’s Recycling Space Allocation Ordinance (Chapter 17.118 OMC) and specify the methods by which the Project would meet the current diversion of solid waste generated by Project operation from landfill disposal.

The Proposed Project would have a less than significant impact to solid waste services with implementation of the required SCAs.

Mitigation: None required.

Energy

Impact UTIL-5: The Proposed Project would not violate applicable federal, state and local statutes and regulations relating to energy standards; nor would result in a determination by the energy provider which serves or may serve the Project that it does not have adequate capacity to serve the Project’s projected demand in addition to the providers’ existing commitments and require or result in construction of new energy facilities or expansion of existing facilities. (Less than Significant)

The Proposed Project would result in an incremental increase in the demand for gas and electrical power given the increase in development on the Project Site. Overall, the level of public energy required of the Proposed Project would not be expected to violate applicable federal, state and local statutes and regulations relating to energy standards or exceed PG&E’s service capacity or require new or expanded facilities. The Project would be required by the City to comply with all

standards of Title 24 of the California Code of Regulations, aimed at the incorporation of energy-conserving design and construction. PG&E infrastructure exists on the Project Site, and any improvements and extensions required to accommodate the Project would be determined in consultation with PG&E prior to installation. As a result, although the Project would increase energy consumption, it would not result in a significant impact related to the provision of energy services.

Mitigation: None required.

Cumulative Impacts on Utility and Service Systems

Impact UTIL-6: The increased development resulting from the Proposed Project, in conjunction with population and density of other past, present, pending and reasonably foreseeable development in the City, would not result in cumulative impacts on utilities and service systems. (Less than Significant)

Geographic Context

The geographic context considered for the cumulative utilities, service systems impacts includes the surrounding area that, when combined with the Proposed Project, could result in cumulative impacts. Given the nature of the potential impacts analyzed for this topic, the geographic scope would include, but not be limited to, projects listed in Table IV-1, List of Relevant Cumulative Projects from the City's Major Project List. In addition to these major projects, the geographic context for each of the utilities topics is as follows:

Regarding water supply, the geographic context is the planning area for East Bay Municipal District (EBMUD), the water district that serves the City of Oakland and other jurisdictions throughout Alameda County and Contra Costa County.

Regarding sanitary sewer facilities, the geographic context considered for the cumulative analysis of wastewater treatment impacts is EBMUD's Special District No. 1 (SD-1) area (the cities of Alameda, Berkeley, Emeryville, Oakland, and Piedmont, and for the Stege Sanitary District, which includes El Cerrito, Kensington, and parts of Richmond).

Regarding stormwater drainage, the geographic context is generally the Oakland and surrounding area development that affects the underground system of storm drains and culverts to the San Francisco Bay, via the Oakland Estuary (directly or by way of Lake Merritt) or through the City of Emeryville.

Regarding solid waste, the geographic context considered for the cumulative analysis consists of the service regions of the Altamont Landfill and Resource Recovery Facility, the WMAC service area, and the Vasco Road Landfill, which includes most of Alameda County.

Regarding energy utilities, the geographic context considered for the cumulative is Pacific Gas & Electric's (PG&E's) service area in north and central California.

Impacts

Water Supply

The Proposed Project, in conjunction with past, present, and reasonably foreseeable future projects, could result in a cumulative increase in demand for water service. However, as discussed in the above analysis, the Project would not exceed water supplies available to serve the Project, nor cause significant environmental effects due the construction of new or expanded water facilities. The increases in demand attributable to other future development would be addressed on a site-by-site basis by EBMUD prior to approval of new development. Additionally, all future Projects would be required to comply with City ordinances and policies regarding water supply, as well as water conservation measures, and wherever feasible, participate in water recycling programs established by EBMUD to address effects of severe drought. Development of the Project and other future projects may involve improvements to existing water utility lines and may result in construction impacts. Construction related impacts are addressed throughout this EIR and would address any construction activities related to water utilities. Overall, the effect of the Proposed Project on water supply, in combination with other foreseeable projects would be less than significant.

Sanitary Sewer Facilities

The Proposed Project, in conjunction with past, present, and reasonably foreseeable future projects, could result in a cumulative increase in sewage generation, resulting in increased demand on EBMUD's wastewater treatment facility serving the Project Site. However, it is not anticipated that the wastewater demands of the Project combined with future projects in Oakland would result in the City exceeding its citywide allocation under the Wet Weather Program or East Bay Municipal Utility District's (EBMUD) capacity to serve the Project's projected demand in addition to its existing commitments within its service area.

The City would continue to implement its infiltration/inflow correction program intended to reduce the amount of inflow and infiltration, but this would not provide additional capacity beyond that projected for future years, and other foreseeable future projects would be required to comply with the City's programs and ordinances regarding adequate function and capacity of the sanitary sewer system. Any construction related effects that may result from future projects' improvements to existing sanitary sewer facilities are addressed by other mitigation measures in this EIR. Overall, the effect of the Proposed Project on the need for new or expanded wastewater facilities, in combination with other foreseeable projects would be less than significant.

Stormwater Drainage

Overall stormwater runoff from the Project Site is not anticipated to change substantially with the Project due to the existing developed nature of the site. No major change in the total annual stormwater discharge from the site into the storm drain system is anticipated, due to the required implementation of stormwater management strategies, including the preparation of a SWPPP.

Past, present, pending and reasonably foreseeable future projects would also be subject to all regulatory requirements and programs aimed to reduce impacts on the storm drain system citywide; thus the Proposed Project, in conjunction with reasonably foreseeable future projects, would not result in a cumulative increase in stormwater runoff, requiring the need for new or expanded stormwater drainage facilities.

Solid Waste

The Proposed Project, in conjunction with past, present, pending and reasonably foreseeable future projects, could result in a cumulative increase in solid waste and debris generated by Project construction and operations. However, comprehensive implementation of City and County waste reduction and diversion requirements and programs by the Project would reduce the potential for exceeding existing capacities of existing landfills, which have indicated that adequate capacity currently exists. As a result, the Project would not result in new or expanded landfill facilities or impede the City's ability to meet mandated waste diversion requirements, and the impact would be less than significant.

Energy

Despite annual statewide increases in energy consumption, development of the Project and other past, present, and reasonably foreseeable future projects in Oakland, which is mostly already served by gas and electricity infrastructure, and the net increased power demand from these projects relative to the regional service area, would be minimal and not require expanded or new power facilities as a direct result of project development. Further, all future projects would be required to comply with all standards of Title 24 of the California Code of Regulations, (or other similar building codes that would apply to residential and/or commercial developments); therefore, the effect of the Proposed Project on energy consumption levels, in combination with other foreseeable projects, would be less than significant.

Mitigation: None required.

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San Francisco Bay Regional Water Quality Control Board (SFRWQCB), Final Order R2-2010-060, NPDES CA 0037702 for EBMUD Special District No. 1, Main Wastewater Treatment Plant, Alameda County, 2010.

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CHAPTER V

Alternatives

A. Criteria for Selecting Alternatives

The California Environmental Quality Act (CEQA) requires that an EIR compare the effects of a “reasonable range of alternatives” to the effects of the Project. The alternatives selected for comparison should be those that would attain most of the basic objectives of the Project and avoid or substantially lessen one or more significant effects of the Project (CEQA *Guidelines* Section 15126.6). The “range of alternatives” is governed by the “rule of reason” which requires the EIR to set forth only those alternatives necessary to permit an informed and reasoned choice by the decision-making body and informed public participation (CEQA *Guidelines* Section 15126.6[f]). CEQA generally defines “feasible” to mean an alternative that is capable of being accomplished in a successful manner within a reasonable period of time, while also taking into account economic, environmental, social, technological, and legal factors.

CEQA Guidelines

The alternatives addressed in this EIR were selected based on the following factors:

1. The extent to which the alternative would accomplish most of the basic objectives of the Proposed Project (see Chapter III, Project Description; Section C, Objectives of the Proposed Project);
2. The extent to which the alternative would avoid or lessen any of the identified potentially significant environmental effects of the Proposed Project (identified throughout Chapter IV, Environmental Setting, Impacts, and Mitigation Measures);
3. The feasibility of the alternative, taking into account site suitability, availability of infrastructure, property control (ownership), and consistency with applicable plans and regulatory limitations;
4. The extent to which an alternative contributes to a “reasonable range” of alternatives necessary to permit a reasoned choice; and
5. The requirement of the CEQA *Guidelines* to consider a no project alternative and to identify an environmentally superior alternative in addition to the no-project alternative (CEQA *Guidelines*, Section 15126.6[e]).

This chapter describes and discusses each of the selected alternatives as well as alternatives that were considered but not studied further in this EIR based on one or more of the aforementioned factors or requirements under CEQA.

Significant Impacts Resulting from the Project

As indicated above, CEQA requires that the alternatives selected for comparison would avoid or substantially lessen one or more significant effects of the Project. To determine alternatives that would avoid or substantially lessen any of the identified significant environmental effects of the Project, the significant impacts of the Project must be considered. Impacts for which no feasible mitigations are identified to reduce the impact to less than significant are considered “significant and unavoidable” (“SU”). The analysis in Chapter IV of this EIR determined that the Proposed Project would result in the following SU impacts:

SU Aesthetics - Wind Hazards Impacts

- **Impact AES-6:** The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*
- **Impact AES-7:** Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to wind hazards at the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Air Quality – Criteria Pollutant Emissions Impacts

- **Impact AIR-3:** The Proposed Project would result in increased emissions of criteria pollutants. *(Significant and Unavoidable PM₁₀ emissions for Operations)*
- **Impact AIR-8:** Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. *(Significant and Unavoidable for Operations)*

SU Historic Resources Impacts

- **Impact CUL-1:** The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*
- **Impact CUL-2:** The proposed new construction would adversely affect the remaining portion of the qualified historic resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Roadway Noise Impacts

- **Impact NOI-4:** Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. *(Significant and Unavoidable)*

SU Transportation – Intersection/Roadway Impacts

The Proposed Project would result in SU impacts at several intersections and roadways under several scenarios: “Existing plus Project”, “2015 plus Phase 1 Only”, “2015 plus Project”, and “Cumulative 2030 plus Project”. (“Project” includes Phase 1 and Phase 2 buildout.) The

following list of impact summaries is organized by intersection, with the specific Impact Statement (e.g., TRANS-7a) and scenario (e.g., Cumulative 2030 plus Project) for each noted. This allows the reader to assess all the scenarios under which SU impacts at a particular intersection or roadway occurs. This organization is provided here specifically to allow for easy comparison of relative impacts across the alternatives analyzed in this chapter. (See Table V-2, *Comparison of Proposed Project and Alternatives Impacts*, at the end of this Chapter for complete Impact Statement for each scenario.)

Intersections Outside Downtown

- **Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)**

Added traffic would increase the v/c ratio by more than three percent during the PM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour. (*Impacts TRANS-1a, Existing plus Project; TRANS-3a, 2015 plus Phase 1 Only; TRANS-5a, 2015 plus Project; TRANS-7a Cumulative Plus Project*) (*Significant and Unavoidable, after mitigation*)
- **Intersection #3 (Harrison Street / 27th Street / 24th Street)**

Added traffic would increase the average intersection vehicle delay by more than four seconds during the PM peak hour and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour (2015); and increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour (2030). (*Impacts TRANS-3b, 2015 without Project; TRANS-5b, 2015 Plus Project; and TRANS-7b, Cumulative 2030 Plus Project*) (*Conservatively Deemed Significant and Unavoidable, after mitigation; Less than Significant if City determines proposed implementation approach for Mitigation Measure TRANS-1b is feasible*)
- **Intersection #45 (Grand Avenue / El Embarcadero)**

Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. (*Impacts TRANS-7h, Cumulative 2030 plus Project*) (*Significant and Unavoidable, after mitigation*)
- **Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp)**

Added traffic would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour. (*Impacts TRANS-1f, Existing plus Project; TRANS-5h, 2015 plus Project; and TRANS-7i, Cumulative 2030 plus Project*) (*Significant and Unavoidable, after mitigation*)
- **Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)**

Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. (*Impacts TRANS-5i, 2015 Plus Project; TRANS-7j, Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)
- **Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue)**

Added traffic would cause an increase in average intersection delay by more than two seconds during the AM peak hour. (Impact TRANS-7l, *Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)

Intersections Within Downtown

- **Intersection #12 (Harrison Street / Grand Avenue)**

Added traffic would increase the average intersection vehicle delay by more than two seconds during the PM peak hour and increase the average intersection vehicle delay by more than two seconds during the PM peak hour (2015); increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour (2030). (Impacts TRANS-3c, 2015 Plus Phase 1 Only; TRANS-5d, 2015 Plus Project; and TRANS-7d, *Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)

- **Intersection #13 (Harrison Street / 21st Street)**

Added traffic would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour (Impact TRANS-7e, *Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)

- **Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)**

If the City elects to implement Alternative Measure DD, but determines proposed mitigation measures are infeasible, then added traffic would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour and degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour (2015); and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour (2030). (Impact ALT DD TRANS-1, 2015 Plus Project Phase 1 only; ALT DD TRANS-2, 2015 Plus Project; ALT DD TRANS-3, *Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation, if the City determines additional mitigation measures feasible*)

- **Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)**

Added traffic would increase the v/c ratio by more than three percent during the PM peak hour, increase the average intersection vehicle delay by more than four seconds during the AM peak hour (2015); and increase the v/c ratio by more than three percent during the PM peak hour (2030). (Impacts TRANS-1d, *Existing Plus Project*; TRANS-5f, 2015 Plus Project; and TRANS-7g, *Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)

Roadways

- **Segment #3 (I-880 from Oak Street to 5th Avenue) – Caltrans Facility**

Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours. (Impact TRANS-8a, *Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)

- **Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero) – Non-Caltrans Facility**

Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, would increase the v/c ratio by more than three percent during the PM peak hour (2015); would degrade the roadway segment

level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour (2030). (*Impacts TRANS-2a, Existing Plus Project; TRANS-6a, 2015 Plus Project; and TRANS-8b, Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)

- **Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580). – Non-Caltrans Facility**

Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour (2015); degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour (*Impacts TRANS-2b, Existing Plus Project; TRANS-4a, 2010 Plus Phase 1 Only; TRANS-6b, 2015 Plus Phase 1 Only; and TRANS-8c, Cumulative 2030 Plus Project*) (*Significant and Unavoidable, after mitigation*)

B. Summary of Alternatives

In accordance with the alternatives selection criteria discussed above in Section A, *Criteria for Selecting Alternatives*, the alternatives listed below were selected for analysis in this EIR because they reduce or avoid adverse effects of the Proposed Project while aligning with most of the Project Objectives. Each is described in greater detail and discussed relative to the Proposed Project throughout Section C, *Alternative Analysis*, below.

- **No Project/No Build Alternative** – As discussed in Section A, above, consideration of a “no project” alternative is required in the EIR. CEQA states, “The purpose of describing and analyzing a “no project” alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project.” It also states that the “no project” alternative is “not the baseline for determining whether the proposed project’s environmental impacts may be significant, unless it is identical to the existing environmental setting analysis which does establish that baseline . . .” (CEQA *Guidelines* Section 15126.6[e]). The No Project/No Building Alternative is consistent with the existing environmental setting presented throughout Chapter IV of this EIR.
- **Alternative 1: South Tower Build Only**– This alternative would construct only the proposed South Tower, as described for Phase I of the Proposed Project. The 42-story North Tower would not be built. This alternative would include 552,000 square feet of office space and 27,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative, as with the Project.
- **Alternative 2: Onsite Maximum Reduced Impacts** – This Alternative would be similar to Alternative 1 in that only the South Tower would be constructed. However, in order to reduce the maximum number of SU impacts that occur on the Project Site, the size of the South Tower is reduced from 34 stories (Proposed Project) to 11 stories. The South Tower would have 222,000 square feet of office space and 46,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative as with the Project.
- **Alternative 3: Offsite Maximum Reduced Impacts** – This alternative would construct a 268,000 square foot office tower at an offsite location immediately north of the Project Site.

The total floor area is the same as Alternative 2, but no commercial/retail would be developed due to the limited street frontage available along the site. This Alternative is intended to avoid most of the impacts identified with the Proposed Project by avoiding SU historic resources and roof garden level wind hazards impacts. The offsite location, which is currently a 1-acre private pay parking lot bounded by 21st Street on the south, an existing 11-story commercial office building that fronts Webster Street on the west, 22nd Street on the north, and Kaiser Plaza Street on the east. Under this alternative, Kaiser Center would remain in its current state, with no improvements or demolition of existing facilities.

The development programs for the Proposed Project and each of the alternatives described above are summarized in **Table V-1**, Comparison of Proposed Project and Alternatives Characteristics, below.

**TABLE V-1
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES CHARACTERISTICS**

	Proposed Project	No Project/ No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
South Tower (20th Street Mall Building)	34 stories 552,000 sf office 46,000 sf commercial/retail	3 stories 58,190 sf office/retail	34 stories 552,000 sf office 27,000 sf commercial/retail	11 stories 222,000 sf office 46,000 sf retail	11-12 stories 268,000 sf office
North Tower (Webster Street Mall)	42 stories 786,900 sf retail	3 story 38,190 sf retail	0	0	0
Total Floor Area	1.47 million sf	96,380 sf	579,000 sf	268,000 sf	268,000 sf
Roof Garden	127,170 sf	122,606 sf	127,170 sf	127,170 sf	122,606 sf

SOURCE: The Swig Company, 2008, 2009; SOM, 2009

C. Alternatives Analysis

The alternatives analysis is conducted in this EIR to provide a comparison of the Proposed Project to one or more reduced alternatives that could reasonably occur if the Proposed Project was not approved. As permitted by CEQA, the potential effects of the alternatives are discussed in less detail than are the effects of the Project (CEQA *Guidelines* Section 15126.6[d]). However, the analysis is conducted at a sufficient level of detail to provide the public, other public agencies, and City decision-makers adequate information to fully evaluate the alternatives and for the City to approve an alternative instead of the Proposed Project without further environmental review.

Unless otherwise indicated, the impacts associated with the Proposed Project and the alternatives throughout this chapter are for buildout conditions and are stated as levels of significance *after* implementation of mitigation measures identified in Chapter IV. Table V-1 at the end of this chapter summarizes the comparison of the impacts associated with the Proposed Project and the Alternatives.

No Project/No Build Alternative

Under the No Project/No Build Alternative, no demolition or new construction would occur on the Project Site, and existing conditions would continue into the future. Existing buildings, infrastructure, the Kaiser Center roof garden, parking garage, and all other physical conditions would remain in their current state. The existing mall buildings – the 20th Street Mall and Webster Street Mall - and the current tenant mix would not change from existing uses. Overall, the characteristics of this alternative are a continuation of existing conditions through buildout. Table V-1, above, summarizes this alternative relative to the Proposed Project.

Impacts Compared to the Proposed Project

Aesthetics, Shadow and Wind

Under the No Project/No Build Alternative, all conditions of the Project Site would remain the same as the current conditions. No new construction, alterations or demolition would occur. Unlike the Proposed Project, this alternative would not impact aesthetics, shadow, or light and glare as a result of changes on the site. No impacts would occur.

The wind tunnel testing conducted for this EIR indicate that, existing winds at ten sidewalk locations on and around the Project Site and one location on the Kaiser Center roof garden exceed the thresholds for significant wind hazards impacts. This existing condition occurs because the Project Site is currently quite open and exposed to the three strongest of the prevailing wind. In comparison, the Proposed Project would result in an overall net increase of 7 hours in the duration of the wind hazard and would result in at least 2 new wind hazards and an increase in total wind hazard on the roof garden by 55 hours due to downwash winds from the new towers. The Proposed Project's effects are determined to be significant, and the No Project/No Build Alternative is affected by existing hazard conditions, however they are less than those identified with the Proposed Project.

Air Quality and Greenhouse Gases

There would be no construction activity or an increase in vehicle trips, development or on-site activity under the No Project/No Build Alternative. Therefore, the significant air quality impact identified with the Proposed Project would not occur under this alternative, and the less-than-significant GHG emissions impacts would occur since no new development would occur. No impacts would occur.

Biological Resources

Since no construction activities or tree removal would occur under the No Project/No Build Alternative, the less-than-significant biological resource impacts associated with tree removal or the effects of new buildings and lighting on birds or other species would not occur since no changes would occur to the site or the roof garden. No impacts would occur.

Cultural Resources

The No Project/No Build Alternative would not alter, demolish or construct any structures on the Project Site. Specifically, there would be no effect to any portion of the Kaiser Center or existing character-defining exterior features of the mall buildings, which includes their overall shape, siting, and massing and aggregate wall panels. Also, there would be no grading or excavation to potentially affect archaeological or paleontological resources or human remains. Therefore, the No Project/No Build Alternative would not result in the significant historic resources impacts associated with the Proposed Project, including the conservatively-deemed significant historic resources impacts associated with changes to existing buildings and roof garden (CUL-1 and CUL-2). No impacts would occur.

Geology, Soils, and Seismicity

Under the No Project/No Build Alternative, no new structures would be built and no site alterations would occur. Therefore, while the Project Site would still be susceptible to the less-than-significant seismic ground shaking and geologic hazards impacts due to its location as identified with the Proposed Project, this alternative would not introduce new population to these seismic risk conditions on the Project Site. No impacts would occur.

Hazards and Hazardous Materials

Under the No Project/No Build Alternative, no significant hazards to the public or the environment would occur due to routine transport, use, or disposal of hazardous materials since no changes would occur to the site. Nor would significant hazards result from reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment. Since there would be no construction activity, the No Project/No Build Alternative would not expose construction workers or the public to hazardous materials or airborne toxics (i.e., lead-based paint and asbestos) during construction activities. No impacts would occur, however, this alternative would not remove existing hazardous conditions that may exist in buildings or on the Project Site.

Hydrology and Water Quality

The No Project/No Build Alternative would not construct any new structures or alter the Project Site in any way. Runoff associated with this alternative could affect stormwater conveyance systems at levels potentially greater than the Proposed Project, but no more than existing conditions. This is because the Proposed Project would implement current NPDES requirements to reduce stormwater flows from current/existing conditions. Further, this alternative would not expand the roof garden, which under the Proposed Project would increase pervious surface area on the Project Site and incorporate landscaped based treatment options and detention of stormwater runoff. While no improvements would occur, this analysis does not assume that existing conditions constitute a violation of any waste discharge requirements.

Since dewatering would not occur on the Project Site under this alternative, construction workers and the public would not potentially be exposed to contaminants that may be present in the soil and groundwater. Therefore, the less-than-significant impacts associated with hydrology and

water quality or stormwater drainage capacity would not occur with this alternative, which would maintain existing conditions on the Project Site. No impacts would occur.

Land Use, Plans and Policies

Under the No Project/No Build Alternative, the existing mall buildings containing commercial and retail uses would remain, as would the publicly accessible roof garden. Land uses would remain consistent with existing surrounding uses, as would all buildings on the Project Site. Therefore, like the Proposed Project, this alternative would not result in the physical division of an existing community, or conflict with any existing plans. No impacts would occur.

Noise

The No Project/No Build Alternative would not involve construction activity or new operations on the Project Site. Therefore, the alternative would not result in the SU roadway noise impact associated with operations identified with the Proposed Project. No impacts would occur.

Population, Employment, and Housing

Under the No Project/No Build Alternative, no changes would occur to existing businesses or jobs on the Project Site, nor would there be an increase in population due to new housing, businesses or infrastructure. Therefore this alternative would not result in the population and housing impacts identified with the Proposed Project. No impacts would occur.

Public Services

The No Project/No Build Alternative would not result in any increase in population on the Project Site. Therefore, there would be no increase in demand for fire, police, schools and emergency services. Thus, this alternative would not result in public services impacts identified with the Proposed Project. No impacts would occur.

Traffic and Circulation

The No Project/No Build Alternative would not change the existing traffic conditions, circulation patterns, or parking associated with uses on the Project Site. Therefore, this alternative would not have traffic, circulation or parking impacts that were identified with the Proposed Project. This alternative specifically would not have the significant intersection and roadway impacts resulting from new vehicle trips associated with the Proposed Project. None of the SU intersection and roadway impacts resulting with the Proposed Project would occur.

Utilities and Service Systems

The No Project/No Build Alternative would not result in any new development on the Project Site or any other site changes. Therefore this alternative would not cause an increase in demand for water, wastewater, solid waste disposal, and energy, and would not have utilities and service systems impacts like those identified with the Proposed Project. No impacts would occur.

Alternative 1: South Tower Build Only

The South Tower Build Only Alternative assumes that the Proposed Project would construct the South Tower (on the 20th Street Mall site at the corner of 20th and Webster streets), but would not construct the North Tower (on the Webster Street Mall site at the corner of 21st and Webster streets). Table V-1, above, summarizes this alternative relative to the Proposed Project, and the other alternatives. The South Tower Build Only Alternative would include office and retail uses in a 34 story (469 foot tall) tower, with 552,000 square feet of office and 27,000 square feet of commercial/retail use, including in street level retail space. This is the same program as the South Tower proposed by the Project. The existing Webster Street Mall would remain as is with a 3-story building and approximately 38,190 square feet of retail space. No roof garden space would be removed, but improvements to the garden would occur under this alternative

Impacts of Alternative 1: South Tower Build Only Compared to the Proposed Project

Aesthetics, Shadow and Wind

The South Tower Build Only Alternative would include the construction of a 34-story South Tower at the corner of 20th and Webster Streets, and would not construct the 42-story North Tower that the Project proposes at the corner of 21st and Webster Streets; the existing Webster Street Mall building would remain at that location. Considerably less new physical development and changes would occur on the Project Site. As a result, this alternative would have less-than-significant impacts to scenic vistas and resources, visual character, light and glare, and shadow since only one of the proposed towers would be built. The City's Standard Conditions of Approval (SCA) identified to address light and glare effects of the Proposed Project would also apply to this alternative. Shadow effects would also be less than with the Proposed Project because there would be no 42-story tower casting new shadows.

As discussed in the wind hazards analysis in Section IV.A of this EIR, building large new high-rise structures can decrease the number and durations of occurrence of wind hazard in an area. The largest adverse wind hazards effect with the Proposed Project occurs at the roof garden, which would be exposed to downwash winds from the two new towers. Only the 34-story tower would be constructed under this alternative, so the downwash wind effects at the roof garden would likely be less than with the Proposed Project. Because existing significant wind hazards conditions exist at the roof garden however, those are not expected to be reduced under this alternative. Even with construction of only the 34-story South Tower at the southwest area of the Project Site (20th and Webster Streets), the Project Site will remain quite exposed to the strongest of the prevailing winds there, winds from the west, north-northwest, and south-southeast, particularly without construction of the 42-story North Tower at the northwest corner of the Project Site (21st and Webster Streets). Therefore, the South Tower Build Only alternative would reduce, but would not avoid, the significant wind hazards impact (AES-6 and AES-7) identified with the Proposed Project. Overall, aesthetics impacts would be the same or reduced from those identified for the Project.

Air Quality

The South Tower Build Only Alternative would involve demolition of the 3-story 20th Street Mall, related site excavation /grading (approx. 31,000 cubic yards), and construction and paving to build the 34-story tower. The construction emissions and fugitive dust resulting from Alternative 1 would be less than would occur with the Proposed Project since demolition, site preparation and construction of the North Tower would not occur. The construction period emissions (ROG in 2018) impact identified for the Project would be mitigated to less than significant, however, Alternative 1 would avoid this impact. The SCAs identified to address fugitive dust and construction emissions with the Proposed Project would also apply to this alternative.

The vehicle trips and stationary area source emissions under this alternative would also be less compared to the Proposed Project due to the reduction in office, commercial and retail square footage (from not building the 42-story North Tower). As a result, criteria pollutant emissions would be less than with the Proposed Project. The Proposed Project would result in a significant impact due to PM10 emission increases (as much as 111 lbs/day compared to the BAAQMD significance threshold of 82 lbs/day). Vehicle trips with this South Tower Build Only Alternative would be reduced by approximately 60 percent compared to the Proposed Project. As a result, this alternative would avoid the significant impact identified with the Proposed Project; the net new PM10 emissions would be approximately 49 lbs/day compared to the aforementioned threshold: less than significant. The City's SCAs identified for the Proposed Project would also apply to this alternative. See Appendix C to this Draft EIR for supporting calculations.)

Greenhouse Gases

Compared to the Proposed Project, the South Tower Build Only Alternative would result in fewer vehicle trips (thus fewer emissions) and require less net increases for heating (natural gas), electricity use, and solid waste – key sources of GHG emissions. Considering the 1,100 MT CO₂e per year threshold for GHG emissions, this alternative would generate approximately 7,110 MT CO₂e per year compared to 13,591 MT CO₂e for the Proposed Project. However, because the ratio of employees to annual emissions is different for Alternative 1, it would exceed the 4.6 MT CO₂e annual service population threshold, whereas the Project would not. The alternative would result in approximately 5.0 MT CO₂e per year per service population (total emissions divided by service population 1,423 net new employees for Phase I South Tower) compared to 4.2 MT CO₂e for the Proposed Project. Thus, Alternative 1 would have a significant but mitigable GHG emissions CEQA impact (by exceeding both significance thresholds) where the Project resulted in a less-than-significant impact. Standard Conditions identified for the Proposed Project would also apply to Alternative 1. (See Appendix I to this Draft EIR for supporting calculations.)

Biological Resources

The South Tower Build Only Alternative would not impact special-status plants or species given the limited and marginal habitat existing on and around the Project Site. The alternative would still require the removal of seven or eight protected trees, which is fewer than the 19 protected trees that

would be removed with the Proposed Project. Also like the Proposed Project, this alternative would not affect wetlands or breeding birds and would not conflict with any existing tree ordinance, conservation plan, or creek ordinance. The alternative would result in the same less-than-significant impacts identified with the Proposed Project, and the same SCA regarding tree removal identified with the Proposed Project would apply to this alternative.

Because a new 34-story tower would be constructed where a 3-story structure currently exists, this alternative, like the Proposed Project, would create the potential for bird strikes to the towers. This would be the case although the potential for strikes would be reduced since only one tower would be constructed (instead of two with the Proposed Project). The potential for bird strikes would be reduced due to the absence of the 42-story tower, but the impact would still occur and be less-than-significant, as with the Proposed Project. The applicable SCA's identified for the Proposed Project would also apply to this alternative. Overall, biological resources impacts would be the same or reduced from those identified for the Project.

Cultural Resources

The South Tower Build Only Alternative would involve demolition of one of the two Mall Buildings, which is a component of a qualified historic resource (the Kaiser Center). As discussed in Section IV.D in this EIR, demolition or material impairment of a resource is considered to be a significant adverse impact

As with the Proposed Project, construction of the new South Tower under this alternative would affect the integrity of the historic resource's setting and continue to be a significant impact. This would occur since the 20th Street Mall building would be removed, including its dolomite panels, and because the view corridor from the west on 20th Street to the rear of the existing Kaiser Center office tower (which is identified as a contributor to the resource's historic integrity) would be altered by the construction of the new South Tower. This is the case although there would only be one tower in the view corridor instead of the two with the Proposed Project. This alternative would not remove any part of the existing historic roof garden, but would actually add more garden space adjacent to the South Tower on the east side. Therefore the direct impact associated specifically with the roof garden identified with the Proposed Project would not occur. Overall, the alternative would result in the significant impact to historic resources identified for the Proposed Project (CUL-1 and CUL-2).

Mitigation measures and SCAs identified for the Proposed Project would also apply to this alternative, including those address potential effects to archaeological and paleontological resources and human remains. However, as discussed for the Proposed Project, because design details adhering to the mitigation measures are not yet available, the impact would be conservatively deemed significant and unavoidable, as is the case with the Proposed Project. Overall, cultural resources impacts would be the same or reduced from those identified for the Project.

Geology, Soils, and Seismicity

Under the South Tower Build Only, grading activities and building foundations similar to those required for the Proposed Project would be required and would be subject to the same geologic and seismic conditions and constraints of the site. An earthquake on a nearby fault could result in strong seismic shaking at the Project Site, and the alternative would introduce new population to these seismic risks. The alternative would result in the same less-than-significant impacts identified with the Proposed Project. Each of the City's SCAs requiring the preparation, approval and adherence to geotechnical reports and erosion reports, as identified for the Proposed Project, would also apply to this alternative. Overall, geological, soils and seismicity impacts would be the same or reduced from those identified for the Project.

Hazards and Hazardous Materials

The South Tower Build Only Alternative would involve development on a portion of the Project Site and at a reduced intensity compared with the Proposed Project. However, this alternative would continue to have similar effects related to public health and hazards associated with demolition of existing structures, the routine transport, use or disposal of hazardous materials; or the creation of a significant hazard to the public or the environment through reasonable foreseeable upset or accident conditions involving the release of hazardous materials into the environment. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs addressing each of the above effects would also apply to the alternative. Overall, hazards and hazardous materials impacts would be the same or reduced from those identified for the Project.

Hydrology and Water Quality

The South Tower Build Only Alternative involves reduced development on a portion of the Project Site, but would not result in substantially different drainage patterns, flooding, or impervious surfaces to adversely affect stormwater conveyance systems. As with the Proposed Project, construction workers and the public would be exposed to potential contaminants in the soil and groundwater related to dewatering onsite, but this potential impact would be reduced by the fact that only part of the site would be developed. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs that would ensure the alternative would not violate water quality standards or waste discharge requirements nor increase runoff to levels that would exceed the capacity of the stormwater drainage system would also apply to the alternative. Overall, hydrology and water quality impacts would be the same or reduced from those identified for the Project.

Land Use, Plans and Policies

Under the South Tower Build Only Alternative, land uses would remain consistent with existing surrounding uses, even though the 34-story South Tower would involve a substantial addition of office and retail use on the site compared to existing conditions, but notably less than would be with the Proposed Project since the 42-story North Tower would not be built. The configuration of new development on the site would be similar to the Proposed Project and would be essentially the same except for not constructing the North Tower on the Webster Street Mall. As a result, this

alternative would have the same less-than-significant impacts associated with the physical division of an existing community, or relationship with existing plans as identified with the Proposed Project.

Noise

Noise effects from construction of the South Tower would be similar to that with the Proposed Project. It would be temporary and would occur over a shorter period of time than with the Proposed Project since only one tower would be constructed. City SCAs identified with the Proposed Project to address construction period noise effects would also apply to this alternative.

As discussed above for Air Quality, development under this alternative would be approximately 60 percent less than that for the Proposed Project and would generate approximately 40 percent of peak hour and daily vehicle trips compared to the Proposed Project given the reduced level of development. The Proposed Project would generate a net increase of 1,187 AM peak hour vehicle trips and 1,144 PM peak hour vehicle trips. The Project's contribution to cumulative roadway noise levels would exceed the significance threshold by 0.3 dBA and be a cumulative SU impact. Given the 40 percent reduction in traffic that would result with the Alternative, resulting roadway noise levels would not exceed the significance threshold. This alternative would avoid the SU cumulative roadway noise impact; the impact would be less than significant. All City SCAs identified with the Project would also apply to the alternative.

Population, Employment, and Housing

Under the South Tower Build Only Alternative, less new population would occur on the Project Site and there would be fewer changes to existing businesses and jobs than would occur with the Proposed Project on the Project Site. This is because approximately 60 percent less office development would be developed with this alternative. There would be population increase resulting from new business on the site, however, it would not result from new housing on the Project Site or be at levels not previously anticipated by the City. The impacts with this alternative would be essentially the same as the less-than-significant impact identified with the Proposed Project in that it will not be necessary to replace facilities due to displaced existing business and jobs, and that it will not induce substantial population growth.

Public Services

The South Tower Build Only Alternative would result in less new population on the Project Site compared to the Proposed Project. The development would be approximately 60 percent less office and retail development than the Proposed Project. As a result, there would be a proportional reduction in the level of increased demand for fire, police, schools and emergency services from the Project. Thus, the alternative would have the same or reduced less-than-significant impacts to public services as identified for the Proposed Project.

Traffic and Circulation

The South Tower Build Only Alternative would result in fewer AM and PM peak hour trips compared to the Proposed Project (approximately 60 percent less) (see Table 1 in Appendix J).

As a result, this alternative would avoid several of the Project's SU intersection impacts that would occur in the Cumulative (2030) plus Project Condition. SU intersection conditions at the following Project-impacted intersections would be avoided by this alternative, as detailed in Table 2 in Appendix J to this Draft EIR: Intersections #2, #13, #44, #45, #47, and #48. Except for Intersection #2, traffic contributions to these intersections would not exceed thresholds of significance and would therefore have no impact. Intersection #2 would not exceed thresholds of significance *after* mitigation and also would therefore be less than significant. This alternative would result in the same SU roadway impacts (Segments #3, #9, and #10) at buildout as identified with the Project. (See Appendices J and H to this Draft EIR for supporting calculations.)

Utilities and Service Systems

The amount of development under the South Tower Build Only Alternative is approximately 60 percent less than the Proposed Project, and only one tower would be developed instead of two. As a result, the alternative would result in less demand for water, wastewater, solid waste disposal, and energy compared to the Proposed Project. Therefore, impacts to utilities and services systems with this alternative would be less-than-significant, as with the Project, and have a relatively reduced effect. The City's SCA's identified with the Proposed Project and that apply to the wastewater generation and stormwater drainage facilities would also apply to this alternative.

Alternative 2: Onsite Maximum Reduced Impacts

The Onsite Maximum Reduced Impacts Alternative would be similar to Alternative 1 in that only the South Tower would be constructed. However, in order to reduce all SU traffic impacts, the total floor area of the South Tower would be reduced to 11 stories, compared to the 34 stories under the Proposed Project. The South Tower would have 222,000 square feet of office space and 27,000 square feet of commercial/retail. The floor area was formulated after the number/percentage of vehicle trips would need to be reduced to avoid the Project's SU impacts. No roof garden space would be removed, but improvements to the garden would occur under this alternative. Table V-1, above, summarizes this alternative relative to the Proposed Project and the other alternatives.

Impacts of Alternative 2: Onsite Maximum Reduced Impacts Compared to the Proposed Project

Aesthetics, Shadow and Wind

The Onsite Maximum Reduced Impacts Alternative would include the construction of an 11-story South Tower at the corner of 20th and Webster Streets, and would not construct the proposed 42-story North Tower at the corner of 21st and Webster Streets; the existing Webster Street Mall building would remain at that location. Considerably less new physical development and changes would occur on the Project Site. As a result, this alternative would have less-than-significant

impacts to scenic vistas and resources, visual character, light and glare, and shadow since only one of the proposed towers would be built and would be 23 stories shorter. The City's SCAs identified to address light and glare effects of the Proposed Project would also apply to this alternative. Shadow effects would also be less than with the Proposed Project because there would be no 42-story tower casting new shadows.

As discussed in the wind hazards analysis in Section IV.A of this EIR, building large new high-rise structures can decrease the number and durations of occurrence of wind hazard in an area. The largest adverse wind hazards effect with the Proposed Project occurs at the roof garden, which would be exposed to downwash winds from the two new towers. Only an 11-story tower would be constructed under this alternative, so the downwash wind effects at the roof garden would likely be less than with the Proposed Project. Because existing significant wind hazards conditions exist at the roof garden however, those are not expected to be reduced under this alternative. Even with construction of only the 11-story South Tower at the southwest area of the Project Site (20th and Webster Streets), the Project Site will remain quite exposed to the strongest of the prevailing winds there, winds from the west, north-northwest, and south-southeast, particularly without construction of the 42-story North Tower at the northwest corner of the Project Site (21st and Webster Streets). Therefore, the Onsite Maximum Reduced Impacts Alternative would reduce, but would not avoid, the significant wind hazards impact identified with the Proposed Project.

The City's SCAs identified to address light effects of the Proposed Project would also apply to this alternative.

Air Quality

The Onsite Maximum Reduced Impacts Alternative would involve demolition of the 3-story 20th Street Mall, related site excavation /grading (approx. 31,000 cubic yards), and construction and paving to build the 11-story tower. The construction exhaust emissions and fugitive dust resulting from Alternative 2 would be less than the Proposed Project since demolition, site preparation and construction of the North Tower would not occur. Alternative 2 would avoid the Project's less-than-significant after mitigation short-term pollutant emissions impact during construction. The SCAs identified to address fugitive dust and construction emissions with the Proposed Project would also apply to this alternative.

The vehicle trips and stationary area source emissions under this alternative would also be less compared to the Proposed Project due to the reduction in office and commercial footage (from not building the 42-story North Tower and from building a smaller South Tower). As a result, criteria pollutant emissions would be less than with the Proposed Project. The Proposed Project would result in a significant impact due to PM₁₀ emission increases (as much as 111lbs/day compared to the existing BAAQMD significance threshold of 82 lbs/day). Vehicle trips with this Onsite Maximum Reduced Alternative would be reduced by approximately 80 percent compared to the Proposed Project. As a result, this alternative would avoid the significant impact identified with the Proposed Project; the net new PM₁₀ emissions would be approximately 24 to 26 lbs/day compared to the aforementioned threshold, less than significant. (See Appendix C to this Draft EIR for supporting calculations.)

Greenhouse Gases

Compared to the Proposed Project, the Onsite Maximum Reduced Alternative would result in fewer vehicle trips (thus fewer emissions) and require less net increases for heating (natural gas), electricity use, and solid waste – key sources of GHG emissions. This alternative would generate approximately 2,554 MT CO₂e per year compared to 13,591 MT CO₂e for the Proposed Project. On an annual service population basis, this alternative would generate approximately 3.9 MT CO₂e per year per service population (total emissions divided by service population 647 net new employees for the reduced Project) compared to 4.2 MT CO₂e for the Proposed Project. Thus, like the Project, Alternative 2 exceeds the 1,100 MT CO₂e per year threshold, and is below the 4.6 MT CO₂e service population threshold, resulting in a less-than-significant GHG emissions impact. However, Alternative 2, unlike the Project, does not meet the criteria of “very large project” and therefore the SCA GHG-1 identified for the Proposed Project would not apply to the Alternative 2. (See Appendix I to this Draft EIR for supporting calculations.)

Biological Resources

The Onsite Maximum Reduced Impacts Alternative would not impact special-status plants or species given the limited and marginal habitat existing on and around the Project Site. The alternative would still require the removal of seven or eight protected trees with construction of the 11-story South Tower, which is less than the 19 protected trees that would be removed with the Proposed Project. Also like the Proposed Project, this alternative would not affect wetlands or breeding birds and would not conflict with any existing tree ordinance, conservation plan, or creek ordinance. The alternative would result in the same less-than-significant impacts identified with the Proposed Project, and the same SCA regarding tree removal identified with the Proposed Project would apply to this alternative.

Because the alternative involves a lower in height South Tower, compared to the Proposed Project, this alternative would have less potential for bird strikes to the tower from height incidents, but could still create impacts from glare conditions. However, as indicated with the Proposed Project, the impact would continue to be less-than-significant and the applicable SCA’s identified for the Proposed Project would also apply to this alternative.

Cultural Resources

The Onsite Maximum Reduced Impacts Alternative would involve demolition of one of the two Mall Buildings, which is a component of a qualified historic resource (the Kaiser Center). As discussed in Section IV.D in this EIR, demolition or material impairment of a resource is considered to be a significant adverse impact.

As with the Proposed Project, construction of the new 11-story South Tower under this alternative would affect the integrity of the historic resource’s setting and continue to be a significant impact. This would occur since the 20th Street Mall building would be removed, including its dolomite panels, and because the view corridor from the west on 20th Street to the rear of the existing Kaiser Center office tower (which is identified as a contributor to the resource’s historic integrity) would be altered by the construction of the new South Tower. This is the case although there would only be one tower in the view corridor instead of the two with

the Proposed Project, and the new tower would be shorter than the one tower under Alternative 1. This alternative would not remove any part of the existing historic roof garden, but would actually add more garden space adjacent to the South Tower on the east side. Therefore the direct impact associated specifically with the roof garden identified with the Proposed Project would not occur. Overall, the alternative would result in the significant impact to historic resources.

Mitigation measures identified for the Proposed Project would also apply to this alternative. However, as discussed for the Proposed Project, because design details adhering to the mitigation measures are not yet available, the impact would be conservatively deemed significant and unavoidable, as is the case with the Proposed Project.

Geology, Soils, and Seismicity

Under this alternative, grading activities and building foundations similar to those required for the Proposed Project would be required and would be subject to the same geologic and seismic conditions and constraints of the site. An earthquake on a nearby fault could result in strong seismic shaking at the Project Site, and the alternative would introduce new population to these seismic risks. The alternative would result in the same less-than-significant impacts identified with the Proposed Project. Each of the City's SCAs requiring the preparation, approval and adherence to geotechnical reports and erosion reports, as identified for the Proposed Project, would also apply to this alternative.

Hazards and Hazardous Materials

The Onsite Maximum Reduced Impacts Alternative would involve development on a portion of the Project Site and at a reduced intensity compared with the Proposed Project. However, this alternative would continue to have similar effects related to public health and hazards associated with demolition of existing structures, the routine transport, use or disposal of hazardous materials; or the creation of a significant hazard to the public or the environment through reasonable foreseeable upset or accident conditions involving the release of hazardous materials into the environment. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs addressing each of the above effects would also apply to the alternative.

Hydrology and Water Quality

The Onsite Maximum Reduced Impacts Alternative involves reduced development on a portion of the Project Site, but would not result in substantially different drainage patterns, flooding, or impervious surfaces to adversely affect stormwater conveyance systems. As with the Proposed Project, construction workers and the public would be exposed to potential contaminants in the soil and groundwater related to dewatering onsite, but this potential impact would be reduced by the fact that only part of the site would be developed. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs that would ensure the alternative would not violate water quality standards or waste discharge requirements nor increase runoff to levels that would exceed the capacity of the stormwater drainage system would also apply to the alternative.

Land Use, Plans and Policies

Under the Onsite Maximum Reduced Impacts Alternative, land uses would remain consistent with existing surrounding uses, even though the 11-story South Tower would involve a substantial addition of office and retail use on the site compared to existing conditions, but notably less than would be with the Proposed Project since the 42-story North Tower would not be built, and less than would be with Alternative 1 since the South Tower would be only 11 stories instead of 34 stories. The configuration of new development on the site would be similar to the Proposed Project and would be essentially the same except for not constructing the North Tower on the Webster Street Mall. As a result, this alternative would have the same less-than-significant impacts associated with the physical division of an existing community, or relationship with existing plans as identified with the Proposed Project.

Noise

Noise effects from construction of the Onsite Maximum Reduced Impacts Alternative would be substantially less than that with the Proposed Project. The effects would be temporary and would occur over a shorter period of time than with the Proposed Project since only one tower would be constructed. City SCAs identified with the Proposed Project to address construction period noise effects would also apply to this alternative.

As discussed above for Air Quality, development under this alternative would be approximately 80 percent less than that for the Proposed Project and would generate approximately 40 percent of peak hour and daily vehicle trips compared to the Proposed Project given the reduced level of development. The Proposed Project would generate a net increase of 1,187 AM peak hour vehicle trips and 1,144 PM peak hour vehicle trips. The Project's contribution to resulting cumulative roadway noise levels would exceed the significance threshold by 0.3 dBA and be a cumulative SU impact. Given the reduced traffic that would result with the Alternative, resulting roadway noise levels would not exceed the significance threshold. Thus, this alternative would avoid the SU cumulative roadway noise impact identified with the Project; the impact would be less than significant. All City SCAs identified with the Project would also apply to the alternative.

Population, Employment and Housing

Under the Onsite Maximum Reduced Impacts Alternative, less new population would occur on the Project Site and there would be fewer changes to existing businesses and jobs than would occur with the Proposed Project on the Project Site. This is because approximately 60 percent less office development would be developed. There would be population increase resulting from new business on the Project Site, however, it would not result from new housing on the Project Site or be at levels not previously anticipated by the City. The impacts with this alternative would be essentially the same as the less-than-significant impact identified with the Proposed Project in that it will not be necessary to replace facilities due to displaced existing business and jobs, and that it will not induce substantial population growth.

Public Services

The Onsite Maximum Reduced Impacts Alternative would result in less new population on the Project Site compared to the Proposed Project. The development would be approximately 60 percent less office development than the Proposed Project. As a result, there would be a proportional reduction in the level of increased demand for fire, police, schools and emergency services from the Project. Thus, the alternative would have the same less-than-significant impacts to public services as identified for the Proposed Project.

Traffic and Circulation

Under the Onsite Maximum Reduced Impacts Alternative, only the South Tower would be built, similar to Alternative 1, except the South Tower would have 80 percent less office square footage than the South Tower proposed in the Proposed Project (222,000 square feet in Alternative 2 compared with 522,000 square feet in the Proposed Project).

The Onsite Maximum Reduced Impacts Alternative would result in fewer AM and PM peak hour trips compared to the Proposed Project (approximately 80 percent less). As a result, this alternative would avoid all of the Project's SU intersection impacts that would occur in the Cumulative (2030) plus Project Condition. These include Intersections #2, #12, #13, #44, #45, #47, and #48 (Intersection #12 is avoided in addition to those avoided under Alternative 1). Except for Intersection #2, traffic contributions to these intersections would not exceed thresholds of significance and would therefore have no impact. Intersection #2 would not exceed thresholds of significance *after* mitigation and also would therefore be less than significant. This alternative would avoid all 3 SU roadway impacts (Segments #3, #9, and #10) at buildout as identified with the Project. (See Appendices J and H to this Draft EIR for supporting calculations.)

Utilities and Service Systems

The amount of development under the Onsite Maximum Reduced Impacts Alternative is approximately 80 percent less than with the Proposed Project, and only one tower would be developed instead of two. In addition, the constructed tower would be 80 percent less square footage than the Proposed Project. As a result, the alternative would result in less demand for water, wastewater, solid waste disposal, and energy compared to the Proposed Project. Therefore, impacts to utilities and services systems with this alternative would be less-than-significant, as with the Project, and have a reduced effect. The City's SCA's identified with the Proposed Project and that apply to the wastewater generation and stormwater drainage facilities would also apply to this alternative.

Alternative 3: Offsite Maximum Reduced Impacts

The Offsite Maximum Reduced Impacts Alternative assumes that Alternative 2 would be constructed at another location in order to avoid the significant cultural and wind impacts that occur with the Proposed Project and Alternatives 1 and 2. The selected offsite location is

currently a private pay parking lot which is not owned or controlled by the Applicant and may not be available for acquisition or use. The rectangular site is approximately 1 acre in size and is bounded by 21st Street on the south, an existing 11-story commercial office building that flanks Webster Street on the west, 22nd Street on the north, and Kaiser Plaza Street on the east. Across 22nd Street from the Alternative 3 site is the 15-story Caltrans building, and across Kaiser Plaza Street is the 28-story Ordway building. A map showing the location of the Alternative 3 site is included as **Figure V-1**, and a conceptual layout for Alternative 3 is included as **Figure V-2**.

This alternative would construct a 268,000 square foot office tower at this location; No street level or other retail or commercial use would be included. The Kaiser Center Site would remain in its current state, with no improvements or demolition of existing facilities, including improvements to the roof garden.

Compared to Proposed Project

Aesthetics, Shadow and Wind

The Offsite Maximum Reduced Impacts Alternative would include the construction of a 268,000 square foot Office Tower at the offsite location and would not construct a second office tower. This alternative would be about the same height at the commercial building west of the site and would be considerably less in height than the Ordway Building east of the site and the Caltrans building to the north. No new physical development and changes would occur on the Project Site. As a result, this alternative would have less-than-significant impacts to scenic vistas and resources, visual character, light and glare, and shadow since only one of the proposed towers would be built. The City's SCA identified to address light and glare effects of the Proposed Project would also apply to this alternative. Shadow effects would also be less than with the Proposed Project because there would be no new 34- and 42-story towers casting new shadows across the roof garden, and the building under Alternative 3 would not be tall enough to cast a large shadow across 21st Street onto the roof garden.

As discussed in the wind hazards analysis in Section IV.A of this EIR, building large new high-rise structures can decrease the number and durations of occurrence of wind hazard in an area. The largest adverse wind hazards effect with the Proposed Project occurs at the roof garden, which would be exposed to downwash winds from the two new towers. Because Alternative 3 is at another location but across 21st Street from the Kaiser Center roof garden, the existing wind conditions at the roof garden would remain the same. However, significant new wind hazards are also identified at ground level for the Project, so it is conservatively assumed that the similar impacts could occur at ground level with the new tower under Alternative 3 and the significant wind hazards impact at ground level could continue.

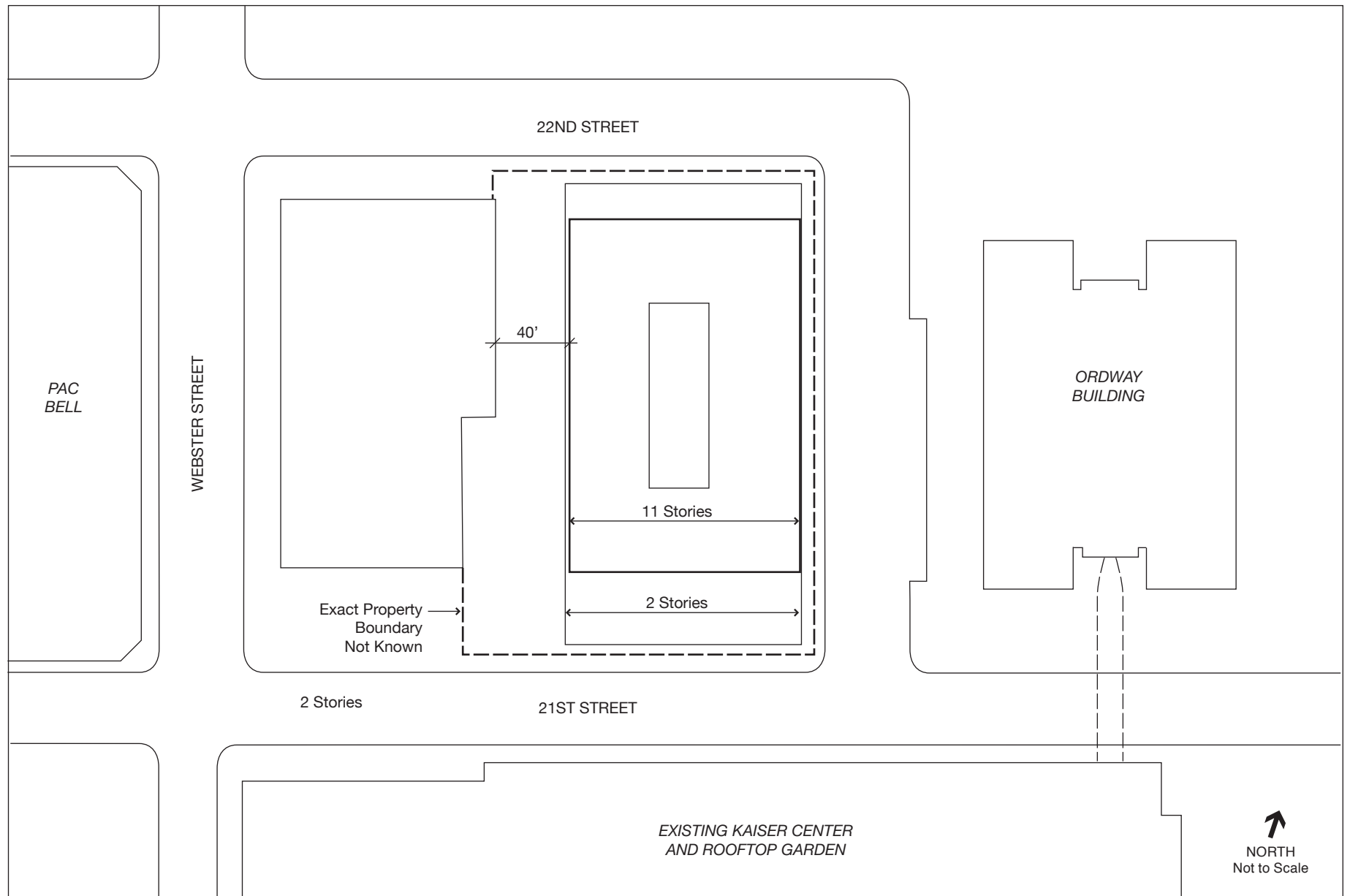
The City's SCAs identified to address light effects of the Proposed Project would also apply to this alternative. This would be a less than significant impact.



SOURCE: ESA

Kaiser Oakland . 206213

Figure V-1
Proposed Offsite Location
Alternative 3 Offsite Fully Mitigated Project



SOURCE: SOM, 2010; The Swig Company, 2010

Kaiser Oakland . 206213

Figure V-2
Conceptual Site Plan Alternative 3
Offsite Maximum Reduced Impacts

Impacts of Alternative 3: Offsite Maximum Reduced Impacts

Air Quality

The Maximum Reduced Impacts Alternative would not involve demolition of any existing buildings; the Alternative 3 site is currently a paved parking lot. The Project would require new construction and paving to build the 268,000 square foot tower. The construction exhaust emissions and fugitive dust resulting from this alternative would be less than the Proposed Project since demolition, site preparation and construction would be approximately 50 percent less than with the Proposed Project. The alternative would have a less-than-significant short-term pollutant emissions and dust impacts during construction and would avoid the less-than-significant after mitigation construction emissions impact identified with the Proposed Project. The SCAs identified to address fugitive dust and construction emissions with the Proposed Project would also apply to this alternative. Since the development program for Alternative 3 is the same as the Onsite Maximum Reduced Alternative (Alternative 2), the resulting comparative air quality emissions would also be less than significant, as discussed above for Alternative 2.

Greenhouse Gases

The development program of the Offsite Maximum Reduced Impacts Alternative is generally the same as Alternative 2, therefore, its GHG emissions would be the same. As discussed for Alternative 2, compared to the Proposed Project, this alternative would result in fewer vehicle trips (thus fewer emissions) and require less net increases for heating (natural gas), electricity use, and solid waste – key sources of GHG emissions. This alternative would generate approximately 2,554 MT CO₂e per year compared to 13,591 MT CO₂e for the Proposed Project. On an annual service population basis, this alternative would generate approximately 3.9 MT CO₂e per year per service population (total emissions divided by service population 647 net new employees for the reduced Project) compared to 4.2 MT CO₂e for the Proposed Project. Thus, like the Project, Alternative 3 exceeds the 1,100 MT CO₂e per year threshold, and is below the 4.6 MT CO₂e service population threshold, resulting in a less-than-significant GHG emissions impact. SCA GHG-1 identified for the Project would not apply to Alternative 3, unlike the Project, does not meet the criteria of “very large project” and therefore the SCA GHG-1 identified for the Proposed Project would not apply to the Alternative 2. (See Appendix I to this Draft EIR for supporting calculations.)

Biological Resources

The Offsite Maximum Reduced Impacts Alternative would not impact special-status plants or species given the limited and marginal habitat existing on and around the Project Site. In addition, this alternative would not require the removal of any trees, which is less than the 19 protected trees that would be removed with the Proposed Project. Like the Proposed Project, this alternative would not affect wetlands or breeding birds and would not conflict with any existing tree ordinance, conservation plan, or creek ordinance. The alternative would result in the same less-than-significant impacts identified with the Proposed Project, and the same SCA regarding tree removal identified with the Proposed Project would apply to this alternative.

Because a new 11 story tower would be constructed where a parking lot currently exists, this alternative, like the Proposed Project, would create the potential for bird strikes to the towers, based on a new obstruction and the possible placement of glass windows that would increase glare. This would be the case although the potential for strikes would be reduced since only one tower would be constructed (instead of two with the Proposed Project). The potential for bird strikes would be reduced due to the absence of a second tower, but the impact would still occur and be less-than-significant, as with the Proposed Project. The applicable SCA's identified for the Proposed Project would also apply to this alternative.

Cultural Resources

The Offsite Maximum Reduced Impacts Alternative would not require the demolition of any of the buildings at the Kaiser Center, which is a component of a qualified historic resource (the Kaiser Center). Building offsite would preserve the historic resource in its existing condition, including retention of the dolomite panels and keeping the roof garden in its existing condition. There could be an issue with shadows cast across the northern part of the roof garden and into some areas of the Lake Merritt Historic District, but this is likely to be minimal. Therefore, no mitigation measures would be required for construction of Alternative 3 and impacts would be less than significant.

Geology, Soils, and Seismicity

Under this alternative, grading activities and building foundations similar to those required for the Proposed Project would be required and would be subject to the same geologic and seismic conditions and constraints of the site. An earthquake on a nearby fault could result in strong seismic shaking at the Project Site, and the alternative would introduce new population to these seismic risks. The alternative would result in the same less-than-significant impacts identified with the Proposed Project. Each of the City's SCAs requiring the preparation, approval and adherence to geotechnical reports and erosion reports, as identified for the Proposed Project, would also apply to this alternative.

Hazards and Hazardous Materials

The Offsite Maximum Reduced Impacts Alternative would involve construction of an office tower on an existing paved parking lot. Demolition of an existing structure would not occur. However, this alternative would continue to have similar effects related to public health and hazards associated with building constructions, the routine transport, use or disposal of hazardous materials; or the creation of a significant hazard to the public or the environment through reasonable foreseeable upset or accident conditions involving the release of hazardous materials into the environment. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs addressing each of the above effects would also apply to the alternative.

Hydrology and Water Quality

The Offsite Maximum Reduced Impacts Alternative involves reduced development at another location from the Proposed Project Site, but would not result in substantially different drainage

patterns, flooding, or impervious surfaces to adversely affect stormwater conveyance systems. As with the Proposed Project, construction workers and the public would be exposed to potential contaminants in the soil and groundwater related to dewatering onsite. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs that would ensure the alternative would not violate water quality standards or waste discharge requirements nor increase runoff to levels that would exceed the capacity of the stormwater drainage system would also apply to the alternative.

Land Use, Plans and Policies

Under the Offsite Maximum Reduced Impacts Alternative, land uses would remain consistent with existing surrounding uses, even though the 268,000 square foot tower in Alternative 3 would involve a substantial addition of office (and possibly retail) use on the site compared to existing conditions, but notably less than would be with the Proposed Project. The configuration of new development on the site would be similar to the Proposed Project. As a result, this alternative would have the same less-than-significant impacts associated with the physical division of an existing community, or relationship with existing plans as identified with the Proposed Project.

Noise

Noise effects from construction of the 268,000 square foot tower would be similar to that with the Proposed Project. It would be temporary and would occur over a shorter period of time than with the Proposed Project since only one tower would be constructed at the offsite location. City SCAs identified with the Proposed Project to address construction period noise effects would also apply to this alternative. As discussed above for Air Quality, development under this alternative would be approximately 60 to 80 percent less than that for the Proposed Project and would generate approximately 20 to 40 percent of peak hour and daily vehicle trips compared to the Proposed Project given the reduced level of development. The Project's contribution to resulting cumulative roadway noise levels would exceed the significance threshold by 0.3 dBA and be a cumulative SU impact. Given the reduced traffic that would result with the Alternative, resulting roadway noise levels would not exceed the significance threshold, consistent with Alternative 2. Thus, this alternative would avoid the SU cumulative roadway noise impact identified with the Project; the impact would be less than significant. All City SCAs identified with the Project would also apply to the alternative.

Population, Employment and Housing

Under the Offsite Maximum Reduced Impacts Alternative, less new population would occur with the Alternative and there would be fewer changes to existing businesses and jobs than would occur with the Proposed Project on the Project Site. This is because approximately 60 to 80 percent less office development would be developed. There would be population increase resulting from new business on the site, however, it would not be resulting from new housing on the Site or be at levels not previously anticipated by the City. The impacts with this alternative would be essentially the same as the less-than-significant impact identified with the Proposed Project in that it will not be necessary to replace facilities due to displaced existing business and jobs, and that it will not induce substantial population growth.

Public Services

The Offsite Maximum Reduced Impacts Alternative would result in less new population on the Alternative 3 site compared to the Proposed Project. The development would be approximately 60-80 percent less office and retail development than the Proposed Project. As a result, there would be a proportional reduction in the level of increased demand for fire, police, schools and emergency services from the Project. Thus, the alternative would have the same less-than-significant impacts to public services as identified for the Proposed Project.

Traffic and Circulation

As indicated under Greenhouse Gases, above, the development program of the Offsite Maximum Reduced Impacts Alternative is generally the same as Alternative 2, therefore, intersection operations would be similar. Like Alternative 2, this alternative would have fewer AM and PM peak hour trips compared to the Proposed Project (approximately 80 percent less). As a result, this alternative would avoid all of the Project's SU intersection impacts that would occur in the Cumulative (2030) plus Project Condition. These include Intersections #2, #12, #13, #44, #45, #47, and #48, . (Intersection #12 is avoided in addition to those avoided under Alternatives 1 and 2). Except for Intersection #2, traffic contributions to these intersections would not exceed thresholds of significance and would therefore have no impact. Intersection #2 would not exceed thresholds of significance *after* mitigation and also would therefore be less than significant. This alternative would avoid all 3 SU roadway impacts (Segments #3, #9, and #10) at buildout as identified with the Project.

Access and Circulation

Access for the Off-Site Alternative was assumed to be provided on the north side of 21st Street (between Harrison Street and Webster Street), and thus, would be similar to that of the three Project garage access points on the south side of 21st Street. The primary inbound access routes from westbound I-580 (via southbound Harrison Street and then westbound 21st Street) would remain unchanged under the Off-Site Alternative. Similarly, the primary outbound route (eastbound 21st Street to northbound Harrison Street) to eastbound I-580 on-ramps should be the same for the Project and the Off-Site Alternative.

However, on the south side of the proposed Project there is an additional access point from the intersection of Harrison Street / 20th Street. Therefore, original project trips assigned to this access point are expected to use 21st Street in order to enter or exit the Off-Site Alternative's Garage. In particular, there may be slight increases in traffic generated under the Off-Site Alternative at the intersections of Harrison Street / 21st Street, Kaiser Plaza / 21st Street, and Webster Street / 21st Street. The Cumulative (2030) plus Project (Phase I and Phase II) Conditions intersection analysis identifies only one out of these three intersections as operating at unacceptable conditions, namely Harrison Street / 21st Street during the weekday PM peak hour. The poor LOS and delay at this intersection is a result of spillback queuing from the northbound right from Harrison Street onto eastbound Grand Avenue, which affect throughput on the Harrison Street NBT and 21st Street EBL movements at Harrison Street / 21st Street.

While the Off-Site Alternative would add traffic at Harrison Street / 21st Street above what the original Project would add, these vehicles are expected to be on movements that generally do not operate at unacceptable conditions—namely, the Harrison Street NBL (for inbound trips) and 21st Street EBR (for outbound trips). Additional traffic generated under the Off-Site Alternative above what the original Project would generate at the remaining two intersections (Kaiser Plaza / 21st Street and Webster Street / 21st Street) is not expected to be sufficient to degrade operations at these intersections to unacceptable conditions. The Cumulative (2030) plus Project (Phase I and Phase II) Conditions intersection analysis identifies that the intersection of Webster Street / 21st Street would operate at LOS B under both the weekday AM and PM peak hours.

It should be noted that the effect of the relocated garage access under the Off-Site Alternative is also lessened by parking behavior, as not everyone will want to or be able to park in the on-site garage. The analysis for the Project assumes diversion to other parking facilities in the area as the on-site garage fills to capacity, and this would continue to be the case under the Off-Site Alternative. As a result, the relocation of garage access would have little to no impact on these drivers, as they would not be accessing the on-site garage anyways. In fact, some traffic under the Off-Site Alternative would be expected to use the Kaiser Center Garage given its proximity and available capacity.

Utilities and Service Systems

The amount of development under the Offsite Maximum Reduced Impacts Alternative is approximately 60 to 80 percent less than with the Proposed Project. As a result, the alternative would result in less demand for water, wastewater, solid waste disposal, and energy compared to the Proposed Project. Therefore, impacts to utilities and services systems with this alternative would be less-than-significant, as with the Project, and have a reduced effect. The City's SCA's identified with the Proposed Project and that apply to the wastewater generation and stormwater drainage facilities would also apply to this alternative.

D. Environmentally Superior Alternative

CEQA requires that the EIR identify an environmentally superior alternative that, when compared to the Proposed Project and all other alternatives considered, would avoid (or reduce to the greatest extent) more of the adverse environmental effects identified for the project, particularly any significant impacts. The **No Project/No Build Alternative** is considered the environmentally superior alternative in the strictest sense that environmental impacts associated with the Proposed Project's implementation would reduce or avoid most of the significant impacts identified with the Proposed Project to the greatest extent compared to the other alternatives. The exception is where adverse conditions current exist on the Project Site, such as with wind hazards and cultural resources. While the No Project/No Build Alternative would avoid all of the significant environmental effects, it would fail to achieve any of the objectives of the Project.

In cases where the No Project/No Build Alternative is the environmentally superior alternative, CEQA requires that the second most environmentally superior alternative be identified. Comparison of the environmental impacts associated with each of the alternatives and the

Proposed Project indicates that the **Alternative 3, Offsite Maximum Reduced Impacts**, would be the next environmentally superior in that it would *avoid* most of the Proposed Project's significant impacts than would continue to occur with the other build alternatives. This is primarily because developing the Project offsite would *avoid* the significant cultural resources and roof garden wind hazards impacts that are site specific and would therefore still occur with Alternative 2 because it would be developed on the Kaiser Center site.¹ Although Alternative 3 would avoid the significant wind hazards impact that would occur at the roof garden (as Alternative 3 does not include a roof garden), the significant wind hazards at ground level identified with the Project is conservatively considered also to potentially occur with Alternative 3. Therefore, Alternative 3 is the Environmentally Superior Alternative.

The comparative impacts of the Proposed Project and all the alternatives are summarized in **Table V-2**, below.

¹ Development of the project on the offsite location may not be feasible as it is not known if the site, which is owned by a separate private entity, is available for acquisition or development, or if the Project Sponsor is interested in such.

**TABLE V-2
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT**

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Aesthetics, Shadow, Light, and Wind					
Impact AES-1: The Proposed Project would not adversely affect a scenic vista or substantially damage scenic resources. (Less than Significant)	LS	N	LS	LS	LS
Impact AES-2: The Proposed Project would alter the existing visual conditions on the Project Site, but would not substantially degrade the existing visual character or quality of the site and its surroundings. (Less than Significant)	LS	N	LS	LS	LS
Impact AES-3: The Proposed Project would create a new source of light or glare, but would not adversely affect day or nighttime views in the area. (Less than Significant)	LSC	N	LSC↓	LSC↓	LSC↓
Impact AES-4: The Proposed Project would result in additional shadow on adjacent areas. However, it would not cast shadow that would substantially impairs the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors; would not cast shadow that would substantially impair the beneficial use of any public or quasi-public park, lawn, garden, or open space; and would not cast shadow on an historic resource. (Less than Significant)	LS	N	LS	LS↓	LS↓
Impact AES-5: The Proposed Project would be consistent with the policies and regulations addressing the provision of adequate light related to appropriate uses. (Less than Significant)	LS	N	LS	LS	LS
Impact: AES-6: The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. (Potentially Significant)	SU (Conservatively Deemed)	N	SU↓ (Conservatively Deemed)	SU↓ (Conservatively Deemed)	SU↓ (Conservatively Deemed)
Impact AES-7: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to visual character, views, aesthetics, shadow, or light and glare. (Potentially Significant)	SU (Conservatively Deemed)	N	SU↓ (Conservatively Deemed)	SU↓ (Conservatively Deemed)	SU↓ (Conservatively Deemed)

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

LS Less than significant or negligible impact; no mitigation required
 LSM Less than significant impact, after mitigation
 LSC Less than significant impact with SCA

SU Significant or Significant and Unavoidable adverse impact, after mitigation
 ↑↓ Impact is more severe or less severe than project impact, after mitigation
 N No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Air Quality					
Impact AIR-1: Construction and demolition activities associated with new development under the Proposed Project would generate short-term emissions of fugitive dust. (Less than Significant)	LSC	N	LSC↓	LSC↓	LSC↓
Impact AIR-2: Activities associated with demolition, site preparation, and construction throughout development of the Proposed Project would generate emissions of criteria pollutants, including equipment exhaust emissions. (Potentially Significant Phase 2 ROG emissions)	LSC, LSM	N	LSC↓	LSC↓	LSC↓
Impact AIR-3: The Proposed Project would result in increased emissions of criteria pollutants. (Significant PM10 emissions at Buildout)	SU	N	LSC	LSC	LSC
Impact AIR-4: The Proposed Project would not result in increased emissions of criteria pollutants due to poor ventilation in the Parking Garage. (Less than Significant)	LS	N	LS	LS	LS
Impact AIR-5: The Proposed Project would not contribute to CO concentrations exceeding the State AAQS of 9 ppm averaged over 8 hours and 20 ppm for 1 hour. (Less than Significant)	LS	N	LS	LS	LS
Impact AIR-6: The Proposed Project would not frequently and for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial number of people, specifically in residential uses, schools, daycare centers, nursing homes, or medical centers.(Less than Significant)	LS	N	LS	LS	LS
Impact AIR-7: The Proposed Project would not expose persons to substantial levels of toxic air contaminants (TACs) or PM _{2.5} concentrations (Less than Significant)	LS	LS	LS	LS	LS
Impact AIR-8: Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. (Significant Operational PM10 Emissions.)	SU (PM10)	N	LSC	LSC	LSC
Impact AIR-9: Construction and operation of the Proposed Project would result in a cumulatively considerable increase in GHG emissions. (Significant)	LSC (LSM Phase 1)	N	LSM; LSC	LS	LS

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

LS Less than significant or negligible impact; no mitigation required
 LSM Less than significant impact, after mitigation
 LSC Less than significant impact with SCA

SU Significant or Significant and Unavoidable adverse impact, after mitigation
 ↑↓ Impact is more severe or less severe than project impact, after mitigation
 N No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Air Quality (cont.)					
Impact AIR-10: The Proposed Project would conflict with an applicable plan, policy or regulation of an appropriate regulatory agency adopted for the purpose of reducing greenhouse gas emissions (Potentially Significant)	LSC; (LSM Phase 1)	N	LSM; LSC	LS	LS
Biological Resources					
Impact BIO-1: The Proposed Project would not adversely affect special-status species. (Less than Significant)	LS	N	LS	LS	LS
Impact BIO-2: The Proposed Project not would adversely affect sensitive natural communities. (Less than Significant)	LS	N	LS	LS	LS
Impact BIO-3: The Proposed Project not would adversely affect wetlands. (Less than Significant)	LS	N	N	N	N
Impact BIO-4: Project construction and operations have the potential to affect migratory and breeding birds, and wildlife, corridors, and nursery sites, through building collisions, increases in night lighting, increases in noise pollution due to project construction, shading of existing habitat, and vegetation removal. (Potentially Significant)	LSC	N	LSC↓	LSC↓	LSC
Impact BIO-5: The Proposed Project would not adversely affect adopted Habitat Conservation Plans. (Less than Significant)	LS	N	LS	LS	LS
Impact BIO-6: The Proposed Project would not adversely affect the City's Tree Preservation or Removal Ordinance. (Less than Significant)	LSC	N	LSC	LSC	N
Impact BIO-7: The Proposed Project would not adversely affect the City's Creek Protection Ordinance. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact BIO-8: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in impacts on special-status species, wetlands, and other waters of the U.S. (Less than Significant)	LSC	N	LSC	LSC	LSC

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Cultural Resources					
Impact CUL-1. The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site (Potentially Significant)	SU (Conservatively Deemed)	N	SU↓ (Conservatively Deemed)	SU↓ (Conservatively Deemed)	N
Impact CUL-2. The proposed new construction would adversely affect remaining portion of the qualified historic resource on the Project Site. (Potentially Significant)	SU (Conservatively Deemed)	N	SU↓ (Conservatively Deemed)	SU↓ (Conservatively Deemed)	N
Impact CUL-3. The Proposed Project would have indirect shadow effects on the historic roof garden (Less than Significant).	LS	N	LS↓	LS↓	LS↓
Impact CUL-4. The Proposed Project could affect the eligibility of the Lake Merritt Historic District (Less than Significant).	LS	N	LS	LS	LS
Impact CUL-5: Construction of the Proposed Project could cause substantial adverse changes to the significance of archaeological resources at the Project Site. (Less than Significant)	LSC	N	LSC	LSC	LSC↓
Impact CUL-6: The Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant)	LSC	N	LSC	LSC	LSC↓
Impact CUL-7: The Proposed Project may adversely affect unidentified human remains at the Project Site. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact CUL-8. The Proposed Project could have a cumulative impact to a historic architectural resources (Less than Significant).	LS	N	LS	LS	N

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Geology, Soils, and Seismicity					
Impact GEO-1: Redevelopment in the project area could expose people or structures to seismic hazards such as groundshaking or liquefaction. (Less than Significant).	LSC	N	LSC↓	LSC↓	LSC↓
Impact GEO-2: Redevelopment in the project area could be subjected to geologic hazards, including expansive soils and differential settlement. (Less than Significant).	LSC	N	LSC	LSC	LSC
Impact GEO-3: The development proposed as part of the project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, would not result in significant cumulative impacts with respect to geology, soils or seismicity. (Less than Significant)	LSC	N	LSC	LSC	LSC
Hazardous Materials					
Impact HAZ-1: Demolition of existing structures that contain hazardous building materials, such as lead-based paint, asbestos, and PCBs could expose workers, the public, or the environment to these hazardous materials and would generate hazardous waste. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HAZ-2: The project would involve the transportation, use, and storage of hazardous chemicals, which could present public health and/or safety risks to facility workers, patients and visitors, and the surrounding area. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HAZ-3: Hazardous materials used onsite during construction activities (i.e. solvents) could be spilled through improper handling or storage, potentially increasing public health and/or safety risks to Kaiser Center workers, patients and visitors, and the surrounding area. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HAZ-4: Hazards at the Project Site could contribute to cumulative hazards in the vicinity of the Project Site. (Less than Significant)	LS	N	LS	LS	LS

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Hydrology and Water Quality					
Impact HYD-1: Project construction would involve activities (excavation, soil stockpiling, and grading) that could generate loose, erodable soils that could violate water quality standards or waste discharge requirements, result in substantial erosion or siltation, create or constitute substantial polluted runoff, or otherwise substantially degrade water quality. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HYD-2: Project excavation activities would not deplete groundwater supplies nor substantially interfere with groundwater recharge or cause contaminated groundwater discharge to surface water. (Less than Significant)	LS	N	LS	LS	LS
Impact HYD-3: The project would result in new development that could substantially alter existing drainage pattern of the Project Site or the surrounding area (Less than Significant)	LS	N	LS	LS	LS
Impact HYD-4: The project would not result in a net increase in impervious surfaces and would not cause an increase in the volume of stormwater runoff. The project would not violate any waste discharge requirements that would create substantial runoff and result in substantial flooding onsite or offsite. The project would not exceed the capacity of the stormwater drainage system. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HYD-5: The project would not result in flooding due to its proximity to a 100-year flood hazard area, or expose people or structures to other substantial risk related to flooding, seiche, tsunami, or mudflow. (Less than Significant)	LS	N	LS	LS	LS
Impact HYD-6: The increased construction activity and new development resulting from the project, in conjunction with past, present, and reasonably foreseeable probable future projects in the city, would not result in cumulatively considerable impacts on hydrology and water quality conditions. (Less than Significant)	LS	N	LS	LS	LS

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Land Use, Plans, and Policies					
Impact LU-1: The project would redevelop buildings at the Kaiser Center property on the northwest corner of Webster and 20th Streets in Downtown Oakland, but would not result in the physical division of an existing community. (Less than Significant)	LS	N	LS	LS	LS
Impact LU-2: The project would not conflict with applicable land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effects. (Less than Significant)	LS	N	LS	LS	LS
Impact LU-3: The project would not result in a fundamental conflict between adjacent and nearby land uses, particularly with respect to any applicable habitat conservation plan or natural community conservation plan. (Less than Significant)	LS	N	LS	LS	LS
Impact LU-4: The proposed project would not result in a significant cumulative land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect from past, present or reasonably foreseeable future development. (Less than Significant)	LS	N	LS	LS	LS
Noise					
Impact NOI-1: Construction activities associated with the Proposed Project would temporarily generate noise levels that could conflict with standards established in the City noise ordinance. (Less than Significant)	LSC	N	LSC↓	LSC↓	LSC↓
Impact NOI-2: Project operations would increase noise levels in the Project vicinity that could result in the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. (Less than Significant)	LS	N	LS	LS	LS
Impact NOI-3: Project traffic could substantially increase traffic noise levels in the project area. (Less than Significant)	LSC	N	LSC↓	LSC↓	LSC↓
Impact NOI-4: Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. (Potentially Significant)	SU	N	LSC	LSC	LSC

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Population and Housing					
Impact POP-1: The project would displace existing businesses and jobs, but not in substantial numbers necessitating construction of replacement facilities elsewhere, in excess of that anticipated in the City's General Plan. (Less than Significant)	LS	N	LS	LS	LS
Impact POP-2: The project would not induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	LS	N	LS	LS	LS
Impact POP-3: In combination with other past, present and reasonably foreseeable projects, the Proposed Project would not cumulatively induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	LS	N	LS	LS	LS
Public Services and Recreation Facilities					
Impact PUB-1: The project could result in an increase in calls for police protection services, but would not require new or physically altered police facilities in order to maintain acceptable performance objectives. (Less than Significant)	LS	N	LS	LS	LS
Impact PUB-2: The increased population and density resulting from the project would not involve or require new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection and emergency medical services and facilities. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact PUB-3: The proposed project could result in new students for local schools, but would not require new or physically altered school facilities to maintain acceptable performance objectives. (Less than Significant)	LS	N	LS	LS	LS

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Public Services and Recreation Facilities (cont.)					
Impact PUB-4: The project could increase the demand for parks, recreational facilities, and library facilities, but would not result in substantial physical deterioration of such facilities or require new or physically altered facilities in order to maintain acceptable performance objectives. (Less than Significant)	LS	N	LS	LS	LS
Impact PUB-5: The project, when combined with other past, present, pending, and reasonably foreseeable development in the vicinity, could result in cumulative impacts to the provision of public services. (Less than Significant)	LS	N	LS	LS	LS
Traffic and Circulation					
Impact TRANS-1a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at <i>Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)</i> (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions (Significant)	SU	N	SU↓	LS	LS
Impact TRANS-1b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at <i>Intersection #3 (Harrison Street / 27th Street / 24th Street)</i> (Existing). (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM↓	LSM↓

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-1c: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at <i>Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)</i> (Existing). (Significant)	LSM	N	LSM ↓	LSM ↓	LSM ↓
Impact TRANS-1d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at <i>Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)</i> (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)	SU	N	LS	LS	LS
Impact TRANS-1e: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at <i>Intersection #45 (Grand Avenue / El Embarcadero)</i> (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)	LSM	N	LSM ↓	LSM ↓	LSM ↓
Impact TRANS-1f: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour at <i>Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp)</i> (Existing). (Significant)	SU	N	LS	LS	LS
Impact TRANS-2a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on <i>Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero)</i> (Existing). (Significant)	SU	N	SU ↓	LSM	LSM
Impact TRANS-2b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on <i>Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)</i> (Existing). (Significant)	SU	N	SU ↓	LSM	LSM

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-3a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ↓	LSM	LSM
Impact TRANS-3b: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015), which would operate at an unacceptable LOS E during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM ↓	LSM ↓
Impact TRANS-3c: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ↓	LSM	LSM
Impact TRANS-3d: Phase I of the proposed Project, when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)	LSM	N	LSM ↓	LSM ↓	LSM ↓

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-3e: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015), which would operate at an unacceptable LOS E during the AM peak hour under Near-Term (2015) without Project Conditions. (Significant)	LSM	N	LSM ↓	LSM ↓	LSM ↓
Impact TRANS-4a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on <i>Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)</i> (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ↓	LSM	LSM
Impact TRANS-5a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at <i>Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps)</i> (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ↓	LSM	LSM
Impact TRANS-5b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at <i>Intersection #3 (Harrison Street / 27th Street / 24th Street)</i> (2015). (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM	LSM

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-5c: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2015). (Significant)	LSM	N	LSM↓	LSM↓	LSM↓
Impact TRANS-5d: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ↓	LSM	LSM
Impact TRANS-5e: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)	LSM	N	LSM↓	LSM↓	LSM↓
Impact TRANS-5f: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp) (2015), which would operate at an unacceptable LOS F during both peak hours under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-5g: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	LSM	N	N	N	N

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COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-5h: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #47 (<i>Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp</i>) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-5i: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (<i>Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp</i>) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-5j: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #49 (<i>Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp</i>) (2015). (Significant)	LSM	N	LSM↓	LSM↓	LSM↓
Impact TRANS-6a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (<i>Grand Avenue from Harrison Street to El Embarcadero</i>) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-6b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (<i>northbound Harrison Street / Oakland Avenue from 27th Street to I-580</i>) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU↓	LSM	LSM

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-7a: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	LSM	LSM	LSM
Impact TRANS-7b: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM ↓	LSM ↓
Impact TRANS-7c: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2030) (Significant)	LSM	N	LSM ↓	LSM ↓	LSM ↓
Impact TRANS-7d: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU ↓	LSM	LSM

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

LS Less than significant or negligible impact; no mitigation required
 LSM Less than significant impact, after mitigation
 LSC Less than significant impact with SCA

SU Significant or Significant and Unavoidable adverse impact, after mitigation
 ↑↓ Impact is more severe or less severe than project impact, after mitigation
 N No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-7e: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour at <i>Intersection #13 (Harrison Street / 21st Street)</i> (2030). (Significant)	SU	N	N	N	N
Impact TRANS-7f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at <i>Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)</i> (2030). (Significant)	LSM	N	LSM↓	LSM↓	LSM↓
Impact TRANS-7g: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at <i>Intersection #44 (Oak Street / 5th Street / I-880 SB On-Ramp)</i> (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-7h: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at <i>Intersection #45 (Grand Avenue / El Embarcadero)</i> (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-7i: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at <i>Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp)</i> (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-7j: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at <i>Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)</i> (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

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 LSM Less than significant impact, after mitigation
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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-7k: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #449 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	LSM	N	N	N	N
Impact TRANS-7l: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU↓	LSM	LSM
Impact TRANS-8a: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on Segment #3 (I-880 from Oak Street to 5th Avenue) (2030). (Significant)	SU	N	SU↓	LSM	LSM
Impact TRANS-8b: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU↓	LSM	LSM

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-8c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU↓	LSM	LSM
Impact TRANS-9: The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)	LSM	N	LSM↓	LSM↓	LSM↓
Impact TRANS-10: The Project proposes vehicular site access out of an existing garage exit located along 21st Street (just east of Kaiser Plaza) which is currently designed in such a way that could be hazardous to pedestrians on the sidewalk (Significant).	LSM	N	LSM↓	LSM↓	LSM↓
Impact TRANS-11: Potential short-term construction impacts generated by the Proposed Project would include the impacts associated with the delivery of construction materials and equipment, removal of construction debris, and parking for construction workers. (Less than Significant).	LSC	N	LSC	LSC	LSC

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2; Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact ALT DD TRANS-1: Intersection #24 Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM
Impact ALT DD TRANS-2: Intersection #24 Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area. Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2; Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact ALT DD TRANS-3: Intersection #24 Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection is located within the Downtown area. Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	SU ↓ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM
Utilities and Service Systems					
Impact UTIL-1: The project would not exceed water supplies available to serve the project from existing entitlements and resources, nor require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)	LS	N	LS ↓	LS ↓	LS ↓
Impact UTIL-2: The project's projected wastewater generation would not result in the City of Oakland exceeding its citywide projected base flow allocation or its base flow allocation for Subbasin 52-05. (Less than Significant)	LSC	N	LSC ↓	LSC ↓	LSC ↓
Impact UTIL-3: The project would not require or result in construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)	LSC	N	LSC ↓	LSC ↓	LSC ↓

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
Utilities and Service Systems (cont.)					
Impact UTIL-4: The project would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs, and would not require or result in construction of landfill facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact UTIL-5: The project would not violate applicable federal, state and local statutes and regulations relating to energy standards; nor would result in a determination by the energy provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new energy facilities or expansion of existing facilities. (Less than Significant)	LS	N	LS	LS	LS
Impact UTIL-6: The increased development resulting from the proposed project, in conjunction with population and density of other past, present, and reasonably foreseeable future project development in the City, would not result in cumulative impacts on utilities and service systems. (Less than Significant)	LS	N	LS	LS	LS

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CHAPTER VI

Impact Overview and Growth-Inducing Impacts

A. Significant Unavoidable and Cumulative Environmental Impacts

A significant, unavoidable impact results if a project reaches or exceeds the defined threshold of significance and no feasible mitigation measure is available to reduce the significant impact to a less-than-significant level. CEQA defines cumulative impacts as two or more individual impacts which, when considered together, are substantial or which compound or increase other environmental impacts. The cumulative analysis is intended to describe the “incremental impact of the project when added to other, closely related past, present, and reasonably foreseeable future projects” that can result from “individually minor but collectively significant projects taking place over a period of time (CEQA Guidelines Section 15355). The analysis of cumulative impacts is a two-phase process that first involves the determination of whether the Project, together with past, present and reasonably foreseeable projects, would result in a significant impact. If there would be a significant cumulative impact of all such projects, the EIR must determine whether the Project’s incremental effect is cumulatively considerable, in which case, the Project itself is deemed to have a significant cumulative effect (CEQA Guidelines Section 15130).

The Proposed Project would result in the following significant, unavoidable environmental effects, some of which are also cumulative effects, as identified in Chapter IV of this EIR:

Proposed Project would result in the following SU impacts:

SU Aesthetics - Wind Hazards Impacts

- **Impact AES-6:** The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*
- **Impact AES-7:** Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to wind hazards at the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Air Quality – Criteria Pollutant Emissions Impacts

- **Impact AIR-3:** The Proposed Project would result in increased emissions of criteria pollutants. *(Significant and Unavoidable PM₁₀ emissions for Operations)*
- **Impact AIR-8:** Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. *(Significant and Unavoidable for Operations)*

SU Historic Resources Impacts

- **Impact CUL-1:** The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*
- **Impact CUL-2:** The proposed new construction would adversely affect the remaining portion of the qualified historic resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Roadway Noise Impacts

- **Impact NOI-4:** Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. *(Significant and Unavoidable)*

SU Transportation – Intersection/Roadway Impacts

The Proposed Project would result in SU impacts at several intersections and roadways under several scenarios: “Existing plus Project”, “2015 plus Phase 1 Only”, “2015 plus Project”, and “Cumulative 2030 plus Project”. (“Project” includes Phase 1 and Phase 2 buildout.) The following list of impact summaries is organized by intersection, with the specific Impact Statement (e.g., TRANS-7a) and scenario (e.g., Cumulative 2030 plus Project) for each noted. This allows the reader to assess all the scenarios under which SU impacts at a particular intersection or roadway occurs. This organization is provided here specifically to allow for easy comparison of relative impacts across the alternatives analyzed in this chapter. (See Table V-2, *Comparison of Proposed Project and Alternatives Impacts*, at the end of this Chapter for complete Impact Statement for each scenario.)

Intersections Outside Downtown

- **Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)**
Added traffic would increase the v/c ratio by more than three percent during the PM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour. *(Impacts TRANS-1a, Existing plus Project; TRANS-3a, 2015 plus Phase 1 Only; TRANS-5a, 2015 plus Project; TRANS-7a Cumulative Plus Project)* *(Significant and Unavoidable, after mitigation)*
- **Intersection #3 (Harrison Street / 27th Street / 24th Street)**
Added traffic would increase the average intersection vehicle delay by more than four seconds during the PM peak hour and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour (2015); and increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable

LOS F during the PM peak hour (2030). *(Impacts TRANS-3b, 2015 without Project; TRANS-5b, 2015 Plus Project; and TRANS-7b, Cumulative 2030 Plus Project)* *(Conservatively Deemed Significant and Unavoidable, after mitigation; Less than Significant if City determines proposed implementation approach for Mitigation Measure TRANS-1b is feasible)*

- **Intersection #45 (Grand Avenue / El Embarcadero)**

Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-7h, Cumulative 2030 plus Project)* *(Significant and Unavoidable, after mitigation)*

- **Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp)**

Added traffic would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-1f, Existing plus Project; TRANS-5h, 2015 plus Project; and TRANS-7i, Cumulative 2030 plus Project)* *(Significant and Unavoidable, after mitigation)*

- **Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)**

Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-5i, 2015 Plus Project; TRANS-7j, Cumulative 2030 Plus Project)* *(Significant and Unavoidable, after mitigation)*

- **Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue)**

Added traffic would cause an increase in average intersection delay by more than two seconds during the AM peak hour. *(Impact TRANS-7l, Cumulative 2030 Plus Project)* *(Significant and Unavoidable, after mitigation)*

Intersections Within Downtown

- **Intersection #12 (Harrison Street / Grand Avenue)**

Added traffic would increase the average intersection vehicle delay by more than two seconds during the PM peak hour and increase the average intersection vehicle delay by more than two seconds during the PM peak hour (2015); increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour (2030). *(Impacts TRANS-3c, 2015 Plus Phase 1 Only; TRANS-5d, 2015 Plus Project; and TRANS-7d, Cumulative 2030 Plus Project)* *(Significant and Unavoidable, after mitigation)*

- **Intersection #13 (Harrison Street / 21st Street)**

Added traffic would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour *(Impact TRANS-7e, Cumulative 2030 Plus Project)* *(Significant and Unavoidable, after mitigation)*

- **Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)**

If the City elects to implement Alternative Measure DD, but determines proposed mitigation measures are infeasible, then added traffic would degrade the vehicle level of

service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour and degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour (2015); and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour (2030). *(Impact ALT DD TRANS-1, 2015 Plus Project Phase 1 only; ALT DD TRANS-2, 2015 Plus Project; ALT DD TRANS-3, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation, if the City determines additional mitigation measures feasible)*

- **Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)**

Added traffic would increase the v/c ratio by more than three percent during the PM peak hour, increase the average intersection vehicle delay by more than four seconds during the AM peak hour (2015); and increase the v/c ratio by more than three percent during the PM peak hour (2030). *(Impacts TRANS-1d, Existing Plus Project; TRANS-5f, 2015 Plus Project; and TRANS-7g, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

Roadways

- **Segment #3 (I-880 from Oak Street to 5th Avenue) – Caltrans Facility**

Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours. *(Impact TRANS-8a, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero) – Non-Caltrans Facility**

Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, would increase the v/c ratio by more than three percent during the PM peak hour (2015); would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour (2030). *(Impacts TRANS-2a, Existing Plus Project; TRANS-6a, 2015 Plus Project; and TRANS-8b, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580). – Non-Caltrans Facility**

Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour (2015); degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour *(Impacts TRANS-2b, Existing Plus Project; TRANS-4a, 2010 Plus Phase 1 Only; TRANS-6b, 2015 Plus Phase 1 Only; and TRANS-8c, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

B. Growth-Inducing Impacts

Section 15126.2(d) of the CEQA Guidelines requires that an EIR should discuss “...the ways in which the Proposed Project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment.” Growth can be

induced in a number of ways, including through the elimination of obstacles to growth, through the stimulation of economic activity within the region, or through precedent-setting action.

Examples of projects likely to have significant growth-inducing impacts include extensions or expansions of infrastructure systems beyond what is needed to serve project-specific demand, and development of new residential subdivisions or industrial parks in areas that are currently only sparsely developed or are undeveloped. Typically, projects on infill sites that are surrounded by existing urban uses are not considered growth-inducing because it usually does not facilitate development intensification on adjacent sites.

Because the Proposed Project would be redeveloping an existing urban site, it is not expected to have any growth-inducement effects. The Project Site is in a developed area fully served by public utilities. There are no significant areas that are undeveloped adjacent to the Project Site. Additionally, the Project would not remove any obstacles that would help facilitate growth that could significantly affect the physical environment.

However, indirect population growth associated with the Proposed Project could occur in association with job creation. The economic stimulus generated by construction of the Proposed Project could result in the creation of new construction-related jobs. In addition, the increase in commercial and office space square footage that would be built as part of the Project could generate more employees. It is estimated that the future office businesses at the completed Kaiser Center Project would employ approximately 3,300 people, commercial/retail businesses would employ approximately 132 people, plus add 4 people to the site's parking services for a total of 12 parking employees. However, the jobs created during both the construction and operation phases of the Project would not be substantial in the context of job growth in Oakland and the region over the next 10 to 20 years. The Proposed Project's new employment would represent about 1.7 percent increase of the total 2005 employment in Oakland and only 1.3 percent increase of the City's future total employment as projected by ABAG's projections for Oakland in 2030. Consequently, the Proposed Project would not result in a substantial population increase.

The Proposed Project does not include housing; therefore, it would not directly induce an increase in residential population. Indirectly, as described above, it could bring new residents into the downtown area, fulfilling Oakland's 10k in Downtown plan (see Section IV.J *Population, Employment, and Housing*).

The Proposed Project would occur on an infill site in an existing urbanized neighborhood in Oakland. It would not result in the extension of utilities or roads into exurban areas, and would not directly or indirectly lead to the development of greenfield sites in the East Bay. Because the Project Site is located within an existing urbanized area, and is near a major transit station (19th Street BART Station) as well as high-density urban residential units, anticipated growth would benefit the existing transit system and could reduce adverse impacts associated with automobile use, such as traffic, air pollution and noise. Therefore, the population growth that would occur as a result of Project implementation would be largely beneficial and not considered substantial and adverse.

C. Significant Irreversible Environmental Effects

An EIR must identify any significant irreversible environmental changes that could result from implementation of a Proposed Project. These may include current or future uses of non-renewable resources, and secondary or growth-inducing impacts that commit future generations to similar uses. CEQA dictates that irretrievable commitments of resources should be evaluated to assure that such current consumption is justified (CEQA Guidelines §15126.2(c)). The CEQA Guidelines identify three distinct categories of significant irreversible changes: (1) changes in land use that would commit future generations; (2) irreversible changes from environmental actions; and (3) consumption of non-renewable resources.

Changes in Land Use Which Would Commit Future Generations

The Proposed Project would allow for the redevelopment of approximately 2.2 acres of land near Lake Merritt and the 19th Street BART Station. The Project Site, which is within the Central Business District and is designated C-55 Central Core Commercial Zone, is surrounded by urban development on all sides. The Project Site has been identified for additional growth, including housing, commercial, and mixed use development, which is consistent with the plans, policies, and zoning of the City of Oakland. Because the Proposed Project Site's land use is expected to remain unchanged, and because the Proposed Project would occur on an infill site on land within an urban area surrounded by similar or compatible uses, it would not commit future generations to a significant change in land use.

Irreversible Changes from Environmental Accidents

No significant irreversible environmental damage, such as what could occur as a result of an accidental spill or explosion of hazardous materials, is anticipated due to implementation of the Proposed Project. Furthermore, compliance with federal, State, and local regulations, the City of Oakland's Standard Conditions of Approval, and the implementation of mitigation measures identified in Section IV.F, *Hazardous Materials*, would reduce to a less than significant level the possibility that hazardous substances within the Project Site would cause significant environmental damage.

Consumption of Non-Renewable Resources

Consumption of non-renewable resources includes conversion of agricultural lands, loss of access to mining reserves, and use of non-renewable energy sources. The Project Site is located within an urban area of Oakland; no agricultural land would be converted to non-agricultural uses. The Project Site does not contain known mineral resources and does not serve as a mining reserve.

Construction of Proposed Project would require the use of energy, including energy produced from non-renewable resources. Energy consumption would also occur during the operational period of the Proposed Project due to the use of automobiles, lighting, and appliances. However, the Proposed Project would incorporate energy-conserving features, as required by the uniform Building Code and California Energy Code Title 24. The Proposed Project would also incorporate sustainable construction features where feasible or as otherwise required by law that would strive to meet the LEED ND Program over the long-term, resulting in a more energy efficient development and reduced consumption using local materials and labor. Additionally, the location of the Project Site in close proximity to the 19th Street BART Station and with access to other public transit options, would facilitate the increased use of public transit, further reducing non-renewable energy consumption associated with single-occupant vehicles.

D. Effects Found Not to be Significant

Meetings with representatives of the City of Oakland departments involved in the planning and review of development projects, and consultants for the City were held to determine the preliminary scope of the Kaiser Center EIR Project. In addition to those meetings, a Notice of Preparation was circulated on May 22, 2008 and two public scoping meetings were held, one on June 9, 2008 at the Landmark Preservation Advisory Board, and on June 19, 2008 at the Planning Commission, to solicit comments from the public and city officials about the scope of this EIR. Written comments received on the NOP were considered in the preparation of the final scope for this document and in the evaluation of the Proposed Project. An Initial Study was not prepared for the Proposed Project.

The following two topics from the CEQA Environmental Checklist were excluded from discussion in the EIR because it was determined during the scoping phase that there would be no impacts to these issues: Agricultural Resources and Mineral Resources.

Agricultural and Forest Resources

The Proposed Project Site is located within an urban area and is completely developed with existing commercial buildings. No agriculture uses or farmland are present within or adjacent to the Project Site.

The March 18, 2010 revisions to the CEQA Guidelines' Appendix G included revisions considering impacts on forestry resources. The Project area is not in a forest, nor would the Project cause changes to timberland zoning, loss of forest land, or conversion of forest land to non-forest use.

Mineral Resources

No known mineral resources are located within or near the Project Site. Mineral resource extraction activities have not taken place within or around the Project Site during recent history.

CHAPTER VII

Report Preparers

EIR Preparers

Report Authors

City of Oakland
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Martha Lowe, Biology
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Sabine Tucker, Land Use; Public Services
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www.swigco.com
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San Francisco, CA 94111
(415) 743-6900
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KAISER CENTER OFFICE PROJECT

Draft Environmental Impact Report Appendices
SCH No. 2008052103

Prepared for
The City of Oakland

August 2010



KAISER CENTER OFFICE PROJECT

Draft Environmental Impact Report Appendices
SCH No. 2008052103

Prepared for
The City of Oakland

August 2010



225 Bush Street
Suite 1700
San Francisco, CA 94104
415.896.5900
www.esassoc.com

Los Angeles

Oakland

Olympia

Petaluma

Portland

Sacramento

San Diego

Seattle

Tampa

Woodland Hills

206213

APPENDIX A

Notice of Preparation (NOP) and Responsive Comments

Appendix A Contents:

- A.1 NOP and Attachments
- A.2 NOP Mailing List: Agencies and Organizations
- A.3 NOP Mailing List; 300' Radius
- A.4 NOP Mailing List: Neighborhood Groups/Census Tract
- A.5 NOP Posting Locations
- A.6 Summary of Scoping Meeting and Responsive Comments
- A.7 Comment Letters in Response to NOP

APPENDIX A.1

NOP and Attachments



CITY OF OAKLAND

Community and Economic Development Agency, Planning & Zoning Services Division
250 Frank H. Ogawa Plaza, Suite 3315, Oakland, California, 94612-2032

NOTICE OF PREPARATION (NOP) OF A DRAFT ENVIRONMENTAL IMPACT REPORT (EIR) KAISER CENTER PROJECT

The Oakland Community and Economic Development Agency, Planning and Zoning Division, is preparing a Draft Environmental Impact Report (EIR) for the Kaiser Center Project as identified below, and is requesting comments on the scope and content of the EIR. The EIR will address the potential physical, environmental effects for each of the environmental topics outlined in the California Environmental Quality Act (CEQA). The City has not prepared an Initial Study.

The City of Oakland is the Lead Agency for the Project and is the public agency with the greatest responsibility for approving the Project or carrying it out. This notice is being sent to Responsible Agencies and other interested parties. Responsible Agencies are those public agencies, besides the City of Oakland, that also have a role in approving or carrying out the Project. When the Draft EIR is published, it will be sent to all Responsible Agencies and to others who respond to this NOP or who otherwise indicate that they would like to receive a copy. Responses to this NOP and any questions or comments should be directed in writing to: Margaret Stanzone, Planner IV, City of Oakland, Community and Economic Development Agency, Planning Division, 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, CA 94612; (510) 238-4932 (phone); (510) 238-6538 (fax); or e-mailed to mstanzone@oaklandnet.com. Comments on the NOP must be received at the above mailing or e-mail address by 5:00 p.m. Monday, June 23, 2008. Please reference case number ER 08-003/PUD 08-103 in all correspondence. In addition, comments may be provided at the EIR Scoping Meetings to be held before the Landmarks Preservation and Advisory Board and the City Planning Commission. Comments should focus on discussing possible impacts on the physical environment, ways in which potential adverse effects might be minimized, and alternatives to the project in light of the EIR's purpose to provide useful and accurate information about such factors.

EIR SCOPING MEETING LANDMARKS PRESERVATION ADVISORY BOARD

Monday, June 9, 2008

6:00 p.m.

Oakland City Hall – Hearing Room 1

EIR SCOPING MEETING CITY PLANNING COMMISSION

Wednesday, June 18, 2008

6:00 p.m.

Oakland City Hall – Hearing Room 1

PROJECT TITLE: Kaiser Center Project

PROJECT LOCATION: 300 Lakeside Drive. The project site to be redeveloped is an approximately 2.2-acre portion of the 7 acre Kaiser Center site, and is located at the northeast corner of Webster and 20th Streets in the City of Oakland, Alameda County, California. The project site is a portion of a larger parcel identified as Assessor's Parcel Number 008-0652-00-105.

PROJECT SPONSOR: The Swig Company, LLC

EXISTING CONDITIONS: The project site contains existing commercial structures which range from approximately 25 to 35 feet tall, and includes Longs Drugs Store/US Bank on 20th Street (generally the "20th Street Mall") comprising approximately 58,190 square feet, and 24 Hour Fitness on Webster Street (generally the "Webster Street Mall") comprising approximately 38,190 square feet. The project site and the larger Kaiser Center site are CEQA historic resources (Oakland Cultural Heritage Survey Rating A1+; listed on the Local Register of Historical Resources; appears eligible for the National Register individually and as part of the Lake Merritt District (code 3B)).

The project site is located in Oakland's Central Business District. Uses to the east of the project site include the existing Kaiser Center office tower (386 feet in height), parking garage and roof garden, as well as Lakeside Park opposite Harrison Street and Lakeside Drive, and Lake Merritt beyond. To the southeast of the project site opposite Harrison Street and 20th Street is 4.2-acre Snow Park. Uses to the west of the project opposite Webster Street include approximately four low- to mid-rise commercial uses


(25 feet to 65 feet) and surface parking lots. Uses to the north of the project site opposite 21st Street include the Pacific Bell/City National Bank Building (313 feet), the Ordway Building (404 feet), the AT&T Building (125 feet), and surface parking lots. The Cathedral of Christ the Light (57 feet) is located one block northeast of the project site. Uses to the south of the project site opposite 20th Street include Lake Merritt Plaza (371 feet). The project site has not been identified on the Cortese List of Hazardous Waste and Substance Sites as of the date of this Notice.

PROJECT DESCRIPTION: The proposed project would redevelop approximately 2.2 acres of the 7-acre Kaiser Center property to include approximately 1.47 million square feet (msf) of office, ground-floor retail, parking, and enhanced open space on approximately 97,000 square feet at the northeast corner of Webster and 20th Streets in Downtown Oakland. The project would result in two office towers of approximately 436 feet or 34 stories tall in place of the "20th Street Mall" (generally in the location of Longs Drugs Store/US Bank), and 566 feet or 42 stories tall in place of the "Webster Street Mall" (generally in the location of the 24 Hour Fitness). Approximately 22,500 square feet of retail space would be constructed on the ground floor along the Webster and 20th Street frontages. The project would add approximately 852 net new parking spaces, which would be integrated into the existing Kaiser Center garage or constructed behind the new ground-floor retail. The project would relocate the westernmost portion of the existing rooftop garden to the southern portion of the site, which would result in a net increase of public open space by approximately 4,500 square feet. The public open spaces uses would be made accessible by a new exterior "grand stairway" from 20th Street to the rooftop garden. All existing development on the 2.2-acre project site would be demolished and replaced as part of the proposed project. In connection with the redevelopment of the 2.2-acre project site, the Kaiser Center site would be subdivided into four parcels, although no physical changes are proposed to the remainder of the Kaiser Center site. The proposed project would also require Planned Unit Development (PUD) approvals as well as other possible discretionary permits from the City.

The project site is located within the City of Oakland General Plan Central Business District land use designation, and is located within the City of Oakland's C-55, S-1, and S-4 zoning districts (Commercial – Central Core, Special Zoning – Downtown Residential Usable Open Space Combining District, and Special Zoning – Design Review Combining Zone). The C-55 zoning district is intended to preserve and enhance a very high-intensity regional center of employment, shopping, culture, and recreation, and is appropriate to the core of the central district. The S-17 zone is intended to provide open space standards for residential development that are appropriate to the unique density, urban character and historic character of the central business district. The S-4 zone is intended to create, preserve, and enhance the visual harmony and attractiveness of areas which require special treatment and the consideration of relationships between facilities, and is typically appropriate to areas of special community, historical, or visual significance.

PROBABLE ENVIRONMENTAL EFFECTS: It is anticipated that the proposed project may have the following environmental effects: aesthetics (including views and shadows), traffic, circulation, and parking; air quality; and cultural resources. It is anticipated that the project will not have the following environmental effects: biological resources; geology and soils; wind; hazards and hazardous materials; hydrology and water quality; land use, plans, and policies; noise levels; population and housing; public services; recreation; utilities and service systems; and cumulative growth. However these environmental factors will nevertheless be analyzed in the EIR.

The Draft EIR will also examine a reasonable range of alternatives to the Project, including the CEQA-mandated No Project Alternative, and other potential alternatives that may be capable of reducing or avoiding potential environmental effects.


Gary V. Patton, Deputy Director
Planning and Zoning

May 22, 2008
ER 08-003

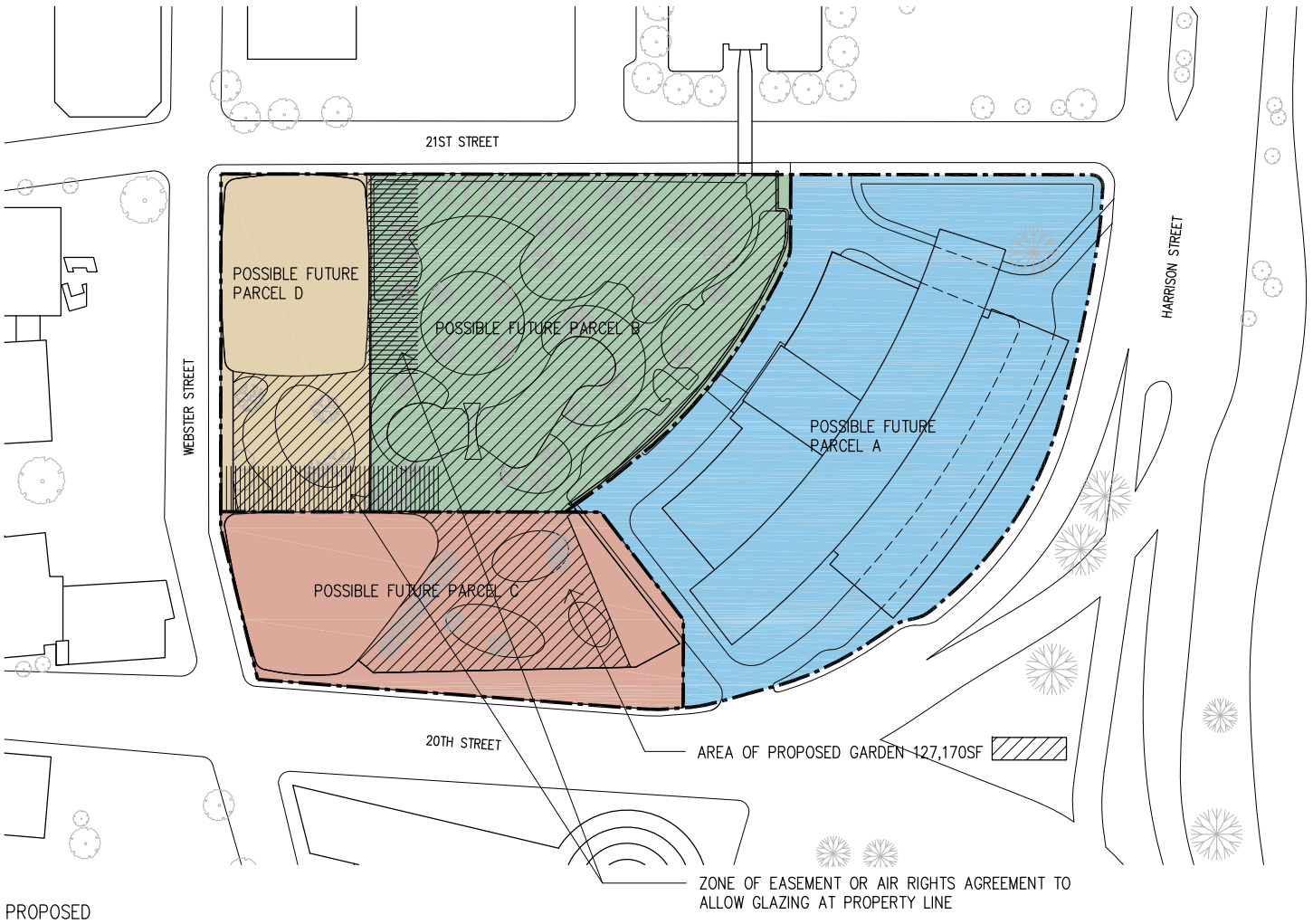
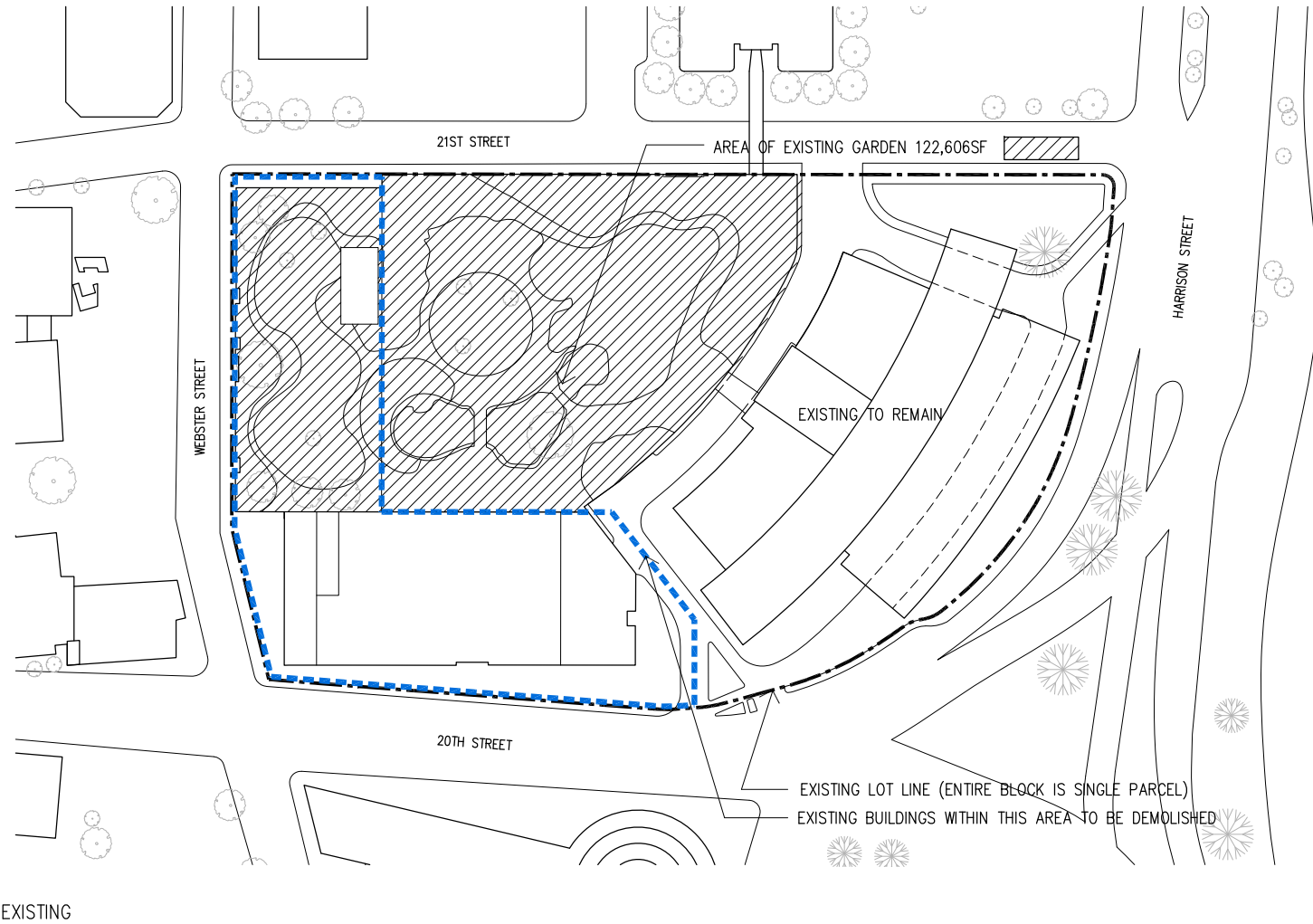
Attachments: ASK-047-Project and Lot Information
ASK-048-Building Section Looking East
ASK-050-Site Plan
ASK-057-Sixth Level Floor Plan (including rooftop garden)

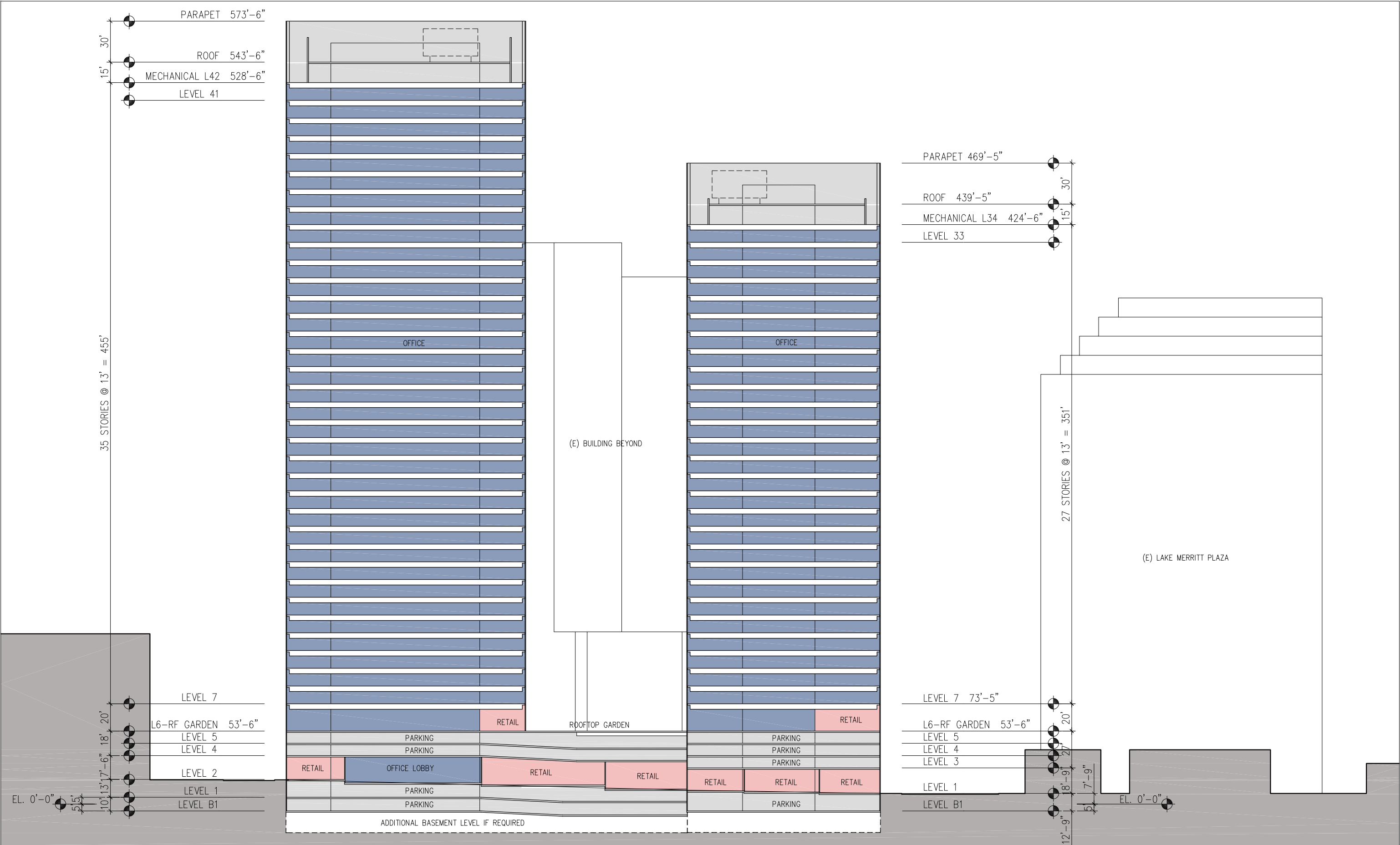
EXISTING & PROPOSED AREA OVERVIEW

	TOTAL EXISTING	-	EXISTING TO BE DEMOLISHED	=	EXISTING TO REMAIN	+	NEW	=	TOTAL	% CHANGE
TOTAL LOT AREA*	311,741GSF		0		311,741GSF		0		311,741GSF	0%
TOTAL BUILDING FOOTPRINT AREA	197,460GSF		74,900GSF		122,560GSF		80,168GSF		202,728GSF	+3%
TOTAL FLOOR AREA	1,690,879GSF		280,002GSF		1,410,877GSF		1,830,984GSF		3,241,861GSF	+92%
BUILDING HEIGHT										
MAXIMUM STORIES	29		N/A		29		42		N/A	N/A
MAXIMUM FEET	386'		N/A		386'		±573.5'		±573.5'	+49%
NUMBER OF PARKING SPACES **	1340		155		1185		852		2037	+52%

* LOT AREA INCLUDES ALL FOUR POSSIBLE FUTURE PARCELS
** PARKING INCLUDES SPACES RESERVED FOR (E) KAISER CENTER TOWER AND ORDWAY BUILDING. SEE ASK-059

NOTE : POSSIBLE PARCELS SHOWN ON THIS DRAWING ARE FOR REFERENCE ONLY AND ARE INTENDED ONLY TO FACILITATE DESCRIPTION OF THE RELEVANT AREAS AND LOCATION OF THE PROPOSED PROJECT. THIS DRAWING DOES NOT SUGGEST OR PROPOSE A LEGAL SUBDIVISION.



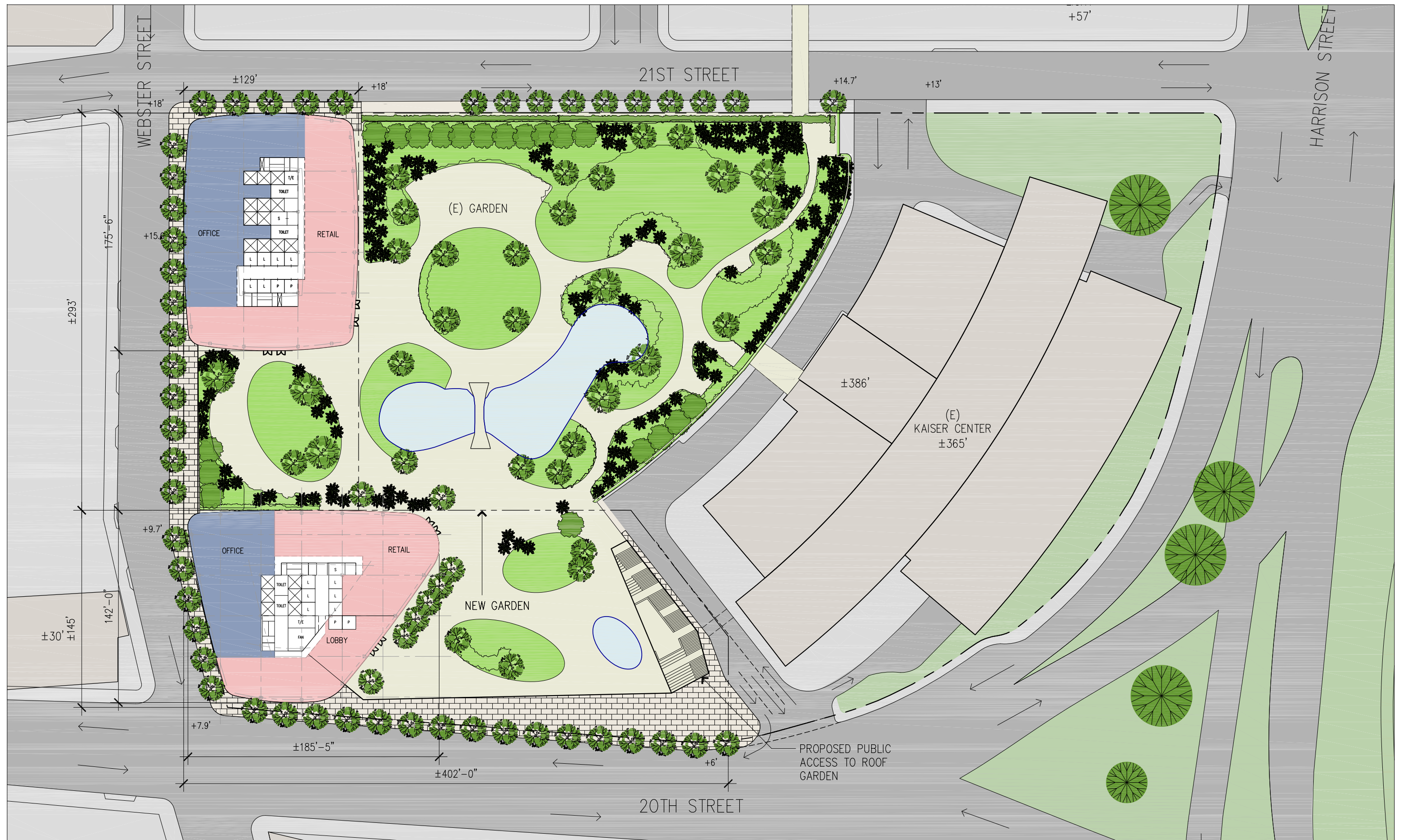


EAST/ WEST BUILDING SECTION
ASK - 048R1

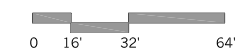


September 15, 2008
Scale: 1" = 64'-0"





SIXTH LEVEL FLOOR PLAN
ASK - 057R2



May 29, 2009
Scale: 1" = 64'-0"



KAISER CENTER
THE SWIG COMPANY

SOM


APPENDIX A.2

NOP Mailing List: Agencies and Organizations

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CERTIFICATE OF MAIL DEPOSIT FOR PUBLIC NOTICES

I certify that on May 21, 2008 notices called under the Oakland Zoning and Subdivision Regulations for the following cases were placed into the U.S. Mail system:

<i>CASE FILE NOS:</i>	<i>STREET ADDRESS:</i>
<i>1. ER08-003/PUD08-103</i>	<i>Mailed a Notice of Preparation (NOP) of a Draft Environmental</i>
<i>2.</i>	<i>Impact Report (EIR) – Kaiser Center Project to the attached</i>
<i>3.</i>	<i>mailing list.</i>
<i>4.</i>	
<i>5.</i>	
<i>6.</i>	
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<i>17.</i>	
<i>18.</i>	
<i>19.</i>	
<i>20.</i>	



(NAME OF PERSON PLACING NOTICES IN MAIL)

May 21, 2008

(DATE)

**Agency Mailing Labels for
Environmental Review Notices
Revised 3/31/08**

Oakland Chamber of Commerce
475 14th Street
Oakland, CA 94612

City of Alameda
Planning Department
2263 Santa Clara Avenue, Rm. 120
Alameda, CA 94501

City of Emeryville
Planning/Redevelopment Agency
1330 Park Avenue
Emeryville, CA 94608

City of Piedmont
Planning Department
120 Vista Avenue
Piedmont, CA 94611

City & County of San Francisco
Planning Department
1660 Mission Street, 5th Floor
San Francisco, CA 94103

County of Alameda
Planning Department
399 Elmhurst, Room 136
Hayward, CA 94544

EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

Alameda County CMA
Attn: Saravana Suthanthira
1333 Broadway, Suite 220
Oakland, CA 94612

California Air Resources Board
Bob Fletcher
P.O. Box 2815
Sacramento, CA 95812

California Dept. of Water Resources
Attn: DPLA Environmental Review
P.O. Box 942836
Sacramento, CA 94236-0001

MTC
Attn: Environmental Staff
Metro Center
101 8th Street
Oakland, CA 94612

California Highway Patrol
3601 Telegraph Avenue
Oakland, CA 94609

BCDC
Environmental Planning Department
50 California Street, #260
San Francisco, CA 94111

Alameda Co. Dept. of Env. Health
Hazardous Materials Division
1131 Harbor Bay Parkway
Alameda, CA 94612

Marianne Payne
Planning Department Manager
San Francisco BART District
300 Lakeside Drive, P.O. Box 126
Oakland, CA 94604-2688

AC Transit Attn: Nathan Landau
Long Range Planning Division
1600 Franklin Street, Suite 700
Oakland, CA 94612

City of Berkeley
Planning Director
2118 Milvia Street
Berkeley, CA 94704

Alameda County Clerk-Recorder
1106 Madison Street
Oakland, CA 94607

City of San Leandro
Planning Division
835 E. 14th Street
San Leandro, CA 94577

**Agency Mailing Labels for
Environmental Review Notices
Revised 3/31/08 - Page 2**

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State Lands Commission
Environ. Planning & Mgt. Division
100 Howe Avenue, Suite 100
South Sacramento, CA 95825-8202

Montclarion Newspaper
1516 Oak Street
Alameda, CA 94501

S. F. Bay Guardian
c/o Matthew Hirsch
135 Mississippi Street
San Francisco, CA 94107-2536

Oakland Heritage Alliance
446 17th Street, Suite 301
Oakland, CA 94612

EBMUD, Office of Water Recycling
Attn: Linda Hu
P.O. Box 24055, MS 702
Oakland, CA 94623-1055

State Office of Historic Preservation
Attn: Ms. Cheryl Widell
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Sacramento, CA 94296

State Geologist
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Sacramento, CA 95814

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700 Heinz Ave., Bldg. F, Suite 200
Berkeley, CA 94710-2721

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c/o Laura Counts
7677 Oakport Street, #950
Oakland, CA 94621

Ron Bishop
BPAC
409 45th Street
Oakland, CA 94609

East Bay News Service
c/o Sanjiv Handa
P.O. Box 11093
Oakland, CA 94611

Oakland Unified School District
1025 Second Avenue, Room 301
Oakland, CA 94606

Pacific Gas & Electric Company
1919 Webster Street
Oakland, CA 94612

East Bay Regional Park District
Attn: Brad Olson
P.O. Box 5381
Oakland, CA 94605-0381

CA Department of Fish & Game
Habitat Conservation
P.O. Box 47
Yountville, CA 94599

Governor's Office of Planning &
Research - State Clearinghouse U
1400 10th Street, Room 121
Sacramento, CA 95814

Oakland Public Library
Social Science and Documents
125 14th Street
Oakland, CA 94612

East Bay Express
c/o Bob Gammon
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Emeryville, CA 94608

Staff Mailing Labels for EIR Notices
Page 1 of 2
Revised 3/10/08

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Oakland, CA 94607

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Oakland, CA 94602

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Alameda, CA 94501

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Emeryville, CA 94608

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Oakland, CA 94618

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Oakland, CA 94612

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Staff Mailing Labels for EIR Notices
Page 2 of 2

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CEDA/Planning

Gary Patton
CEDA/Planning

Scott Miller
CEDA/Zoning

Margaret Stanzione
CEDA/Planning

Reference Copies for
Zoning Div., 2nd Floor
2 each

Planning Commission
Reference Copy for Zoning Div.
2nd Floor

Reference Copy
for Planning Div.
3rd Floor

Councilmember Jean Quan
(District 4)
Council Office, 2nd Fl.

Oraiu Amoni
Council Office, 2nd Fl.
City Hall

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Senior Vice President
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David Preiss
Wendel Rosen Black & Dean
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Councilmember Nancy Nadel
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Council Office, 2nd Floor

**Landmarks Preservation
Advisory Board Mailing List
Page 1 of 3
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Kirk E. Peterson & Assoc. Architects
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Oakland Heritage Alliance
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3rd Floor

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CEDA/Planning
3rd Floor

Joann Pavlinec
CEDA/Planning
3rd Floor

Betty Marvin
CEDA/Planning
3rd Floor

Mark Wald
City Attorney's Office
City Hall, 6th Floor
(Interoffice Mail)

Eric Angstadt
CEDA/Planning
3rd Floor

City Clerk's Office
City Hall, 1st Floor

Reference Copies
4 each
(Give to Joann)

AGENDA & MINUTES

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Clear Channel Outdoor
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Oakland, CA 94618

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Caltrans - OCRS
Environ. Div., Mail Station 8A
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Oakland, California 94623-0660

Annalee Allen
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**Landmarks Preservation
Advisory Board Mailing List
Page 2 of 3**

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AGENDA & MINUTES

↓ ↓ ↓

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Oakland, California 94611

Mayor Ronald V. Dellums
Mayor's Office
City Hall, 3rd Floor
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**Landmarks Preservation
Advisory Board Mailing List
Page 3 of 3
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Jim Ratcliff
725 Hillgirt Circle
Oakland, CA 94610

Peter VanDernaillen
503 Crofton Avenue
Oakland, California 94610

Osa Armi
Shute, Mihaly & Weinberger LLP
396 Hayes Street
San Francisco, California 94102

Jane Freeman
750 Oakland Avenue, #102
Oakland, CA 94611

Robert S. Perlmutter
Shute, Mihaly et.al.
396 Hayes Street
San Francisco, California 94102

Alex Hernandez
Diocese of Oakland
2900 Lakeshore Avenue
Oakland, California 94610

Jordan Harrison
2427 Hilgard Avenue, #12
Berkeley, California 94709

David Dibble
2806 Bellaire Place
Oakland, Ca 94601

Bill O'Brien
Express
4420 Albert Street
Oakland, California 94619

Constance Ward
P.O. Box 1885
Oakland, California 94604-1885

The Oakland Tribune
c/o Laura Counts
7677 Oakport Street, # 950
Oakland, CA 94621

David Nicolai, Director
Pardee Home Museum
672 - 11th Street
Oakland, California 94607

Deputy Editor of Oakland News
c/o Jane Powell
2708 Sunset Avenue
Oakland, CA 94601

Dr. P. Christiaan Klieger
Interim Chief Curator of History
Oakland Museum
(Interoffice Mail)

Michael Munson
KTOP TV
5th Floor, Suite 5354
(Interoffice Mail)

Michele Morton
KTOP
5th Floor, Suite 5354
(Interoffice Mail)

Mark Bryant
OPW - Real Estate, 4th Fl.
(Interoffice Mail)

Library - History Room
125 14th Street
(PLEASE POST)
(Interoffice Mail)

APPENDIX A.3

NOP Mailing List; 300' Radius



**300 Lakeside Drive
ER08-003, PUD08-103**

008 065100101
008 065100301

008 065200105

008 065301903

008 065302400

008 063602008

008 063500100

2030 ASSOCIATES
2021 WEBSTER ST
OAKLAND CA 94612

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

80 GRAND MC LLC
2250 BROADWAY
OAKLAND CA 94612

OPERATING PTSHIP BRANDYWINE
N/AVAIL

ORDWAY LLC BRANDYWINE
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

CALIFORNIA NURSES ASSOCIATION
2000 FRANKLIN ST
OAKLAND CA 94612-2908

CSHV 180 GRAND LLC
220
SANTA ANA CA 92707

CSHV 180 GRAND LLC
220
SANTA ANA CA 92707

SHAHLA DAVOUDI
23 LAGOON RD
SAN RAFAEL CA 94901-1522

EAST BAY STATE BUILDING AUTHORITY
1401 LAKESIDE DR
OAKLAND CA 94612-4305

PORTFOLIO ESSEX
925 E MEADOW DR
PALO ALTO CA 94303-4233

SUSAN B. JOHNSON
PO BOX 173
LEWISTON CA 96052-0173

ELENA LEON
115 LATHAM ST
PIEDMONT CA 94611-4141

MASRI FAMILY LP A
290 27TH ST
OAKLAND CA 94612-3821

MASRI FAMILY LP A
290 27TH ST
OAKLAND CA 94612-3821

PACIFIC BELL 279-1-43-2
2600 CAMINO RAMON #IN05
SAN RAMON CA 94583-5000

PPD MERRITT I LLC
3993 HOWARD HUGHES PKWY #450
LAS VEGAS NV 89169-6759

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #215
DALLAS TX 75204-2911

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

PRENTISS PROPERTIES WEBSTER
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

JOHN J. & GRACE E. SHANAHAN
450 TARAVAL ST
SAN FRANCISCO CA 94116-2530

LAKESIDE DRIVE LLC SIC
220 MONTGOMERY ST #20
SAN FRANCISCO CA 94104-3526

SODALITE
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

TWENTY THIRTY ASSOCIATES
2030 FRANKLIN ST #400
OAKLAND CA 94612-2948

PATRICIA WELD
101 N TRYON ST
CHARLOTTE NC 28255-0001

WEST COAST PROPERTY MANAGEMENT INC
400 VALLEY WAY
MILPITAS CA 95035-4136

RICK T. ZAWADSKI
982 TULARE AVE
ALBANY CA 94707-2540

200 foot radius

Lakeside Drive Llc Sic
220 Montgomery St Fl 20
San Francisco Ca 94104-3526
008-0652-001-05

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0679-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0685-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0681-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0682-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0687-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0680-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0684-001

Bank Of California National Association
Po Box 7788
Newport Beach Ca 92658-7788
008-0637-004-03

Lottie T. Blue
2828 Chestnut St
Oakland Ca 94608-4450
008-0650-003

Operating Ptshp Brandywine
155 Grand Ave
Oakland Ca 94612-3758
008-0653-023

Ordway Llc Brandywine
2711 N Haskell Ave Ste 2150
Dallas Tx 75204-2912
008-0653-019-03

Dana & Manuel Cabello
2120 Broadway
Oakland Ca 94612-2310
008-0650-004

California Bank & Trust
300 Lakeside Dr # 8wes
Oakland Ca 94612-3534
008-0650-016-04

Csa Property Management Llc
334 19th St
Oakland Ca 94612-3406
008-0636-013-01

East Bay State Building Authority
1401 Lakeside Dr
Oakland Ca 94612-4305
008-0653-021-02

Ronald A. Grant
60 98th Ave
Oakland Ca 94603-1000
008-0637-015

Susan B. Johnson
Po Box 173
Lewiston Ca 96052-0173
008-0653-011

Marvene Ltd
1230 Bennett Ln
Calistoga Ca 94515-9714
008-0650-007-01

Oakland Property Llc
1999 Harrison St
Oakland Ca 94612-3520
008-0636-020-08

P G & E Co 135-1-84a-1
Po Box 770000
San Francisco Ca 94177-0001
008-0637-008-08

Pacific Bell 279-1-43-2
2600 Camino Ramon # In05
San Ramon Ca 94583-5000
008-0653-014-01

Michael K. Park
119 Via Floreado
Orinda Ca 94563-1926
008-0636-018-01

Plaza Oakland Park
Po Box 13247
Kansas City Mo 64199
008-0636-010-01

Bernard S. Reynolds
3965 Washington St
San Francisco Ca 94118-1613
008-0650-008-01

Lakeside Drive Llc Sic
220 Montgomery St Fl
San Francisco Ca 94104
008-0652-001-05

Sodalite
2711 N Haskell Ave Ste 2150
Dallas Tx 75204-2912
008-0717-002

Twenty Thirty Associates
2030 Franklin St # 400
Oakland Ca 94612-2948
008-0651-008-01

Two Thousand One W
Po Box 4900
Scottsdale Az 85261-4900
008-0637-003-03

Vsf Of Ref Family Trust
Po Box 219
San Bruno Ca 94066-0219
008-0637-013-01

Patricia Weld
101 N Tryon St
Charlotte Nc 28255-0001
008-0651-018-01

Western Alliance Banc
1951 Webster St
Oakland Ca 94612-2900
008-0637-005

APPENDIX A.4

NOP Mailing List: Neighborhood Groups/Census Tract

NEIGHBORHOOD
GROUPS CENSUS TRACT
4034:

B-19
JIM RATLIFF
725 HILLGIRT CIR
OAKLAND CA 94610

J-6
CHRISTINE ANDERSON
5095 DUBLIN AVE
OAKLAND CA 94602

O-15
ELLEN WYRICK PARKINSON
1420 MAGNOLIA ST
OAKLAND CA 94607

CENSUS TRACT 4034:

B-19, C-33, F-11,
J-6, L-4, L-14, O-15,
O-3-1, S-22,

C-33
FR TIMOTHY K JOHNSON
176 RIDGEWAY AVE
OAKLAND CA 94611

L-14
CAYREN M KING
1727 CLEMENS RD
OAKLAND CA 94602-1801

O-3-1
GORDON LINK
6510 RAYMOND ST
OAKLAND CA 94609

ER08-003
PUD08-103

F-11 (*& F-13*)
JOHN JAY
10700 MACARTHUR BLVD STE 200
OAKLAND CA 94605

L-4
MAUREEN DORSEY
4258 MACARTHUR BLVD
OAKLAND CA 94619

S-22
MARGARET ELIZARES
7501 SUNKIST DR
OAKLAND CA 94605-3022

APPENDIX A.5

NOP Posting Locations

POSTING LOCATIONS

Community & Economic Development Agency

The Sving Company LLC
APPLICANT

300 Lakeside Dr.
ADDRESS

ER08-003
19W008-103
CASE NO.

5/30/08
DATE

TIME

Posting for the above case were made in the following locations:

1. At site
2. Kaiser / 21st
3. Webster / 21st
4. Webster
5. Webster / 20th
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.

POSTED BY:

DMG/YPW

notice of PLANNING COMMISSION PUBLIC HEARING

3. **Location:** 300 Lakeside Drive (Kaiser Center)
Block bounded by 20th Street, Webster Street, 21st Street, and Harrison Street. APN: 008-0652-001-05

Proposal: **Scoping Session** for an Environmental Impact Report to receive comments regarding potential impacts related to the redevelopment of a portion of the Kaiser Center site. The Project would add approximately 1,474,992 square feet of net new development. The Project includes (1) demolition of 280,002 square feet of existing retail/commercial development along 20th and Webster Streets, (2) construction of one 34 story office tower (436 ft.) at the corner of 20th /Webster Streets, (3) construction of one 42 story office tower (566 ft.) at the corner of Webster/21st Street, (4) construction of 22,500 square feet of ground floor retail, and (5) addition of 828 parking spaces. The 122,606 s.f. rooftop garden will be reconfigured by removing approx. 18,369 s.f. in the Webster/21st Street corner and adding 22,933 s.f. along 20th Street.

Applicant: The Swig Company, LLC
Contact Person/Phone Number: Tomás Schoenberg, (415) 291-1100
Owner: SIC-Lakeside Drive, LLC
Case File Number: ER 08-003, PUD 08-103
Planning Permits Required: Vesting Tentative Parcel Map, Planned Development Permit, Preliminary Development Plan
General Plan: Central Business District
Zoning: C-55, Central Core Commercial; S-4, Design Review Combining Zone; S-17 Downtown Residential Open Space
Environmental Determination: An environmental review application was submitted on 3/25/08. A determination has been made that an EIR will be prepared that covers all environmental topic areas.
Historic Status: Kaiser Center Building & Rooftop Garden is a CEQA Historic Resource (Oakland Cultural Heritage Survey Rating A1+; listed on the Local Register of Historical Resources; appears eligible for the National Register individually and as part of the Lake Merritt District (code 3B))
Service Delivery District: 1 – Downtown/West Oakland/Harbor
City Council District: 3
Status: The Notice of Preparation was published and distributed on May 22, 2008 with comments due on June 23, 2008
Action to be Taken: Receive public and Planning Commission comments about what information and analysis should be included in the Environmental Impact Report
For Further Information: Contact project planner **Margaret Stanzione** at (510) 238-4932 or by email mstanzione@oaklandnet.com

The public hearing will be heard on **Wednesday, June 18, 2008, at Oakland City Hall, Hearing Room One, 1 Frank H. Ogawa Plaza, Oakland, California 94612.** The public hearing will be heard at 6:30 p.m.

If you challenge the public hearing in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice or in written correspondence delivered to the Community and Economic Development Agency on, or proper to, the public hearing. If you wish to be notified of the decision of this case, please indicate the **case number and submit a self-addressed stamped envelope for each** to the Community and Economic Development Agency/Zoning Division, 250 Frank H. Ogawa Plaza, 2nd floor, Oakland, California 94612-2031. Please telephone (510)238-3781 for further information.

AT SUCH HEARING, FACTS MAY BE PRESENTED FAVORING OR OPPOSING THIS PROPOSAL

IT IS UNLAWFUL TO ALTER OR REMOVE THIS NOTICE on or before the hearing date indicated above. Such an act is punishable by fine or imprisonment or by both fine and imprisonment.

SECRETARY, City Planning Commission
City Hall, Oakland, California 94612

APPENDIX A.6

Summary of Scoping Meeting and Responsive Comments

KAISER CENTER
SUMMARY OF NOP/SCOPING MEETING COMMENTS
Comment Period: May 22, 2008 to June 23, 2008
SCH# 2008052103

Date	Respondent	Organization/Address	Comment Summary
5/23	Scott Morgan Project Analyst, State Clearinghouse	State of California Governor's Office of Planning & Research 1400 10 th Street P.O. Box 3044 Sacramento, CA 95812-3044	Transmittal to Reviewing Agencies (No specific comments)
5/23	Doug Johnson	WalkOaklandBikeOakland.com	<ul style="list-style-type: none"> EIR to address bicycling and pedestrian circulation. Reduce or eliminate additional auto parking.
5/29	Debbie Pilas-Treadway Assoc. Governmental Program Analyst	State of California Native American Heritage Commission 915 Capitol Mall, room 364 Sacramento, CA 95814	Standard comment letter: <ul style="list-style-type: none"> Contact Information Center for records search. Prepare archaeological inventory survey if none already prepared. Contact NAHC. Include appropriate mitigation in case unknown archaeological finds are encountered.
6/9	Chris Pattillo Co-Chair, HALS Northern California Chapter (LPAB Scoping Session)	Historic American Landscape Survey Northern California Chapter 444 17 th Street, Oakland, CA 94612	<ul style="list-style-type: none"> Letter supporting project and its responsible treatment of historic garden. EIR to include wind and shadow studies and their effects on garden.
6/10	Diane Stark Senior Transportation Planner	Alameda County Congestion Management Agency 1333 Broadway, Suite 220 Oakland, CA 94612	Standard comment letter <ul style="list-style-type: none"> Use of ACCMA Countywide model. Impacts on MTS Adequacy of Mitigation Measures; transit LOS Use of Transit Demand Measures. Bicycle routes. Noise from traffic.
6/16	Lisa Carboni District Branch Chief Local Development – Intergovernmental Review	State of California Business, Transportation and Housing Agency Department of Transportation 111 Grand Avenue P.O. Box 23660 Oakland, CA 94623-0660	Standard comment letter <ul style="list-style-type: none"> Prepare detailed traffic impact study. Coordinate scoping with agency
6/18	William R. Kirkpatrick Manager of Water Distribution Planning	East Bay Municipal Utility District 375 Eleventh Street Oakland, CA 94607-4240	<ul style="list-style-type: none"> Letter acknowledges agency's intent to serve project with water service. Confirms adequate wastewater capacity to serve project. Project to comply with water conservation measures (AB 325, etc.) and best management practices.

Date	Respondent	Organization/Address	Comment Summary
6/23	Jean Roggenkamp Deputy Air Pollution Control Officer	Bay Area Air Quality Management District 939 Ellis Street San Francisco, California 94109	Standard comment letter. <ul style="list-style-type: none"> • Include District's attainment status for criteria pollutants. • Evaluations of the project's construction, operational, and cumulative AQ impacts. • TACs • Project's potential to increase energy demand. • LEED or sustainable construction methods • Evaluation of parking within a transit-rich area. • Greenhouse gas emissions (AB32).
6/23	Val Joseph Nenotti Deputy Planning Manager, Stations	San Francisco Bay Area Rapid Transit (BART) District 300 Lakeside Drive, P.O. Box 12688 Oakland, CA 94612-3543	<ul style="list-style-type: none"> • Project's proximity to BART station. • Impacts on capacity of 19th Street BART station. • Evaluate need for parking supply. • Bicycle parking facilities at BART station. • Pedestrian capacity/circulation on 20th Street, including during construction period. • Greenhouse gas emissions reduction due to BART use.
6/26	Nancy Skowbo Deputy General Manager for Service Development	AC Transit 1600 Franklin Street Oakland, CA 94612	<ul style="list-style-type: none"> • Impacts on transit operations. • Traffic impacts from changes on 20th and Harrison (Measure DD Lake Merritt program). • Key transit intersections in the vicinity. • Cumulative impacts on bus routes • Use of TDM to reduce number of parking spaces. • Bicycle facilities; "car share" parking.
Date	Respondent	Event	Comment Summary
6/9	Landmarks Preservation Advisory Board	NOP/EIR Scoping Meeting	<ul style="list-style-type: none"> • Cumulative traffic • Wind • Historic resources • Shadow on lake and open space • Pedestrian safety
6/18	Planning Commission	NOP/EIR Scoping Meeting	<ul style="list-style-type: none"> • Change to "Y" driveway at 20th Street intersection to improve pedestrian safety. • Luminous (i.e., glass) skin – glare. • Relocation of 24 Hour Fitness • Changes in retail square footage. • LEED certified? • Fiscal feasibility to enforce parking and conditions of approval. • Lack of pedestrian access. • Pedestrian experience (blank walls, safety) • Dust emissions from construction on park users. • Construction circulation and effects on nearby intersections (Webster @ 21st). • Density as mitigation; encourage public transit • Aesthetics with context from DT and Lake Merritt • Access to open space. • Skyline context (visual)

APPENDIX A.7

Comment Letters in Response to NOP



ARNOLD SCHWARZENEGGER
GOVERNOR

STATE OF CALIFORNIA
GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH
STATE CLEARINGHOUSE AND PLANNING UNIT



CYNTHIA BRYANT
DIRECTOR

Notice of Preparation

May 23, 2008

To: Reviewing Agencies

Re: Kaiser Center Project
SCH# 2008052103

Attached for your review and comment is the Notice of Preparation (NOP) for the Kaiser Center Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Margaret Stazione
City of Oakland
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Project Analyst, State Clearinghouse

Attachments
cc: Lead Agency

**Document Details Report
State Clearinghouse Data Base**

SCH# 2008052103
Project Title Kaiser Center Project
Lead Agency Oakland, City of

Type NOP Notice of Preparation

Description The project would result in two office towers of approximately 436 feet or 34 stories tall in place of the "20th Street Mall" and 566 feet or 42 stories tall in place of the "Webster Street Mall". Approximately 22,500 square feet of retail space would be constructed on the ground floor along the Webster and 20th Street frontages. The project would add approximately 852 net new parking spaces. The project would result in a net increase of public open space by approximately 4,500 square feet. All existing development on the 2.2-acre project site would be demolished and replaced as part of the proposed project.

Lead Agency Contact

Name Margaret Stazione
Agency City of Oakland
Phone (510) 238-4932 **Fax**
email mstanzione@oaklandnet.com
Address 250 Frank H. Ogawa Plaza, Suite 3315
City Oakland **State** CA **Zip** 94612

Project Location

County Alameda
City Oakland
Region
Cross Streets Webster and 20th Streets
Parcel No. 008-0652-00-105
Township **Range** **Section** **Base**

Proximity to:

Highways
Airports
Railways
Waterways
Schools
Land Use

Project Issues Aesthetic/Visual; Traffic/Circulation; Recreation/Parks; Air Quality; Archaeologic-Historic; Biological Resources; Geologic/Seismic; Soil Erosion/Compaction/Grading; Toxic/Hazardous; Water Quality; Landuse; Noise; Population/Housing Balance; Public Services; Cumulative Effects; Growth Inducing

Reviewing Agencies Resources Agency; Department of Conservation; Department of Parks and Recreation; San Francisco Bay Conservation and Development Commission; Department of Water Resources; Department of Fish and Game, Region 3; Native American Heritage Commission; California Highway Patrol; Caltrans, District 4; Integrated Waste Management Board; Department of Toxic Substances Control; Regional Water Quality Control Board, Region 2

Date Received 05/23/2008 **Start of Review** 05/23/2008 **End of Review** 06/23/2008

Stanzione, Margaret

From: Doug J. [doug@walkoaklandbikeoakland.org]
Sent: Friday, May 23, 2008 5:47 PM
To: Stanzione, Margaret
Cc: wobo FOUNDERS; Wlassowsky, Wlad; Patton, Jason; Patton, Gary
Subject: NOP: Kaiser Center Project 300 Lakeside

I submit the following comments on the need to address both bicycling and pedestrian circulation and the project description for the area around the enormous project planned for 300 Lakeside (Notice of Preparation May 22, 2008).

First, all planning for the site and adjoining streets must reference and address both the city's bicycle and its pedestrian master plan recommendations for this area. There are a number of critical bicycle routes and pedestrian improvements in this vicinity that must be developed along with this project.

In addition, given the building's two-three block distance from 19th St BART and dozens of high quality bus lines, it is entirely inappropriate to add auto parking at the proposed scale (900+ spaces). Transportation demand management strategies can move employees to the project area without clogging our streets and increasing carbon emissions.

We look forward to the study and additional opportunities to provide comments and we hope - support - when the project warrants it.

Kind regards,
Doug Johnson
WalkOaklandBikeOakland.org
President

NATIVE AMERICAN HERITAGE COMMISSION

915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax



May 29, 2008

Margaret Stazione
City of Oakland
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

RE: SCH # 2008052103 – Kaiser Center project, Alameda County

Dear Ms. Stazione:

The Native American Heritage Commission has reviewed the above mentioned NOP. To adequately assess the project-related impact on archaeological resources, the Commission recommends the following action be required:

1. Contact the appropriate Information Center for a records search. The record search will determine:
 - Whether a part or all of the project area has been previously surveyed for cultural resources.
 - Whether any known cultural resources have already been recorded on or adjacent to the project area.
 - Whether the probability is low, moderate, or high that cultural resources are located within the project area.
 - Whether a survey is required to determine whether previously unrecorded cultural resources are present.
2. The final stage of the archaeological inventory survey is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
 - Required the report containing site significance and mitigation be submitted immediately to the planning department.
 - Required site forms and final written report be submitted within 3 months after work has been completed to the Information Center.
3. Contact the Native American Heritage Commission for:
 - A Sacred Lands File Check.
 - A list of appropriate Native American Contacts for consultation concerning the project site and assist in the mitigation measures.

Lack of surface evidence of archeological resources does not preclude the existence of archeological resources. Lead agencies should include provisions for accidentally discovered archeological resources during construction per California Environmental Quality Act (CEQA) §15064.5 (f). Health and Safety Code §7050.5 and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery and should be included in all environmental documents. If you have any questions, please contact me at (916) 653-4038.

Sincerely,


Debbie Pilas-Treadway
Associate Governmental Program Analyst

CC: State Clearinghouse



HALS

Historic American Landscape Survey
Northern California Chapter
444 17th Street, Oakland, CA 94612
Telephone: 510/465-1284

June 9, 2008

Members of the Landmarks Board
250 Frank Ogawa
Oakland, CA 94612

RE: Kaiser Center Scoping

Dear Landmarks Board Member,

I write on behalf of the Northern California Chapter of the Historic American Landscapes Survey (HALS) regarding the proposed changes to the Henry J. Kaiser Center and its roof garden. For the past two years our members have been engaged in documenting this roof garden for HALS because we feel it is an important cultural resource. Designed in the 1960s by Osmundson and Staley, Landscape Architects this garden incorporates many innovative technologies.

I had the opportunity to meet with representatives of The SWIG Company and am pleased to see that their plans include retention of most of the garden area, reconstruction of the portion that will be impacted by construction, the addition of over 4000 square feet of new garden area in a design style similar to the original, and significantly improved public access to the garden via a new stairway off 20th Street.

We support the proposed development and its responsible treatment of this important historic garden. The Environmental Impact Report (EIR) should include detailed wind and shade studies that analyze the impacts on the garden. How will the new towers impact the plants viability to thrive, how will the new construction impact users comfort in the garden spaces, how will increased use due to the improved access impact the garden? These impacts can certainly be addressed in the design phase, but it is important to understand these impacts.

Sincerely,

Chris Pattillo
Co-Chair, HALS Northern California Chapter

Coc-Chair:

Betsy Flack
The Garden Conservancy
bflack@gardenconservancy.org

Cathy Garrett
PGAdesign^{inc.}
garrett@pgadesign.com

Chris Pattillo
PGAdesign^{inc.}
pattillo@pgadesign.com



ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 • OAKLAND, CA 94612 • PHONE: (510) 836-2560 • FAX: (510) 836-2185
E-MAIL: mail@accma.ca.gov • WEB SITE: accma.ca.gov

AC Translt
Director
Greg Harper

Alameda County
Supervisors
Nate Miley
Scott Haggerty
Chair

City of Alameda
Mayor
Beverly Johnson

City of Albany
Councilmember
Farid Javandel

BART
Director
Thomas Blalock

City of Berkeley
Councilmember
Kris Worthington

City of Dublin
Mayor
Janet Lockhart

City of Emeryville
Vice-Mayor
Ruth Atkin

City of Fremont
Vice-Mayor
Robert Wackowski

City of Hayward
Mayor
Michael Sweeney

City of Livermore
Mayor
Marshall Kamena

City of Newark
Councilmember
Luis Freitas

City of Oakland
Councilmember
Larry Reid

City of Piedmont
Councilmember
John Chiang

City of Pleasanton
Mayor
Jennifer Hosterman

City of San Leandro
Councilmember
Joyce R. Starosciak

City of Union City
Mayor
Mark Green
Vice Chair

Executive Director
Dennis R. Fay

June 10, 2008

Mr. Gary V. Patton
Deputy Director
Planning and Zoning
City of Oakland
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612-2032
gpattson@oaklandnet.com



SUBJECT: Comments on the Notice of Preparation of a Draft Environmental Impact Report (DEIR) for Kaiser Center Project

Dear Mr. Patton:

Thank you for the opportunity to comment on the Notice of Preparation (NOP) for a Draft Environmental Impact Report (DEIR) for the Kaiser Center Project on 300 Lakeside Drive, at the northeast corner of Webster and 20th Streets in the City of Oakland. The 2.2-acre project site is a portion of the 7-acre Kaiser Center. The project would involve redeveloping the site to include approximately 1.47 million square feet of office, 22,500 square feet of ground-floor retail, 852 net new parking spaces, and a relocation and 4,500 square foot expansion of the rooftop garden open space. It would result in two office towers of approximately 34 stories (436 feet) tall in place of the "20th Street Mall" and 42 stories (566 feet) tall in place of the "Webster Street Mall." The project requires approvals for a subdivision and a Planned Unit Development.

The ACCMA respectfully submits the following comments:

- The City of Oakland adopted Resolution No. 69475 on November 19, 1992 establishing guidelines for reviewing the impacts of local land use decisions consistent with the Alameda County Congestion Management Program (CMP). Based on our review of the NOP, the proposed project appears to generate at least 100 p.m. peak hour trips over existing conditions. If this is the case, the CMP Land Use Analysis Program requires the City to conduct a traffic analysis of the project using the Countywide Transportation Demand Model for projection years 2015 and 2030 conditions. Please note the following paragraph as it discusses the responsibility for modeling.
 - The CMA Board amended the CMP on March 26th, 1998 so that local jurisdictions are responsible for conducting the model runs themselves or through a consultant. The ACCMA has a Countywide model that is available for this purpose. The City of Oakland and the ACCMA signed a Countywide Model Agreement on November 16, 2007. Before the model can be used for this project, a letter must be submitted to the

ACCMA requesting use of the model and describing the project. A copy of a sample letter agreement is available upon request.

- Potential impacts of the project on the Metropolitan Transportation System (MTS) need to be addressed. (See 2007 CMP Figures E-2 and E-3 and Figure 2). The DEIR should address all potential impacts of the project on the MTS roadway and transit systems. These include I-880, I-580, I-80, I-980, SR 24, Harrison Street, Webster Street, Grand Avenue, Broadway, San Pablo Avenue, Telegraph Avenue, 14th Street, as well as BART and AC Transit. Potential impacts of the project must be addressed for 2015 and 2030 conditions.
 - Please note that the ACCMA does not have a policy for determining a threshold of significance for Level of Service for the Land Use Analysis Program of the CMP. Professional judgment should be applied to determine the significance of project impacts (Please see chapter 6 of 2007 CMP for more information).

- The adequacy of any project mitigation measures should be discussed. On February 25, 1993, the CMA Board adopted three criteria for evaluating the adequacy of DEIR project mitigation measures:
 - Project mitigation measures must be adequate to sustain CMP service standards for roadways and transit;
 - Project mitigation measures must be fully funded to be considered adequate;
 - Project mitigation measures that rely on state or federal funds directed by or influenced by the CMA must be consistent with the project funding priorities established in the Capital Improvement Program (CIP) section of the CMP or the Regional Transportation Plan (RTP).

The DEIR should include a discussion on the adequacy of proposed mitigation measures relative to these criteria. In particular, the DEIR should detail when proposed roadway or transit route improvements are expected to be completed, how they will be funded, and what would be the effect on LOS if only the funded portions of these projects were assumed to be built prior to project completion.

- Potential impacts of the project on CMP transit levels of service must be analyzed. (See 2007 CMP, Chapter 4). Transit service standards are 15-30 minute headways for bus service and 3.75-15 minute headways for BART during peak hours. The DEIR should address the issue of transit funding as a mitigation measure in the context of the CMA's policies as discussed above.
- The DEIR should also consider demand-related strategies that are designed to reduce the need for new roadway facilities over the long term and to make the most efficient use of existing facilities (see 2007 CMP, Chapter 5). The DEIR should consider the use of TDM measures, in conjunction with roadway and transit improvements, as a means of attaining acceptable levels of service. Whenever possible, mechanisms that encourage ridesharing, flextime, transit, bicycling, telecommuting and other means of reducing peak hour traffic trips should be considered. The Site Design Guidelines Checklist may be useful during the review of the development proposal. A copy of the checklist is enclosed.

Mr. Gary Patton
June 10, 2008
Page 3

- The EIR should consider opportunities to promote countywide bicycle routes identified in the Alameda Countywide Bicycle Plan, which was approved by the ACCMA Board on October 26, 2006. The approved Countywide Bike Plan is available at <http://www.accma.ca.gov/pages/HomeBicyclePlan.aspx>
- For projects adjacent to state roadway facilities, the analysis should address noise impacts of the project. If the analysis finds an impact, then mitigation measures (i.e., soundwalls) should be incorporated as part of the conditions of approval of the proposed project. It should not be assumed that federal or state funding is available.

Thank you for the opportunity to comment on this Notice of Preparation. Please do not hesitate to contact me at 510.836.2560 if you require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Diane Stark". The signature is fluid and cursive, with the first name "Diane" written in a larger, more prominent script than the last name "Stark".

Diane Stark
Senior Transportation Planner

file: CMP - Environmental Review Opinions - Responses - 2008

DEPARTMENT OF TRANSPORTATION

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P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 622-5491
FAX (510) 286-5559
TTY 711



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June 16, 2008

ALA980033
ALA-980-1.4
SCH#2008052103

Ms. Margaret Stazione
City of Oakland
Community and Economic Development Agency
Planning Division
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

Dear Ms. Stazione:

ER 08-003/PUD 08-103 Kaiser Center Project – Notice of Preparation

Thank you for including the California Department of Transportation (Department) in the environmental review process for the Kaiser Center Project. The following comments are based on the Notice of Preparation. As lead agency, the City of Oakland is responsible for all project mitigation, including any needed improvements to State highways. The project's fair share contribution, financing, scheduling, and implementation responsibilities as well as lead agency monitoring should be fully discussed for all proposed mitigation measures and the project's traffic mitigation fees should be specifically identified in the Draft Environmental Impact Report.

Traffic Impact Study (TIS)

The Department is primarily concerned with impacts to the State Highway System. Specifically, a detailed Traffic Impact Study (TIS) should identify impacts to the State Highway System. The TIS should include, but is not limited to the following:

1. Information on the project's traffic impacts in terms of trip generation, distribution, and assignment. The assumptions and methodologies used in compiling this information should be addressed.
2. Average Daily Traffic (ADT) and AM and PM peak hour volumes on all significantly affected streets and highways, including crossroads and controlling intersections.
3. Schematic illustration of the traffic conditions for: 1) existing, 2) existing plus project, and 3) cumulative for the intersections in the project area.

Ms. Margaret Stazione/City of Oakland
June 16, 2008
Page 2

4. Calculation of cumulative traffic volumes should consider all traffic-generating developments, both existing and future, that would affect the State Highway facilities being evaluated.
5. Mitigation measures should consider highway and non-highway improvements and services. Special attention should be given to the development of alternate solutions to circulation problems that do not rely on increased highway construction.
6. All mitigation measures proposed should be fully discussed, including financing, scheduling, implementation responsibilities, and lead agency monitoring.

We encourage the City of Oakland to coordinate preparation of the study with our office, and we would appreciate the opportunity to review the scope of work. Please see the Caltrans' *"Guide for the Preparation of Traffic Impact Studies"* at the following website for more information:
<http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf>

We look forward to reviewing the TIS, including Technical Appendices, and environmental document for this project. Please send two copies to the address at the top of this letterhead, marked ATTN: Yatman Kwan, Mail Stop #10D.

Should you have any questions regarding this letter, please call Yatman Kwan of my staff at (510) 622-1670.

Sincerely,

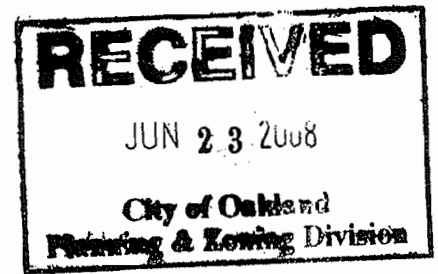


LISA CARBONI
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse



June 18, 2008



Margaret Stanzione, Planner IV
City of Oakland
Community and Economic Development Agency
250 Frank Ogawa Plaza, Suite 3315
Oakland, CA 94612

Re: Notice of Preparation of a Draft Environmental Impact Report –
Kaiser Center Project, Oakland

Dear Ms. Stanzione:

East Bay Municipal Utility District (EBMUD) appreciates the opportunity to comment on the Notice of Preparation of a Draft Environmental Impact Report (EIR) for the Kaiser Center Project located in the City of Oakland. EBMUD has the following comments.

WATER SERVICE

EBMUD's Central Pressure Zone, with a service elevation between 0 and 100 feet, will serve the proposed development. When the development plans are finalized, the project sponsor should contact EBMUD's New Business Office and request a water service estimate to determine costs and conditions for providing water service to the proposed development. Engineering and installation of water services requires substantial lead-time, which should be provided for in the project sponsor's development schedule.

The project sponsor should be aware that EBMUD will not install piping or services in contaminated soil or groundwater (if groundwater is present at any time during the year at the depth piping is to be installed) that must be handled as a hazardous waste, or that may be hazardous to the health and safety of construction and maintenance personnel wearing Level D personal protective equipment. EBMUD will not install piping or services in areas where groundwater contaminant concentrations exceed specified limits for discharge to the sanitary sewer system and sewage treatment plants.

Applicants for EBMUD services requiring excavation in contaminated areas must submit copies of existing information regarding soil and groundwater quality within or adjacent to the project boundary. In addition, the applicant must provide a legally sufficient, complete and specific written remedial plan establishing the methodology, planning and design of all necessary systems for the removal, treatment, and disposal of

all identified contaminated soil and/or groundwater. EBMUD will not design the installation of pipelines until such time as soil and groundwater quality data and remediation plans are received and reviewed and will not install pipelines until remediation has been carried out and documentation of the effectiveness of the remediation has been received and reviewed. If no soil or groundwater quality data exists or the information supplied by the applicant is insufficient EBMUD may require the applicant to perform sampling and analysis to characterize the soil being excavated and groundwater that may be encountered during excavation or perform such sampling and analysis itself at the applicant's expense.

WASTEWATER PLANNING

EBMUD's Main Wastewater Treatment Plant is anticipated to have adequate dry weather capacity to treat the proposed wastewater flow from this project, provided this wastewater meets the standards of EBMUD's Environmental Services Division. However, the City of Oakland's Infiltration/Inflow (I/I) Correction Program set a maximum allowable peak wastewater flow from each subbasin within the City and EBMUD agreed to design and construct wet weather conveyance and treatment facilities to accommodate these flows. EBMUD prohibits discharge of wastewater flows above the allocated peak flow for a subbasin because conveyance and treatment capacity for wet weather flows may be adversely impacted by flows above this agreed limit. The developer for this project needs to confirm with the City of Oakland Public Works Department that there is available capacity within the subbasin flow allocation and that it has not been allocated to other developments. The projected peak wet weather wastewater flows from this project need to be determined to assess the available capacity within the subbasin and confirmation included in the EIR. Suggested language to include in the EIR is as follows: "The City of Oakland Public Works Department has confirmed that there is available wastewater capacity within Subbasin (*insert subbasin number here*) that is reserved for this project."

In general, the project should address the replacement or rehabilitation of the existing sanitary sewer collection system to prevent an increase in I/I. Please include a provision to control or reduce the amount of I/I in the environmental documentation for this project. The main concern is the increase in total wet weather flows, which could have an adverse impact if the flows are greater than the maximum allowable flows from this subbasin.

WATER CONSERVATION

The proposed project presents an opportunity to incorporate water conservation measures. EBMUD would request that the City include in its conditions of approval a requirement that the project sponsor comply with Assembly Bill 325, "Model Water

Margaret Stanzone, Planner IV
June 18, 2008
Page 3

Efficient Landscape Ordinance," (Division 2, Title 23, California Code of Regulations, Chapter 2.7, Sections 490 through 495) of the Landscape Water Conservation Guidelines. EBMUD staff would appreciate the opportunity to meet with the project sponsor to discuss water conservation programs and best management practices applicable to the integrated projects. A key objective of this discussion will be to explore timely opportunities to expand water conservation via early consideration of EBMUD's conservation programs and best management practices applicable to the project.

If you have any questions concerning this response, please contact David J. Rehnstrom, Senior Civil Engineer, Water Service Planning at (510) 287-1365.

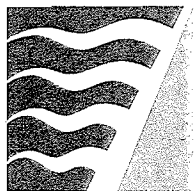
Sincerely,



WRK William R. Kirkpatrick
Manager of Water Distribution Planning

WRK:NJR:sb
sb08_166.doc

cc: The Swig Company, LLC
c/o Tomas Schoenberg
220 Montgomery Street, 20th Floor
San Francisco, CA 94104



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Jack P. Broadbent
EXECUTIVE OFFICER/APCO

June 23, 2008

Margaret Stanzione, Planner IV
City of Oakland, Planning Division
Community and Economic Development Agency
250 Frank H. Ogawa Plaza Suite 3315
Oakland, CA 94612

Subject: Notice of Preparation of a Draft Environmental Impact Report for the
Kaiser Center Project (Case No. ER 08-003/PUD 08-103)

Dear Ms. Stanzione:

Bay Area Air Quality Management District (District) staff has reviewed your agency's Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Kaiser Center Project (Project). The Project is located in downtown Oakland at the northeast corner of Webster and 20th Streets. We understand that the Project would result in the development of two office towers, 34 and 42 stories tall, with 1.47 million square feet of office and retail, and 852 new parking spaces. The Project would also result in a net increase of 4,500 square feet of public open space.

The District has the following specific comments on the environmental analysis that should be included in the EIR.

1. The EIR should provide background information regarding the District's attainment status for all criteria pollutants and the implications for the region if these standards are not attained by statutory deadlines. Information should also be included on the implementation status of the U.S. Environmental Protection Agency's (EPA) recently adopted, more protective PM_{2.5} and ozone standards. A discussion of the health effects of air pollution, especially on sensitive receptors, should be provided.
2. The *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans (1999)* provide guidance on how to evaluate a project's construction, operational and cumulative air quality impacts. You may download a copy from the District's web site at: <http://www.baaqmd.gov/pln/ceqa/index.htm>. The EIR should provide a detailed analysis of the Project's potential effects on local and regional air quality from construction, operations and cumulative impacts for the Project and each of the alternatives analyzed. The EIR should estimate daily and annual volatile organic compounds (VOCs), nitrogen oxides (NO_x), and particulate matter (PM_{2.5} and PM₁₀) emissions from stationary, area and mobile sources resulting from long-term project operation. These estimates should be compared to the significance thresholds in the *BAAQMD CEQA Guidelines*. We recommend utilizing URBEMIS 2007, version 9.2.4, for estimating emissions.

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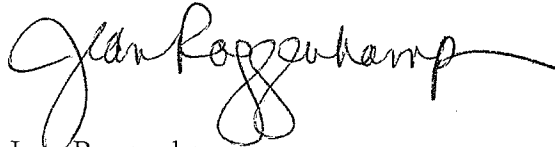
3. The EIR should estimate and evaluate the potential health risk to current and future sensitive populations within the Project area from toxic air contaminants (TACs) as a result of Project construction and operation. We recommend you refer to California Air Resources Board's (ARB) *Air Quality and Land Use Handbook: A Community Health Perspective*, (<http://www.arb.ca.gov/ch/landuse.htm>) for guidelines on siting sensitive land uses. We recommend that the EIR evaluate any risks with siting land uses near major transportation corridors and other emission sources.
4. Construction equipment generates fugitive dust emissions, exhaust emissions of criteria pollutants, and TACs, specifically diesel particulate matter (DPM), a known carcinogen. The EIR should require that all construction activities associated with the Project comply with the dust mitigation measures in the District's CEQA guidelines. The EIR should also include all feasible mitigation measures to reduce construction equipment exhaust emissions to reduce significant exposure to TAC for the existing community. Such measures could include but are not limited to: maintaining properly tuned engines; minimizing the idling time of diesel powered construction equipment to two minutes; using alternative powered construction equipment (i.e., CNG, biodiesel, electric); using add-on control devices such as diesel oxidation catalysts or particulate filters; using equipment that meets ARB's most recent certification standard for off-road heavy duty diesel engines; phasing project construction; and limiting the operating hours of heavy duty equipment.
5. The EIR should evaluate the Project's potential to increase the demand for energy. Increased demand for electricity, natural gas, and gasoline may result in an increase of criteria air pollutant emissions from combustion, as well as an increase in greenhouse gas emissions. We recommend that the EIR discuss energy demand of the Project at build-out, including any cumulative impacts, such as the need to build peaker power plants to provide power during peak demand. When identifying strategies to minimize the Project's impact on energy and air quality, the EIR should include feasible mitigation measures that require a minimum level of green building measures for new development. This minimum level could be based on the Leadership in Energy and Environmental Design (LEED) standards or by setting a target percentage reduction below California Building Code's Title 24 energy standards. Green building measures could include but are not limited to using: super-efficient heating, ventilation, and air conditioning (HVAC) systems; light-colored and reflective roofing materials, pavement treatments and other energy efficient building materials; shade trees adjacent to buildings and in parking areas; photovoltaic panels on buildings; and natural and energy-efficient lighting.
6. Parking is a prominent feature of the Project design, with net new parking for approximately 852 vehicles proposed in addition to existing parking lots and garages. We recommend that the EIR carefully evaluate the Project's design with respect to onsite parking. The Project's location in a particularly transit-rich location represents a significant opportunity to incentivize transit use and reduce vehicle miles traveled and traffic congestion. Pricing strategies for both on-street and off-street parking, based on the market-demand, can encourage the use of carpooling, walking, bicycling and transit. Such strategies may include unbundling the cost of parking (i.e. charge for off-street parking separately from rents). The

Metropolitan Transportation Commission (MTC) has developed the *Toolbox/Handbook: Parking Best Practices & Strategies For Supporting Transit Oriented Development In the San Francisco Bay Area* to assist local jurisdictions in designing parking policies that support smart growth principles. We recommend that the City of Oakland commit to utilizing and incorporating parking policies contained in the Toolbox into the Project design and operation: http://www.mtc.ca.gov/planning/smart_growth/parking_seminar/Toolbox-Handbook.pdf.

7. We recommend that the EIR analyze greenhouse gas (GHG) emissions associated with implementation of the Project. The California Air Pollution Control Officers Association (CAPCOA) recently released a resource document addressing GHG emissions from projects subject to CEQA. The resource document, *CEQA and Climate Change*, contains an overview of available tools and models for evaluating GHG emissions and strategies for mitigating potentially significant GHG emissions from projects. The report may be downloaded at <http://www.capcoa.org>. The Project should seek to minimize its contribution to climate change by implementing all feasible mitigation measures to reduce GHG emissions, especially those measures targeting the Project's vehicle miles traveled, as transportation represents approximately 50 percent of the Bay Area's GHG emissions.

If you have any questions regarding these comments, please contact Nadine Wilmot, Environmental Planner, at (415) 749-5074.

Sincerely,



Jean Roggenkamp
Deputy Air Pollution Control Officer

cc: BAAQMD Director Tom Bates
BAAQMD Director Scott Haggerty
BAAQMD Director Janet Lockhart
BAAQMD Director Nate Miley



SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

300 Lakeside Drive, P.O. Box 12688
Oakland, CA 94612-3534
(510) 464-6000

June 23, 2008

Revised

Gail Murray
PRESIDENT

Thomas M. Blalock
VICE-PRESIDENT

Dorothy W. Dugger
GENERAL MANAGER

Margaret Stanzione
Planner IV
Community and Economic Development Agency
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

Re: Comments on the Notice of Preparation for a Draft Environmental Impact Report for the Kaiser Center Project

DIRECTORS

Gail Murray
1ST DISTRICT

Joel Keller
2ND DISTRICT

Bob Franklin
3RD DISTRICT

Carole Ward Allen
4TH DISTRICT

Zoyd Luce
5TH DISTRICT

Thomas M. Blalock
6TH DISTRICT

Lynette Sweet
7TH DISTRICT

James Fang
8TH DISTRICT

Tom Radulovich
9TH DISTRICT

Dear Ms. Stanzione,

Thank you for the opportunity to comment on the Notice of Preparation (NOP) for the Draft Environmental Report (DEIR) for the Kaiser Center Project, case number ER 08-003, PUD 08-103. We have reviewed the NOP and BART respectfully submits the following comments:

Comment 1:

This project would provide 1.47 million square feet of office space and 22,500 square feet of retail space two blocks from the 19th Street BART Station. BART is very supportive of new urban infill development projects in downtown Oakland near BART stations. The Transit Oriented Development Policy adopted by the BART Board of Directors on July 14, 2005 identifies "promoting high quality, more intensive development on and near BART-owned property...(to) increase ridership" as a vision for BART. Additionally, one of the goals identified in the policy framework for sustainability under BART's Strategic Plan is to "Promote sustainable transit-oriented development in the communities BART services to maximize the use of BART as the primary mode of transportation." This project will assist in achieving the vision and goal identified above.

Comment 2:

The DEIR should identify and analyze the impact that this project will have on the capacity of the 19th Street Oakland BART Station, including the following impacts:

- Additional transit trips generated by the project, including peak hour trips;
- Faregate queues during the weekday peak travel hour at the 20th Street exit and whether the project will create queues at a faregate requiring a passenger to wait more than 60 seconds to process their ticket;
- Passenger flow during weekday AM & PM peak hour through station access portals. This is especially critical for the 19th Street Station portal located at the northeast corner of 20th Street. This analysis should also indicate the impact that a portal expansion, if necessary would have on the sidewalk footprint.



- Vertical Circulation within the BART Station
- Station Platform Capacity

Comment 3:

The DEIR should identify ways to minimize the proposed 52% increase in parking provided for the Kaiser Center Project. Given the City's Transit First policy and the location of this project in a transit-rich environment, we would encourage City staff to consider requiring the developer to prepare a Transportation Demand Management (TDM) plan for the project. A TDM plan should consider a range of options to reduce vehicle trips, including discounted transit pass programs and the provision of dedicated carpool and carsharing spaces to reduce parking ratios for the project. As parking availability and pricing is an important determinant of transit mode share, the TDM plan should also identify parking pricing strategies to encourage shifting trips to non-automobile modes of travel.

Comment 4:

Increased bicycle use in Oakland has resulted in rapid growth in bicycle parking usage in downtown Oakland, including racks at the 19th Street BART Station. The project should meet the requirements for bicycle parking facilities, shower and locker facilities identified in the Oakland Bicycle Parking Ordinance proposed for adoption by the City Council in July 2008. The City should explore establishing a high-capacity bicycle parking facility or bikestation in the vicinity of the proposed project that could accommodate the long-term bicycle parking needs of this project and other proposed projects in the area.

Comment 5

The DEIR should also identify improvements to address pedestrian capacity issues along 20th Street and Broadway with the proposed project. These streets serve as primary pathways for BART patrons wishing to enter the 19th Street BART station. Pedestrian traffic along 20th Street during the weekday peak hour and in the mid-day (12 p.m. to 1 p.m.) period currently exceeds the available sidewalk width. Future growth and the proposed project will exacerbate this condition. It would be beneficial for the City, BART and the project applicant to work together to provide additional pedestrian capacity between Broadway and the Kaiser Center Project as part of the proposed project.

Comment 6

The increasing amount of infill development in downtown Oakland will result in more pedestrian traffic on city streets surrounding the proposed project. Many of these streets have roadway rights-of-way with significantly more capacity for automobile travel than needed. As part of the site design process, BART encourages the City to work with the project applicant to ensure that the full street right-of-way is allocated efficiently and adequately sized sidewalks are provided to accommodate future demand from this development and other projects in the surrounding area.

Comment 7

BART would like to work with the City and the project applicant to ensure that consideration is given to adding pedestrian and/or transit wayfinding elements to the project as part of any developer-funded enhancements. Such elements should incorporate BART's wayfinding standards for guidance to BART stations.

Comment 8

The proposed project site is located in an area well served by public transit and is located in close proximity to significant numbers of new residential units and other urban services. These factors should result in a lower level of Greenhouse Gas emissions per person than development in other parts of Alameda County or the Bay Area. The Air Quality/Climate Change impact should quantify these benefits of constructing more intense development in downtown Oakland.

Comment 9

The DEIR should address pedestrian access along 20th and Webster Streets during the construction period. As noted in Comment #4, the existing pedestrian demand both during the weekday peak hour and mid-day period currently exceeds the available sidewalk width along 20th Street. The City, BART and the project applicant should work together to ensure that an accessible pedestrian path is provided along these streets during the project's construction phase.

We look forward to working with the City of Oakland on this important project. If you have any questions, please contact F. Kenya Wheeler, Senior Planner at (510) 287-4782 or by e-mail at fwhee@bart.gov.

Thank you again for the opportunity to provide input on this project

Sincerely,

A handwritten signature in black ink, appearing to read "Val Menotti", written in a cursive style.

Val Joseph Menotti
Deputy Planning Manager, Stations



1600 Franklin Street, Oakland, CA 94612 - Ph. 510/891-4716 - Fax. 510/891-7157

Nancy Skowbo

Deputy General Manager - Service Development

June 26, 2008

Marge Stanzione

Planner IV

City of Oakland

Community and Economic Development Agency

Planning Division

250 Frank Ogawa Plaza, Suite 3315

Oakland, Ca. 94612

Subject: Notice of Preparation of an Environmental Impact Report - Kaiser Center Project

Dear Ms. Stanzione:

Thank you for the opportunity to comment on the Notice of Preparation of the Draft Environmental Impact Report for the Kaiser Center Project. The Project is proposed for the Kaiser Center block between 20th and 21st Streets, Harrison and Webster Streets. It would essentially double the floor area at the site, from 1.7 million square feet to over 3.2 million square feet. This would be achieved by building two office towers on the Webster Street side of the block. The taller of the two towers would be 42 stories tall. There would be 22,500 square feet of retail space in the new buildings. A net of 700 parking spaces would be added to the existing 1,340 parking spaces in the garage. However, the parking ratio - the number of parking spaces per 1,000 square feet of office and retail space - would decline.

AC Transit is generally supportive of adding employment opportunities in Downtown Oakland locations such as this. Downtown Oakland has the most extensive transit service - bus and BART - of any area in the East Bay. In addition, with residential growth in and around Downtown Oakland, increasing numbers of people have the opportunity to walk or bike to jobs in Downtown Oakland.

Potential for Impact on Transit Operations: It is the District's understanding that the circulation patterns on streets around the edge of the site would not be changed by the project. Therefore, the location of bus stops would not have to be moved. However, if any changes to circulation on bus routes are contemplated, these should be discussed as soon as possible with AC Transit.

Precisely because Downtown Oakland is such a major transit center, the project must be careful not to impact transit operations. Minimizing the traffic generated by the project, and managing that traffic appropriately, will be crucial. AC Transit operates 12 bus routes (exclusive of "allnighter" routes) within two blocks of the Kaiser Center site. The District has recently built the "Uptown Transit Center" on 20th Street between Broadway and Telegraph, which is served by 8 routes.

AC Transit is particularly concerned about impacts on existing and planned Rapid bus and Bus Rapid Transit routes. The District operates the 72R in this area on Broadway, 20th St., and San Pablo, and operates the 1R on Broadway, 20th St. and Telegraph. The 1R is proposed for conversion to fully Bus Rapid Transit (BRT) operation. AC Transit operates the NL to San Francisco on Grand, Harrison, 20th, and San Pablo - this route is proposed for upgrade to Rapid status.

The District also notes that the Measure DD Lake Merritt program proposes changes to the roadway at 20th & Harrison, which could affect the roads' capacity to absorb new traffic. The interaction of increased traffic volumes with the changed roadway must be analyzed.

Key Intersections: It is therefore critical that impacts be analyzed and any necessary mitigations identified for those streets, and the intersections in this area. The following intersections are particularly important:

- Grand & Harrison
- 20th & Harrison
- Grand & Broadway
- 20th & Broadway
- 20th & Telegraph

AC Transit is primarily concerned about changes in traffic volumes or patterns which could either cause delay for buses (and bus passengers) and/or disrupt the reliability of bus operations. As this analysis is done, it is important that the differential impacts of traffic congestion on bus operations be analyzed. Because most buses must repeatedly enter and exit travel lanes, traffic congestion can have a greater delaying impact on buses than on cars.

Cumulative Impacts on Bus Routes: The potential for cumulative impacts to bus routes must be considered and analyzed. For example, changes to MacArthur Boulevard would likely cause bus delays in that corridor, and potentially result in cumulative delays on bus routes in Downtown Oakland.

Transportation Demand Management (TDM), Ecopasses and Parking: AC Transit strongly urges that measures to mitigate traffic and parking impacts be seriously considered in the EIR. Kaiser Center, with its access to buses and BART, is ideally situated for a strong Transportation Demand Management (TDM) program. Purchase of AC Transit Ecopasses for Kaiser Center tenants should be seriously considered.

Marge Stanzione
June 26, 2008
Page 3 of 3

Under the Ecopass program, the Center would buy passes at a deeply discounted rate for all employees in the Center. Any employee could use the pass for unlimited free East Bay and Transbay bus rides. The District would be happy to provide further details on this program.

Kaiser Center should provide safe and accessible bicycle parking. The project should also include a carshare "pod". This would allow employees to commute on transit and use a car at midday, rather than forcing them to drive to work in order to have midday car access.

The addition of 850 parking spaces will inevitably attract additional traffic. However, with a strong TDM program, Kaiser Center can reduce the number of additional parking spaces (therefore also reducing project cost). In effect, parking spaces could be traded off for transit access.

Thank you for your interest. If you have any questions about this letter, please contact Nathan Landau in the Long Range Planning unit at 891-4792.

Yours Truly,



Nandy Skowbo
Deputy General Manager for Service Development

Cc: Tina Spencer
Jim Cunradi
Nathan Landau
Nichele Ayers

APPENDIX B

Wind Study Test Data

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Hazard Analysis

**Existing
Wind Test Date: 27 April 2009**

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded one hour per year (0.01141552512% of the time) for each measurement location. This assumes that a wind hazard occurs if a one-minute average speed of 36 mph is reached or exceeded a total of one hour per year.

The third line of output for each location shows the criterion speed and the percentage of the time that criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

0.011414% Exc.	---	Criterion---						
Loca- Ground	Speed	% Time		NNW	W	SSE	OTHER	SUM
tion	Speed	Exc.	Exc.					
			Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
1	35.3		RATIOS	0.8124	0.7654	1.0874	0.8884	
			CONTRIB	0.32%	1.10%	98.38%	0.21%	5
		36.0	0.0069457	CONTRIB	0.41%	1.44%	97.94%	0.21%
								3
2	31.9		RATIOS	0.7932	0.4623	0.9781	0.7445	
			CONTRIB	1.27%	0.00%	98.71%	0.02%	5
		36.0	0.0002900	CONTRIB	6.63%	0.00%	93.35%	0.02%
								0
3	36.0		RATIOS	0.5691	0.5110	1.1034	0.7278	
			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0106097	CONTRIB	0.00%	0.00%	100.00%	0.00%
								5
4	33.8		RATIOS	0.6323	0.5596	1.0371	0.7430	
			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0016108	CONTRIB	0.00%	0.00%	100.00%	0.00%
								1
5	36.2		RATIOS	1.1845	0.5556	0.7987	0.8463	
			CONTRIB	99.97%	0.00%	0.00%	0.03%	5
		36.0	0.0111580	CONTRIB	99.97%	0.00%	0.00%	0.03%
								5
6	26.7		RATIOS	0.7176	0.4284	0.8202	0.6554	
			CONTRIB	4.12%	0.00%	95.78%	0.10%	5
		36.0	0.0000051	CONTRIB	74.77%	0.00%	25.23%	0.00%
								0
7	22.8		RATIOS	0.7448	0.4842	0.3955	0.5415	
			CONTRIB	94.10%	0.89%	0.00%	5.01%	5
		36.0	0.0000069	CONTRIB	100.00%	0.00%	0.00%	0.00%
								0
8	25.4		RATIOS	0.7599	0.7117	0.3873	0.6196	
			CONTRIB	25.64%	66.55%	0.00%	7.81%	5
		36.0	0.0000421	CONTRIB	22.76%	77.24%	0.00%	0.00%
								0
9	39.2		RATIOS	0.8638	1.1220	0.7509	0.9123	
			CONTRIB	0.19%	95.91%	0.00%	3.91%	5
		36.0	0.0372354	CONTRIB	0.21%	99.71%	0.00%	0.09%
								16
10	29.8		RATIOS	0.8208	0.7405	0.9008	0.8207	
			CONTRIB	7.19%	11.12%	71.09%	10.60%	4
		36.0	0.0001169	CONTRIB	28.68%	51.32%	18.90%	1.11%
								0
11	44.4		RATIOS	0.8136	1.2745	0.6272	0.9051	
			CONTRIB	0.00%	99.50%	0.00%	0.50%	5
		36.0	0.1529660	CONTRIB	0.02%	95.80%	0.00%	4.18%
								67
12	37.8		RATIOS	0.4821	1.0843	0.7306	0.7657	
			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0218831	CONTRIB	0.00%	100.00%	0.00%	0.00%
								10
13	34.5		RATIOS	0.2588	0.9910	0.7113	0.6537	
			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0054420	CONTRIB	0.00%	100.00%	0.00%	0.00%
								2
14	27.5		RATIOS	0.7151	0.7884	0.5558	0.6865	
			CONTRIB	2.70%	97.11%	0.00%	0.19%	5
		36.0	0.0001619	CONTRIB	2.21%	97.79%	0.00%	0.00%
								0

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Hazard Analysis

**Existing
Wind Test Date: 27 April 2009**

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0.011414% Exc.	---	Criterion---						
Loca- tion	Ground Speed	Speed Exc.	% Time Exc.	NNW	W	SSE	OTHER	SUM
Profile Ratios:				1.9040	1.9040	1.9040	1.9040	
15	36.7			RATIOS 1.1858	0.6974	1.0165	0.9666	
				CONTRIB 90.44%	0.00%	4.81%	4.75%	5
		36.0	0.0128545	CONTRIB 87.69%	0.18%	6.81%	5.31%	6
16	37.9			RATIOS 1.1308	0.6173	1.1540	0.9674	
				CONTRIB 22.89%	0.00%	76.75%	0.36%	5
		36.0	0.0483687	CONTRIB 12.58%	0.00%	85.99%	1.43%	21
17	28.2			RATIOS 0.2900	0.5682	0.8684	0.5755	
				CONTRIB 0.00%	0.35%	99.65%	0.00%	5
		36.0	0.0000072	CONTRIB 0.00%	0.00%	100.00%	0.00%	0
18	37.1			RATIOS 0.5442	1.0649	0.4501	0.6864	
				CONTRIB 0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0165465	CONTRIB 0.00%	100.00%	0.00%	0.00%	7
19	30.7			RATIOS 0.3553	0.8861	0.5194	0.5869	
				CONTRIB 0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0009642	CONTRIB 0.00%	100.00%	0.00%	0.00%	0
20	37.2			RATIOS 0.6365	1.0666	0.6656	0.7896	
				CONTRIB 0.00%	99.05%	0.00%	0.95%	5
		36.0	0.0171257	CONTRIB 0.00%	99.05%	0.00%	0.95%	7
21	39.2			RATIOS 1.2511	0.9202	1.1148	1.0954	
				CONTRIB 73.02%	4.29%	10.06%	12.63%	5
		36.0	0.0408253	CONTRIB 45.59%	4.23%	35.56%	14.62%	18
22	37.8			RATIOS 0.8330	0.8465	1.1559	0.9451	
				CONTRIB 0.19%	2.16%	97.44%	0.21%	5
		36.0	0.0447084	CONTRIB 0.10%	1.06%	97.81%	1.04%	20
23	42.0			RATIOS 0.6875	1.2081	1.0282	0.9746	
				CONTRIB 0.00%	99.88%	0.10%	0.02%	5
		36.0	0.0918169	CONTRIB 0.00%	97.79%	1.35%	0.86%	40
24	27.9			RATIOS 0.9019	0.5594	0.7991	0.7535	
				CONTRIB 81.12%	0.35%	11.97%	6.56%	5
		36.0	0.0001554	CONTRIB 99.57%	0.00%	0.37%	0.06%	0
25	33.4			RATIOS 1.0026	0.9394	0.7182	0.8868	
				CONTRIB 26.33%	68.59%	0.00%	5.07%	5
		36.0	0.0032572	CONTRIB 26.51%	73.07%	0.00%	0.42%	1
26	23.3			RATIOS 0.4695	0.6428	0.7028	0.6050	
				CONTRIB 0.04%	46.23%	53.18%	0.56%	5
		36.0	0.0000000	CONTRIB 0.00%	0.00%	100.00%	0.00%	0
27	31.4			RATIOS 0.7249	0.9042	0.6544	0.7612	
				CONTRIB 0.37%	99.55%	0.00%	0.08%	5
		36.0	0.0014142	CONTRIB 0.31%	93.19%	0.00%	6.49%	1
28	47.9			RATIOS 0.6555	1.3756	0.5091	0.8468	
				CONTRIB 0.00%	100.00%	0.00%	0.00%	5
		36.0	0.2980480	CONTRIB 0.00%	98.83%	0.00%	1.17%	131

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Hazard Analysis

**Project
Wind Test Date: 27 April 2009**

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0.011414% Exc.	---	Criterion---						
Loca- Ground	Speed	% Time		NNW	W	SSE	OTHER	SUM
tion	Speed	Exc.	Exc.					
			Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
1	36.3		RATIOS	0.7862	0.7844	1.1144	0.8950	
			CONTRIB	0.13%	1.13%	98.61%	0.12%	5
		36.0	0.0145485	CONTRIB	0.11%	1.01%	98.75%	0.12%
								6
2	34.2		RATIOS	0.7589	0.5716	1.0495	0.7933	
			CONTRIB	0.20%	0.00%	99.78%	0.02%	5
		36.0	0.0023210	CONTRIB	0.40%	0.00%	99.58%	0.02%
								1
3	36.2		RATIOS	0.6218	0.6196	1.1089	0.7834	
			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0123513	CONTRIB	0.00%	0.00%	100.00%	0.00%
								5
4	33.4		RATIOS	0.7018	0.5931	1.0261	0.7737	
			CONTRIB	0.08%	0.00%	99.90%	0.02%	5
		36.0	0.0011656	CONTRIB	0.23%	0.00%	99.76%	0.02%
								1
5	35.4		RATIOS	1.1555	0.5367	0.6171	0.7698	
			CONTRIB	97.81%	0.00%	0.00%	2.19%	5
		36.0	0.0086603	CONTRIB	99.86%	0.00%	0.00%	0.14%
								4
6	43.4		RATIOS	0.7117	0.5451	1.3298	0.8622	
			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.1723540	CONTRIB	0.00%	0.00%	98.17%	1.82%
								75
7	25.8		RATIOS	0.8362	0.6614	0.5914	0.6964	
			CONTRIB	79.25%	14.68%	0.01%	6.05%	5
		36.0	0.0000477	CONTRIB	95.13%	0.00%	0.00%	4.87%
								0
8	22.5		RATIOS	0.7357	0.4844	0.5466	0.5889	
			CONTRIB	94.78%	1.11%	0.08%	4.02%	5
		36.0	0.0000057	CONTRIB	100.00%	0.00%	0.00%	0.00%
								0
9	42.1		RATIOS	1.0287	1.2087	0.8431	1.0268	
			CONTRIB	0.98%	98.93%	0.00%	0.09%	5
		36.0	0.0934429	CONTRIB	1.40%	96.51%	0.00%	2.08%
								41
10	35.8		RATIOS	1.1571	0.8178	0.6070	0.8606	
			CONTRIB	90.64%	2.92%	0.00%	6.44%	5
		36.0	0.0097278	CONTRIB	90.83%	2.86%	0.00%	6.31%
								4
11	43.8		RATIOS	1.3153	1.2189	0.7894	1.1079	
			CONTRIB	27.03%	59.41%	0.00%	13.56%	5
		36.0	0.1344230	CONTRIB	22.10%	72.49%	0.00%	5.41%
								59
12	34.5		RATIOS	0.7199	0.9905	0.5946	0.7683	
			CONTRIB	0.07%	98.00%	0.00%	1.93%	5
		36.0	0.0055039	CONTRIB	0.07%	98.00%	0.00%	1.93%
								2
13	31.9		RATIOS	0.4968	0.8855	0.9535	0.7786	
			CONTRIB	0.00%	55.27%	44.64%	0.09%	5
		36.0	0.0010797	CONTRIB	0.00%	88.42%	11.56%	0.02%
								0
14	25.2		RATIOS	0.6894	0.7106	0.6986	0.6995	
			CONTRIB	6.30%	76.94%	4.88%	11.87%	4
		36.0	0.0000317	CONTRIB	0.00%	99.94%	0.03%	0.03%
								0

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Hazard Analysis

**Project
Wind Test Date: 27 April 2009**

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Loca- tion	Ground Speed	0.011414% Exc.	---Criterion--- Speed Exc.	% Time Exc.	NNW	W	SSE	OTHER	SUM
Profile Ratios:					1.9040	1.9040	1.9040	1.9040	
15	34.3				RATIOS 1.1047	0.6753	0.9726	0.9175	
					CONTRIB 84.54%	0.28%	9.24%	5.94%	5
		36.0	0.0044321		CONTRIB 93.99%	0.00%	5.14%	0.87%	2
16	32.1				RATIOS 0.8846	0.6317	0.9836	0.8333	
					CONTRIB 6.44%	0.27%	92.69%	0.60%	5
		36.0	0.0004363		CONTRIB 25.89%	0.00%	73.64%	0.47%	0
17	28.5				RATIOS 0.2875	0.5855	0.8781	0.5837	
					CONTRIB 0.00%	0.47%	99.53%	0.00%	5
		36.0	0.0000102		CONTRIB 0.00%	0.00%	100.00%	0.00%	0
18	20.0				RATIOS 0.4589	0.4891	0.6144	0.5208	
					CONTRIB 0.30%	6.99%	89.50%	3.21%	5
		36.0	0.0000000		CONTRIB 0.00%	0.00%	0.00%	0.00%	0
19	25.7				RATIOS 0.3010	0.7414	0.4215	0.4880	
					CONTRIB 0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0000612		CONTRIB 0.00%	100.00%	0.00%	0.00%	0
20	27.2				RATIOS 0.6531	0.7709	0.7795	0.7345	
					CONTRIB 0.72%	79.76%	12.50%	7.02%	5
		36.0	0.0001122		CONTRIB 0.00%	99.72%	0.24%	0.04%	0
21	35.6				RATIOS 1.1432	0.8895	0.6215	0.8847	
					CONTRIB 78.84%	11.03%	0.00%	10.14%	5
		36.0	0.0092256		CONTRIB 78.71%	11.09%	0.00%	10.20%	4
22	28.2				RATIOS 0.8117	0.8054	0.7005	0.7725	
					CONTRIB 12.19%	79.67%	0.14%	7.99%	5
		36.0	0.0002482		CONTRIB 11.26%	88.66%	0.00%	0.08%	0
23	41.8				RATIOS 0.7844	1.2045	0.8400	0.9430	
					CONTRIB 0.00%	99.99%	0.00%	0.01%	5
		36.0	0.0878265		CONTRIB 0.02%	99.47%	0.00%	0.51%	38
24	25.9				RATIOS 0.8378	0.6277	0.6950	0.7202	
					CONTRIB 81.16%	6.50%	1.60%	10.73%	5
		36.0	0.0000507		CONTRIB 92.10%	0.00%	0.00%	7.90%	0
25	42.2				RATIOS 1.0030	1.2146	0.9250	1.0475	
					CONTRIB 0.60%	99.24%	0.00%	0.16%	5
		36.0	0.0979598		CONTRIB 0.89%	96.25%	0.05%	2.81%	43
26	38.7				RATIOS 0.5419	1.1116	0.7675	0.8070	
					CONTRIB 0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0321155		CONTRIB 0.00%	100.00%	0.00%	0.00%	14
27	43.9				RATIOS 0.6892	1.0249	1.3461	1.0201	
					CONTRIB 0.00%	3.84%	96.14%	0.02%	5
		36.0	0.2002600		CONTRIB 0.00%	4.57%	94.56%	0.87%	88
28	52.0				RATIOS 1.5207	1.4752	0.4492	1.1484	
					CONTRIB 17.73%	80.60%	0.00%	1.67%	5
		36.0	0.6850750		CONTRIB 16.54%	81.49%	0.00%	1.98%	300

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Hazard Analysis

**Cumulative
Wind Test Date: 27 April 2009**

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0.011414% Exc.	---	Criterion---						
Loca- Ground	Speed	% Time		NNW	W	SSE	OTHER	SUM
tion	Speed	Exc.	Exc.					
			Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
1	35.4		RATIOS	0.8143	0.7850	1.0874	0.8956	
			CONTRIB	0.33%	1.64%	97.76%	0.27%	5
		36.0	0.0069987	CONTRIB	0.42%	2.12%	97.20%	0.26%
								3
2	35.7		RATIOS	0.7645	0.5247	1.0940	0.7944	
			CONTRIB	0.11%	0.00%	99.88%	0.01%	5
		36.0	0.0082045	CONTRIB	0.13%	0.00%	99.87%	0.01%
								4
3	36.4		RATIOS	0.6361	0.5988	1.1144	0.7831	
			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0143677	CONTRIB	0.00%	0.00%	100.00%	0.00%
								6
4	34.6		RATIOS	0.7146	0.5758	1.0624	0.7843	
			CONTRIB	0.06%	0.00%	99.93%	0.01%	5
		36.0	0.0033605	CONTRIB	0.10%	0.00%	99.89%	0.01%
								1
5	35.9		RATIOS	1.1725	0.5266	0.7062	0.8018	
			CONTRIB	99.99%	0.00%	0.00%	0.01%	5
		36.0	0.0101423	CONTRIB	99.99%	0.00%	0.00%	0.01%
								4
6	43.3		RATIOS	0.7458	0.5051	1.3322	0.8611	
			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.1752360	CONTRIB	0.00%	0.00%	98.22%	1.77%
								77
7	27.3		RATIOS	0.8579	0.6432	0.8067	0.7693	
			CONTRIB	52.48%	4.19%	29.83%	13.50%	5
		36.0	0.0000697	CONTRIB	98.64%	0.00%	1.10%	0.26%
								0
8	22.6		RATIOS	0.7313	0.3877	0.6605	0.5932	
			CONTRIB	76.49%	0.00%	19.83%	3.68%	5
		36.0	0.0000051	CONTRIB	100.00%	0.00%	0.00%	0.00%
								0
9	41.4		RATIOS	1.0508	1.1875	0.6605	0.9663	
			CONTRIB	1.76%	94.36%	0.00%	3.89%	5
		36.0	0.0792712	CONTRIB	2.33%	96.81%	0.00%	0.86%
								35
10	38.6		RATIOS	1.2566	0.7759	0.6066	0.8797	
			CONTRIB	96.80%	0.40%	0.00%	2.80%	5
		36.0	0.0203786	CONTRIB	95.17%	0.61%	0.00%	4.23%
								9
11	41.9		RATIOS	1.3037	1.1367	0.5815	1.0073	
			CONTRIB	51.03%	42.43%	0.00%	6.54%	5
		36.0	0.0741237	CONTRIB	36.89%	61.23%	0.00%	1.88%
								32
12	34.3		RATIOS	0.7496	0.9872	0.5137	0.7502	
			CONTRIB	0.15%	98.44%	0.00%	1.41%	5
		36.0	0.0052086	CONTRIB	0.15%	98.44%	0.00%	1.41%
								2
13	31.3		RATIOS	0.5061	0.9015	0.5575	0.6550	
			CONTRIB	0.00%	99.29%	0.00%	0.71%	5
		36.0	0.0012591	CONTRIB	0.00%	100.00%	0.00%	0.00%
								1
14	24.2		RATIOS	0.6496	0.6951	0.5988	0.6479	
			CONTRIB	4.08%	90.20%	0.14%	5.58%	5
		36.0	0.0000000	CONTRIB	0.00%	0.00%	0.00%	0.00%
								0

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Hazard Analysis

**Cumulative
Wind Test Date: 27 April 2009**

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded one hour per year (0.01141552512% of the time) for each measurement location. This assumes that a wind hazard occurs if a one-minute average speed of 36 mph is reached or exceeded a total of one hour per year.

The third line of output for each location shows the criterion speed and the percentage of the time the criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

Loca- tion	Ground Speed	0.011414% Exc.	---Criterion--- Speed Exc.	% Time Exc.	NNW	W	SSE	OTHER	SUM
Profile Ratios:					1.9040	1.9040	1.9040	1.9040	
15	32.4				RATIOS 1.0523	0.7393	0.7938	0.8618	
					CONTRIB 91.73%	2.77%	0.11%	5.39%	5
		36.0	0.0019584		CONTRIB 96.69%	2.99%	0.02%	0.29%	1
16	30.0				RATIOS 0.8810	0.6462	0.9149	0.8140	
					CONTRIB 16.71%	1.00%	75.56%	6.72%	5
		36.0	0.0001421		CONTRIB 74.36%	0.00%	24.92%	0.71%	0
17	21.1				RATIOS 0.2911	0.5849	0.6306	0.5022	
					CONTRIB 0.00%	55.83%	44.13%	0.04%	5
		36.0	0.0000000		CONTRIB 0.00%	0.00%	0.00%	0.00%	0
18	17.1				RATIOS 0.5268	0.4514	0.5038	0.4940	
					CONTRIB 34.66%	22.24%	24.18%	18.92%	5
		36.0	0.0000000		CONTRIB 0.00%	0.00%	0.00%	0.00%	0
19	30.1				RATIOS 0.2999	0.8671	0.3795	0.5155	
					CONTRIB 0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0006890		CONTRIB 0.00%	100.00%	0.00%	0.00%	0
20	23.5				RATIOS 0.6300	0.6681	0.6561	0.6514	
					CONTRIB 4.14%	79.66%	5.62%	10.58%	5
		36.0	0.0000000		CONTRIB 0.00%	0.00%	0.00%	0.00%	0
21	34.9				RATIOS 1.1262	0.8324	0.5878	0.8488	
					CONTRIB 86.88%	5.58%	0.00%	7.54%	5
		36.0	0.0065600		CONTRIB 86.86%	5.59%	0.00%	7.55%	3
22	27.7				RATIOS 0.8042	0.7808	0.7675	0.7842	
					CONTRIB 14.44%	66.91%	4.10%	14.54%	5
		36.0	0.0001608		CONTRIB 14.96%	84.73%	0.10%	0.20%	0
23	42.1				RATIOS 0.8025	1.2096	0.6934	0.9019	
					CONTRIB 0.00%	98.94%	0.00%	1.05%	5
		36.0	0.0970516		CONTRIB 0.02%	93.59%	0.00%	6.38%	42
24	25.4				RATIOS 0.8178	0.6350	0.6428	0.6985	
					CONTRIB 79.86%	10.78%	0.27%	9.08%	5
		36.0	0.0000340		CONTRIB 92.82%	0.00%	0.00%	7.18%	0
25	40.0				RATIOS 0.9901	1.1460	0.9638	1.0333	
					CONTRIB 1.24%	98.12%	0.07%	0.58%	5
		36.0	0.0545477		CONTRIB 1.29%	94.41%	0.32%	3.98%	24
26	36.1				RATIOS 0.5503	1.0346	0.9726	0.8525	
					CONTRIB 0.00%	97.96%	2.01%	0.04%	4
		36.0	0.0108241		CONTRIB 0.00%	97.86%	2.10%	0.04%	5
27	49.7				RATIOS 0.7732	0.6635	1.5211	0.9860	
					CONTRIB 0.00%	0.00%	100.00%	0.00%	5
		36.0	0.5349980		CONTRIB 0.00%	0.00%	99.82%	0.18%	234
28	51.9				RATIOS 1.4946	1.4756	0.5712	1.1805	
					CONTRIB 13.84%	83.51%	0.00%	2.65%	5
		36.0	0.6763130		CONTRIB 14.48%	82.74%	0.00%	2.78%	296

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Comfort Analysis

**Existing
Wind Test Date: 27 April 2009**

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The third line of output for each location shows the criterion speed and the percentage of the time the criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

Loca- tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
<i>Profile Ratios:</i>					<i>1.9040</i>	<i>1.9040</i>	<i>1.9040</i>	<i>1.9040</i>	
1	13.9			RATIOS	0.8124	0.7654	1.0874	0.8884	
				CONTRIB	9.62%	47.13%	32.29%	10.96%	4,380
		11.0	20.21	CONTRIB	11.74%	54.96%	20.28%	13.02%	8,852
2	10.2			RATIOS	0.7932	0.4623	0.9781	0.7445	
				CONTRIB	28.94%	12.93%	39.73%	18.40%	4,380
		11.0	7.91	CONTRIB	27.33%	8.78%	46.63%	17.25%	3,464
3	10.2			RATIOS	0.5691	0.5110	1.1034	0.7278	
				CONTRIB	7.98%	30.20%	44.88%	16.94%	4,380
		11.0	7.59	CONTRIB	7.79%	21.03%	54.76%	16.41%	3,326
4	10.8			RATIOS	0.6323	0.5596	1.0371	0.7430	
				CONTRIB	9.42%	36.64%	39.64%	14.30%	4,380
		11.0	9.55	CONTRIB	9.35%	35.54%	40.94%	14.17%	4,183
5	12.0			RATIOS	1.1845	0.5556	0.7987	0.8463	
				CONTRIB	46.03%	15.12%	22.98%	15.88%	4,380
		11.0	13.66	CONTRIB	39.70%	23.42%	20.21%	16.67%	5,983
6	9.2			RATIOS	0.7176	0.4284	0.8202	0.6554	
				CONTRIB	29.57%	16.52%	37.05%	16.87%	4,380
		11.0	5.55	CONTRIB	26.37%	6.32%	52.54%	14.78%	2,429
7	8.7			RATIOS	0.7448	0.4842	0.3955	0.5415	
				CONTRIB	35.41%	47.61%	7.43%	9.55%	4,380
		11.0	3.21	CONTRIB	52.68%	31.78%	4.11%	11.43%	1,406
8	11.3			RATIOS	0.7599	0.7117	0.3873	0.6196	
				CONTRIB	16.46%	76.80%	0.85%	5.88%	4,380
		11.0	11.08	CONTRIB	16.51%	76.60%	0.98%	5.91%	4,851
9	17.4			RATIOS	0.8638	1.1220	0.7509	0.9123	
				CONTRIB	4.50%	84.55%	5.99%	4.96%	4,380
		11.0	31.06	CONTRIB	9.71%	73.60%	7.84%	8.86%	13,604
10	13.0			RATIOS	0.8208	0.7405	0.9008	0.8207	
				CONTRIB	12.69%	52.21%	24.91%	10.18%	4,380
		11.0	17.71	CONTRIB	13.95%	55.48%	19.19%	11.38%	7,756
11	19.1			RATIOS	0.8136	1.2745	0.6272	0.9051	
				CONTRIB	1.22%	95.18%	0.57%	3.03%	4,380
		11.0	32.68	CONTRIB	7.30%	79.23%	5.17%	8.31%	14,315
12	16.5			RATIOS	0.4821	1.0843	0.7306	0.7657	
				CONTRIB	0.02%	90.47%	6.76%	2.75%	4,380
		11.0	26.09	CONTRIB	0.59%	84.73%	8.83%	5.85%	11,428
13	15.1			RATIOS	0.2588	0.9910	0.7113	0.6537	
				CONTRIB	0.00%	89.07%	9.02%	1.91%	4,380
		11.0	23.24	CONTRIB	0.00%	87.12%	9.39%	3.49%	10,178
14	12.5			RATIOS	0.7151	0.7884	0.5558	0.6865	
				CONTRIB	8.88%	78.17%	6.96%	5.99%	4,380

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Comfort Analysis

**Existing
Wind Test Date: 27 April 2009**

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Loca- tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
		11.0	16.10	CONTRIB	8.96%	76.99%	7.92%	6.13%	7,052
15				RATIOS	1.1858	0.6974	1.0165	0.9666	
	14.2			CONTRIB	34.12%	25.19%	26.77%	13.92%	4,380
		11.0	20.17	CONTRIB	26.94%	39.02%	19.00%	15.03%	8,833
16				RATIOS	1.1308	0.6173	1.1540	0.9674	
	13.5			CONTRIB	34.15%	13.60%	35.34%	16.91%	4,380
		11.0	17.37	CONTRIB	28.69%	28.82%	25.03%	17.47%	7,610
17				RATIOS	0.2900	0.5682	0.8684	0.5755	
	9.8			CONTRIB	0.02%	55.73%	36.63%	7.62%	4,380
		11.0	7.44	CONTRIB	0.00%	49.48%	43.97%	6.55%	3,260
18				RATIOS	0.5442	1.0649	0.4501	0.6864	
	15.8			CONTRIB	0.17%	97.89%	0.01%	1.93%	4,380
		11.0	23.57	CONTRIB	1.81%	92.16%	1.84%	4.18%	10,323
19				RATIOS	0.3553	0.8861	0.5194	0.5869	
	13.3			CONTRIB	0.00%	95.01%	2.86%	2.12%	4,380
		11.0	19.60	CONTRIB	0.05%	92.58%	4.68%	2.69%	8,585
20				RATIOS	0.6365	1.0666	0.6656	0.7896	
	16.2			CONTRIB	0.60%	91.27%	4.60%	3.53%	4,380
		11.0	26.30	CONTRIB	3.48%	82.71%	7.24%	6.56%	11,521
21				RATIOS	1.2511	0.9202	1.1148	1.0954	
	17.0			CONTRIB	23.18%	43.41%	22.32%	11.10%	4,380
		11.0	32.75	CONTRIB	18.28%	57.49%	12.82%	11.40%	14,347
22				RATIOS	0.8330	0.8465	1.1559	0.9451	
	15.0			CONTRIB	7.77%	50.94%	31.09%	10.21%	4,380
		11.0	26.02	CONTRIB	10.06%	61.99%	16.74%	11.22%	11,396
23				RATIOS	0.6875	1.2081	1.0282	0.9746	
	19.0			CONTRIB	0.28%	79.97%	15.23%	4.53%	4,380
		11.0	32.76	CONTRIB	3.78%	75.01%	11.83%	9.38%	14,348
24				RATIOS	0.9019	0.5594	0.7991	0.7535	
	11.2			CONTRIB	31.84%	28.49%	26.49%	13.18%	4,380
		11.0	10.89	CONTRIB	30.37%	31.10%	25.38%	13.15%	4,768
25				RATIOS	1.0026	0.9394	0.7182	0.8868	
	15.3			CONTRIB	14.73%	69.21%	8.80%	7.26%	4,380
		11.0	28.07	CONTRIB	14.27%	68.46%	7.92%	9.35%	12,294
26				RATIOS	0.4695	0.6428	0.7028	0.6050	
	10.5			CONTRIB	1.76%	68.01%	23.18%	7.04%	4,380
		11.0	8.66	CONTRIB	1.43%	67.14%	24.56%	6.87%	3,795
27				RATIOS	0.7249	0.9042	0.6544	0.7612	
	14.2			CONTRIB	5.67%	80.67%	8.24%	5.42%	4,380
		11.0	23.36	CONTRIB	6.51%	79.23%	7.88%	6.38%	10,233
28				RATIOS	0.6555	1.3756	0.5091	0.8468	
	20.4			CONTRIB	0.09%	98.38%	0.00%	1.54%	4,380

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Comfort Analysis

**Project
Wind Test Date: 27 April 2009**

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The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded 10% of the time for each measurement location. This assumes wind comfort criteria of 11 mph for areas of substantial public pedestrian use and 7 mph for public seating areas. These criteria are not to be exceeded more than 10% of the time.

The third line of output for each location shows the criterion speed and the percentage of the time the criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

Loca- tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
<i>Profile Ratios:</i>					<i>1.9040</i>	<i>1.9040</i>	<i>1.9040</i>	<i>1.9040</i>	
1	14.1			RATIOS	0.7862	0.7844	1.1144	0.8950	
				CONTRIB	7.95%	48.64%	32.83%	10.59%	4,380
		11.0	21.12	CONTRIB	9.89%	57.61%	19.89%	12.62%	9,249
2	11.4			RATIOS	0.7589	0.5716	1.0495	0.7933	
				CONTRIB	15.92%	30.49%	38.24%	15.35%	4,380
		11.0	11.30	CONTRIB	16.10%	33.32%	35.01%	15.57%	4,949
3	11.7			RATIOS	0.6218	0.6196	1.1089	0.7834	
				CONTRIB	6.64%	40.76%	39.40%	13.20%	4,380
		11.0	11.76	CONTRIB	7.11%	43.15%	35.52%	14.22%	5,153
4	11.4			RATIOS	0.7018	0.5931	1.0261	0.7737	
				CONTRIB	11.56%	37.52%	37.25%	13.67%	4,380
		11.0	11.12	CONTRIB	12.06%	38.84%	34.79%	14.31%	4,870
5	11.2			RATIOS	1.1555	0.5367	0.6171	0.7698	
				CONTRIB	49.89%	20.13%	15.65%	14.33%	4,380
		11.0	10.78	CONTRIB	48.10%	22.28%	15.16%	14.47%	4,721
6	11.5			RATIOS	0.7117	0.5451	1.3298	0.8622	
				CONTRIB	12.01%	19.24%	48.01%	20.73%	4,380
		11.0	11.61	CONTRIB	12.20%	23.53%	43.13%	21.14%	5,084
7	11.5			RATIOS	0.8362	0.6614	0.5914	0.6964	
				CONTRIB	22.43%	55.08%	13.72%	8.78%	4,380
		11.0	11.67	CONTRIB	22.77%	55.44%	12.84%	8.95%	5,110
8	9.2			RATIOS	0.7357	0.4844	0.5466	0.5889	
				CONTRIB	31.51%	39.33%	18.31%	10.85%	4,380
		11.0	4.35	CONTRIB	37.08%	23.55%	27.07%	12.29%	1,903
9	19.0			RATIOS	1.0287	1.2087	0.8431	1.0268	
				CONTRIB	7.14%	80.40%	6.86%	5.60%	4,380
		11.0	35.22	CONTRIB	11.92%	69.81%	8.75%	9.52%	15,424
10	14.3			RATIOS	1.1571	0.8178	0.6070	0.8606	
				CONTRIB	32.28%	53.72%	5.46%	8.53%	4,380
		11.0	23.40	CONTRIB	22.20%	60.64%	6.75%	10.41%	10,251
11	19.6			RATIOS	1.3153	1.2189	0.7894	1.1079	
				CONTRIB	16.33%	73.28%	3.75%	6.64%	4,380
		11.0	37.85	CONTRIB	17.33%	65.49%	7.12%	10.06%	16,578
12	15.1			RATIOS	0.7199	0.9905	0.5946	0.7683	
				CONTRIB	3.15%	89.44%	3.07%	4.35%	4,380
		11.0	24.78	CONTRIB	5.98%	81.66%	6.11%	6.25%	10,853
13	14.4			RATIOS	0.4968	0.8855	0.9535	0.7786	
				CONTRIB	0.18%	71.15%	23.04%	5.63%	4,380
		11.0	23.56	CONTRIB	0.84%	76.97%	15.26%	6.93%	10,321
14	11.8			RATIOS	0.6894	0.7106	0.6986	0.6995	
				CONTRIB	9.43%	64.47%	18.14%	7.96%	4,380

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Comfort Analysis

**Project
Wind Test Date: 27 April 2009**

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Loca- tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
		11.0	12.85	CONTRIB	9.73%	65.63%	16.36%	8.28%	5,628
15				RATIOS	1.1047	0.6753	0.9726	0.9175	
	13.6			CONTRIB	32.42%	27.48%	26.69%	13.40%	4,380
		11.0	18.21	CONTRIB	26.24%	38.36%	20.14%	15.25%	7,975
16				RATIOS	0.8846	0.6317	0.9836	0.8333	
	12.4			CONTRIB	20.50%	33.56%	32.83%	13.11%	4,380
		11.0	14.50	CONTRIB	22.01%	37.63%	25.58%	14.77%	6,350
17				RATIOS	0.2875	0.5855	0.8781	0.5837	
	10.1			CONTRIB	0.01%	56.62%	36.10%	7.27%	4,380
		11.0	7.95	CONTRIB	0.00%	51.81%	41.70%	6.49%	3,480
18				RATIOS	0.4589	0.4891	0.6144	0.5208	
	8.5			CONTRIB	7.12%	55.93%	27.62%	9.34%	4,380
		11.0	3.13	CONTRIB	3.25%	35.44%	51.69%	9.62%	1,372
19				RATIOS	0.3010	0.7414	0.4215	0.4880	
	11.1			CONTRIB	0.01%	95.72%	2.20%	2.08%	4,380
		11.0	10.33	CONTRIB	0.01%	95.60%	2.30%	2.10%	4,523
20				RATIOS	0.6531	0.7709	0.7795	0.7345	
	12.7			CONTRIB	5.80%	67.24%	19.65%	7.31%	4,380
		11.0	16.34	CONTRIB	6.20%	69.81%	16.08%	7.91%	7,156
21				RATIOS	1.1432	0.8895	0.6215	0.8847	
	15.0			CONTRIB	26.57%	60.88%	4.76%	7.79%	4,380
		11.0	27.57	CONTRIB	18.44%	66.07%	6.01%	9.48%	12,076
22				RATIOS	0.8117	0.8054	0.7005	0.7725	
	13.3			CONTRIB	11.35%	66.79%	14.42%	7.45%	4,380
		11.0	19.47	CONTRIB	12.14%	68.88%	10.86%	8.12%	8,529
23				RATIOS	0.7844	1.2045	0.8400	0.9430	
	18.5			CONTRIB	1.17%	86.86%	7.59%	4.38%	4,380
		11.0	32.54	CONTRIB	6.36%	75.30%	9.40%	8.94%	14,251
24				RATIOS	0.8378	0.6277	0.6950	0.7202	
	11.4			CONTRIB	23.36%	46.86%	19.38%	10.40%	4,380
		11.0	11.28	CONTRIB	23.72%	47.25%	18.44%	10.59%	4,940
25				RATIOS	1.0030	1.2146	0.9250	1.0475	
	19.2			CONTRIB	6.14%	77.99%	10.11%	5.76%	4,380
		11.0	35.67	CONTRIB	11.24%	69.26%	9.78%	9.72%	15,622
26				RATIOS	0.5419	1.1116	0.7675	0.8070	
	16.9			CONTRIB	0.08%	89.32%	7.50%	3.10%	4,380
		11.0	27.49	CONTRIB	1.50%	82.39%	9.26%	6.85%	12,042
27				RATIOS	0.6892	1.0249	1.3461	1.0201	
	17.4			CONTRIB	0.64%	60.17%	31.47%	7.72%	4,380
		11.0	30.56	CONTRIB	4.09%	68.47%	16.58%	10.85%	13,383
28				RATIOS	1.4946	1.4756	0.5712	1.1805	
	23.1			CONTRIB					4,381

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Comfort Analysis

**Cumulative
Wind Test Date: 27 April 2009**

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded 10% of the time for each measurement location. This assumes wind comfort criteria of 11 mph for areas of substantial public pedestrian use and 7 mph for public seating areas. These criteria are not to be exceeded more than 10% of the time.

The third line of output for each location shows the criterion speed and the percentage of the time the criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

Loca- tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
<i>Profile Ratios:</i>					<i>1.9040</i>	<i>1.9040</i>	<i>1.9040</i>	<i>1.9040</i>	
1	14.1			RATIOS	0.8143	0.7850	1.0874	0.8956	
				CONTRIB	9.15%	48.91%	31.30%	10.65%	4,380
		11.0	21.36	CONTRIB	11.21%	57.11%	19.19%	12.49%	9,355
2	10.9			RATIOS	0.7645	0.5247	1.0940	0.7944	
				CONTRIB	19.23%	21.07%	41.52%	18.18%	4,380
		11.0	9.75	CONTRIB	19.19%	20.40%	42.27%	18.13%	4,272
3	11.5			RATIOS	0.6361	0.5988	1.1144	0.7831	
				CONTRIB	7.71%	38.06%	40.21%	14.03%	4,380
		11.0	11.26	CONTRIB	8.12%	39.74%	37.30%	14.84%	4,931
4	11.3			RATIOS	0.7146	0.5758	1.0624	0.7843	
				CONTRIB	12.78%	33.47%	38.86%	14.89%	4,380
		11.0	10.99	CONTRIB	13.09%	35.20%	36.43%	15.28%	4,814
5	11.4			RATIOS	1.1725	0.5266	0.7062	0.8018	
				CONTRIB	49.60%	14.84%	19.86%	15.71%	4,380
		11.0	11.36	CONTRIB	46.87%	18.06%	18.92%	16.16%	4,975
6	11.2			RATIOS	0.7458	0.5051	1.3322	0.8611	
				CONTRIB	15.78%	12.38%	49.22%	22.62%	4,380
		11.0	10.61	CONTRIB	16.02%	13.67%	47.29%	23.01%	4,645
7	11.9			RATIOS	0.8579	0.6432	0.8067	0.7693	
				CONTRIB	21.47%	43.32%	23.93%	11.29%	4,380
		11.0	13.14	CONTRIB	22.34%	44.38%	21.44%	11.84%	5,754
8	8.4			RATIOS	0.7313	0.3877	0.6605	0.5932	
				CONTRIB	36.74%	14.88%	32.34%	16.05%	4,380
		11.0	4.14	CONTRIB	38.02%	3.39%	45.30%	13.28%	1,814
9	18.4			RATIOS	1.0508	1.1875	0.6605	0.9663	
				CONTRIB	8.79%	84.88%	1.33%	5.00%	4,380
		11.0	33.43	CONTRIB	13.05%	72.28%	5.61%	9.06%	14,643
10	14.1			RATIOS	1.2566	0.7759	0.6066	0.8797	
				CONTRIB	38.30%	46.17%	5.77%	9.76%	4,380
		11.0	21.88	CONTRIB	27.59%	53.37%	7.21%	11.83%	9,585
11	18.3			RATIOS	1.3037	1.1367	0.5815	1.0073	
				CONTRIB	20.65%	73.05%	0.32%	5.98%	4,380
		11.0	34.30	CONTRIB	18.82%	67.50%	4.22%	9.47%	15,023
12	15.0			RATIOS	0.7496	0.9872	0.5137	0.7502	
				CONTRIB	4.67%	90.50%	0.85%	3.98%	4,380
		11.0	24.18	CONTRIB	7.17%	83.42%	3.59%	5.82%	10,591
13	13.6			RATIOS	0.5061	0.9015	0.5575	0.6550	
				CONTRIB	0.35%	92.08%	4.33%	3.25%	4,380
		11.0	20.80	CONTRIB	1.12%	88.73%	6.22%	3.93%	9,111
14	11.3			RATIOS	0.6496	0.6951	0.5988	0.6479	
				CONTRIB	8.84%	69.72%	14.48%	6.96%	4,380

**Kaiser Center
OAKLAND, CALIFORNIA**

Wind Comfort Analysis

**Cumulative
Wind Test Date: 27 April 2009**

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded 10% of the time for each measurement location. This assumes wind comfort criteria of 11 mph for areas of substantial public pedestrian use and 7 mph for public seating areas. These criteria are not to be exceeded more than 10% of the time.

The third line of output for each location shows the criterion speed and the percentage of the time the criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

Loca- tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
		11.0	11.09	CONTRIB	8.95%	70.13%	13.86%	7.06%	4,856
15				RATIOS	1.0523	0.7393	0.7938	0.8618	
	13.6			CONTRIB	28.09%	43.97%	17.59%	10.35%	4,380
		11.0	19.32	CONTRIB	22.64%	50.56%	14.11%	12.68%	8,461
16				RATIOS	0.8810	0.6462	0.9149	0.8140	
	12.4			CONTRIB	20.63%	38.47%	28.68%	12.22%	4,380
		11.0	14.50	CONTRIB	21.84%	40.91%	23.80%	13.45%	6,352
17				RATIOS	0.2911	0.5849	0.6306	0.5022	
	9.5			CONTRIB	0.04%	71.61%	23.18%	5.16%	4,380
		11.0	6.06	CONTRIB	0.01%	67.68%	28.17%	4.14%	2,654
18				RATIOS	0.5268	0.4514	0.5038	0.4940	
	7.9			CONTRIB	15.82%	53.19%	21.12%	9.87%	4,380
		11.0	1.91	CONTRIB	17.02%	29.59%	41.33%	12.06%	838
19				RATIOS	0.2999	0.8671	0.3795	0.5155	
	12.9			CONTRIB	0.00%	98.82%	0.03%	1.14%	4,380
		11.0	18.01	CONTRIB	0.00%	97.91%	0.50%	1.59%	7,886
20				RATIOS	0.6300	0.6681	0.6561	0.6514	
	11.1			CONTRIB	8.56%	65.41%	18.25%	7.78%	4,380
		11.0	10.24	CONTRIB	8.59%	65.53%	18.07%	7.81%	4,486
21				RATIOS	1.1262	0.8324	0.5878	0.8488	
	14.3			CONTRIB	30.36%	57.12%	4.48%	8.04%	4,380
		11.0	23.89	CONTRIB	20.71%	63.45%	6.19%	9.65%	10,464
22				RATIOS	0.8042	0.7808	0.7675	0.7842	
	13.1			CONTRIB	11.49%	62.38%	17.81%	8.32%	4,380
		11.0	18.46	CONTRIB	12.36%	64.76%	13.79%	9.10%	8,087
23				RATIOS	0.8025	1.2096	0.6934	0.9019	
	18.3			CONTRIB	1.58%	92.51%	2.18%	3.73%	4,380
		11.0	31.63	CONTRIB	7.15%	77.77%	6.55%	8.53%	13,856
24				RATIOS	0.8178	0.6350	0.6428	0.6985	
	11.3			CONTRIB	22.28%	51.11%	16.95%	9.66%	4,380
		11.0	10.83	CONTRIB	22.49%	51.35%	16.39%	9.77%	4,742
25				RATIOS	0.9901	1.1460	0.9638	1.0333	
	18.5			CONTRIB	6.80%	72.71%	14.11%	6.38%	4,380
		11.0	34.28	CONTRIB	11.42%	68.09%	10.60%	9.88%	15,013
26				RATIOS	0.5503	1.0346	0.9726	0.8525	
	16.4			CONTRIB	0.13%	76.90%	18.24%	4.72%	4,380
		11.0	27.60	CONTRIB	1.70%	76.51%	13.29%	8.50%	12,088
27				RATIOS	0.7732	0.6635	1.5211	0.9860	
	13.5			CONTRIB	8.85%	25.81%	46.74%	18.60%	4,380
		11.0	17.36	CONTRIB	11.27%	37.71%	32.97%	18.05%	7,602
28				RATIOS	1.4946	1.4756	0.5712	1.1805	
	23.1			CONTRIB					4,380

APPENDIX C

Air Quality and GHG Data

AIR QUALITY EMISSIONS DATA

Averging of Construction Emissions
Frrom URBEMIS2007 Output

2012

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	218	1.65	16.47	8.66	0.85	0.78	0.02	2469

Averages =	218	1.65	16.47	8.66	0.85	0.78	0.02	2469.00
BAAQMD Threshold =		54	54	None	82	54	None	None
Significant?		No	No		No	No		NA

Averging of Construction Emissions
 From URBEMIS2007 Output

2013

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	43	5.48	55.76	26.95	2.47	2.27	0.05	8719
2	20	3.95	40.76	18.76	1.71	1.58	0.04	6250
3	196	2.29	12.58	41.38	0.65	0.59	0.05	5621

Averages = 259 2.95 21.92 37.24 1.03 0.95 0.05 6183.91

BAAQMD Threshold = 54 54 None 82 54 None NA

Significant? No No No No

Averging of Construction Emissions
 From URBEMIS2007 Output

2014

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	108	2.1	11.44	38.35	0.58	0.53	0.05	5623
2	153	51.09	21.09	47.02	1.36	1.24	0.05	6839

Averages = 261 30.82 17.10 43.43 1.04 0.95 0.05 6335.83

BAAQMD Threshold = 54 54 None 82 54 None NA

Significant? No No No No

Averging of Construction Emissions
2015

Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	108	50.82	19.34	44.08	1.26	1.15	0.05	6841

Averages =	108	50.82	19.34	44.08	1.26	1.15	0.05	6841.00
BAAQMD Threshold =		54	54	None	82	54	None	
Significant?		No	No		No	No		

Averging of Construction Emissions
Frrom URBEMIS2007 Output

2015

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	219	0.9	6.84	5.48	0.4	0.37	0	1124
2								

Averages =	219	0.90	6.84	5.48	0.40	0.37	0.00	1124.00
BAAQMD Threshold =		54	54	None	82	54	None	None
Significant?		No	No		No	No		NA

Averging of Construction Emissions
 From URBEMIS2007 Output

2016

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	42	5.11	33.05	59.58	1.66	1.51	0.07	10788
2	23	4.27	26.78	54.27	1.31	1.19	0.06	9663
3	195	2.12	10.68	43.47	0.56	0.5	0.06	7314
Averages =	260	2.79	15.72	47.03	0.80	0.72	0.06	8082.98
BAAQMD Threshold =		54	54	None	82	54	None	NA
Significant?		No	No		No	No		

Averging of Construction Emissions
 Frrom URBEMIS2007 Output

2017

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	108	1.95	9.6	40.44	0.51	0.45	0.06	7315
2	152	67.57	17.48	48.68	1.09	0.99	0.06	8551

Averages = 260 40.31 14.21 45.26 0.85 0.77 0.06 8037.58

BAAQMD Threshold = 54 54 None 82 54 None NA

Significant? No No No No

Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser Phase 2 Construction.urb924
Project Name: Kaiser Constructin Phase 2
Project Location: Alameda County
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2015 TOTALS (lbs/day unmitigated)	0.90	6.84	5.48	0.00	2.43	0.40	2.84	0.51	0.37	0.88	1,124.34
2015 TOTALS (lbs/day mitigated)	0.90	6.84	5.48	0.00	2.43	0.40	2.84	0.51	0.37	0.88	1,124.34
2016 TOTALS (lbs/day unmitigated)	5.11	33.05	59.58	0.07	8.34	1.66	10.00	1.79	1.51	3.30	10,787.65
2016 TOTALS (lbs/day mitigated)	5.11	33.05	59.58	0.07	5.90	1.66	7.57	1.28	1.51	2.79	10,787.65
2017 TOTALS (lbs/day unmitigated)	80.21	17.48	48.78	0.06	0.31	1.09	1.41	0.11	0.99	1.10	8,566.15
2017 TOTALS (lbs/day mitigated)	37.72	17.48	48.78	0.06	0.31	1.09	1.41	0.11	0.99	1.10	8,566.15
2018 TOTALS (lbs/day unmitigated)	79.95	16.00	45.86	0.06	0.31	0.99	1.31	0.11	0.90	1.01	8,567.05
2018 TOTALS (lbs/day mitigated)	37.78	16.00	45.86	0.06	0.31	0.99	1.31	0.11	0.90	1.01	8,567.05

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser Center Existing 2014.urb924

Project Name: Kaiser Center

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

<u>Source</u>	ROG	NOX	CO	SO2	PM10	PM25	CO2
Strip mall	21.99	35.00	258.33	0.30	61.30	11.89	33,195.83
TOTALS (lbs/day, unmitigated)	21.99	35.00	258.33	0.30	61.30	11.89	33,195.83

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2014 Temperature (F): 70 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Strip mall		104.21	1000 sq ft	48.00	5,002.08	35,514.77
					5,002.08	35,514.77

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.4	0.4	99.4	0.2
Light Truck < 3750 lbs	12.3	0.8	97.6	1.6

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	19.8	0.5	99.5	0.0
Med Truck 5751-8500 lbs	6.4	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.8	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	0.7	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.9	51.7	48.3	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.1	7.1	7.1	7.1	7.1	7.1
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Strip mall				2.0	1.0	97.0

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 70 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

Home-based work average speed changed from 35 mph to 30 mph

Home-based work urban trip length changed from 10.8 miles to 7.1 miles

Home-based shop average speed changed from 35 mph to 30 mph

Home-based shop urban trip length changed from 7.3 miles to 7.1 miles

Home-based other average speed changed from 35 mph to 30 mph

Home-based other urban trip length changed from 7.5 miles to 7.1 miles

Commercial-based commute average speed changed from 35 mph to 30 mph

Commercial-based commute urban trip length changed from 9.5 miles to 7.1 miles

Commercial-based non-work average speed changed from 35 mph to 30 mph

Commercial-based non-work urban trip length changed from 7.35 miles to 7.1 miles

Commercial-based customer average speed changed from 35 mph to 30 mph

Commercial-based customer urban trip length changed from 7.35 miles to 7.1 miles

Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser Center Existing 2014.urb924

Project Name: Kaiser Center

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2009 TOTALS (lbs/day unmitigated)	4.98	65.90	24.61	0.06	48.84	2.78	51.62	10.19	2.56	12.74	7,578.50
2010 TOTALS (lbs/day unmitigated)	51.43	9.77	7.48	0.00	0.01	0.60	0.61	0.00	0.55	0.55	1,169.93

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	0.43	0.48	1.94	0.00	0.01	0.01	559.61

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	21.99	35.00	258.33	0.30	61.30	11.89	33,195.83

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SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	22.42	35.48	260.27	0.30	61.31	11.90	33,755.44

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser ALt 1 Operational.urb924

Project Name: Kaiser Alt 1

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

<u>Source</u>	ROG	NOX	CO	SO2	PM10	PM25	CO2
General office building	19.41	21.55	209.32	0.27	48.45	9.26	27,720.07
TOTALS (lbs/day, unmitigated)	19.41	21.55	209.32	0.27	48.45	9.26	27,720.07

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General office building		6.30	1000 sq ft	552.00	3,477.60	28,177.25
					3,477.60	28,177.25

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.4	0.2	99.6	0.2
Light Truck < 3750 lbs	12.3	0.8	97.6	1.6

6/9/2010 3:41:49 PM

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	19.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.4	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.8	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	0.7	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.9	48.3	51.7	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General office building				35.0	17.5	47.5

Page: 3

6/9/2010 3:41:49 PM

Operational Changes to Defaults

Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser ALt 1 Operational.urb924

Project Name: Kaiser Alt 1

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	3.62	3.70	4.64	0.00	0.02	0.02	4,418.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	19.41	21.55	209.32	0.27	48.45	9.26	27,720.07

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	23.03	25.25	213.96	0.27	48.47	9.28	32,138.88

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser 2010 revise Project Operation.urb924

Project Name: Kaiser 2010 Project Operation

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

<u>Source</u>	ROG	NOX	CO	SO2	PM10	PM25	CO2
General office building	33.88	31.88	340.22	0.63	110.91	21.09	63,420.84
TOTALS (lbs/day, unmitigated)	33.88	31.88	340.22	0.63	110.91	21.09	63,420.84

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General office building		6.04	1000 sq ft	1,320.00	7,972.80	64,599.61
					7,972.80	64,599.61

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.4	0.0	100.0	0.0
Light Truck < 3750 lbs	12.2	0.0	99.2	0.8

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.4	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.8	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	23.1	76.9
Heavy-Heavy Truck 33,001-60,000 lbs	0.7	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.9	37.9	62.1	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General office building				35.0	17.5	47.5

Page: 3

6/9/2010 3:38:53 PM

Operational Changes to Defaults

Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser 2010 revise Project Operation.urb924

Project Name: Kaiser 2010 Project Operation

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	8.49	8.82	8.94	0.00	0.03	0.03	10,562.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	33.88	31.88	340.22	0.63	110.91	21.09	63,420.84

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	42.37	40.70	349.16	0.63	110.94	21.12	73,983.65

Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\kaiser with TDM 2010.urb924

Project Name: Kaiser 2010 Project Operation

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	8.49	8.82	8.94	0.00	0.03	0.03	10,562.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	31.36	28.66	305.86	0.56	99.71	18.96	57,015.75

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (lbs/day, unmitigated)	39.85	37.48	314.80	0.56	99.74	18.99	67,578.56

APPENDIX D

Biological Resources Data

Appendix D Contents:

- D.1 Lists of Special Status Species within Study Area –CDFG
- D.2 Lists of Special Status Species within Study Area –USFWS
- D.3 Lists of Special Status Species within Study Area –CNPS
- D.4 Tree Removal Plan

APPENDIX D.1

Lists of Special Status Species within Study Area – CDFG

California Department of Fish and Game
Natural Diversity Database
Selected Elements by Scientific Name - Landscape
Query for Oaland East and Oakland West USGS 7.5 Minute Topographic Quadrangles

Scientific Name	Common Name	Element Code	Federal Status	State Status	Global Rank	State Rank	CNPS	CDFG
1 Accipiter cooperii	Cooper's hawk	ABNKC12040			G5	S3		
2 Ambystoma californiense	California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3		SC
3 Amsinckia lunaris	bent-flowered fiddleneck	PDBOR01070			G2	S2.2	1B.2	
4 Antrozous pallidus	pallid bat	AMACC10010			G5	S3		SC
5 Aquila chrysaetos	golden eagle	ABNKC22010			G5	S3		
6 Arctostaphylos pallida	pallid manzanita	PDERI04110	Threatened	Endangered	G1	S1	1B.1	
7 Astragalus tener var. tener	alkali milk-vetch	PDFAB0F8R1			G1T1	S1.1	1B.2	
8 Atriplex joaquiniana	San Joaquin spearscale	PDCHE041F3			G2	S2	1B.2	
9 California macrophylla	round-leaved filaree	PDGER01070			G2	S2	1B.1	
10 Carex comosa	bristly sedge	PMCPY032Y0			G5	S2?	2.1	
11 Chorizanthe cuspidata var. cuspidata	San Francisco Bay spineflower	PDPGN04081			G2T2	S2.2	1B.2	
12 Chorizanthe robusta var. robusta	robust spineflower	PDPGN040Q2	Endangered		G2T1	S1.1	1B.1	
13 Cicindela hirticollis gravida	sandy beach tiger beetle	IICOL02101			G5T2	S1		
14 Circus cyaneus	northern harrier	ABNKC11010			G5	S3		SC
15 Clarkia concinna ssp. automixa	Santa Clara red ribbons	PDONA050A1			G5?T3	S3.3	4.3	
16 Clarkia franciscana	Presidio clarkia	PDONA050H0	Endangered	Endangered	G1	S1.1	1B.1	
17 Cordylanthus maritimus ssp. palustris	Point Reyes bird's-beak	PDSCR0J0C3			G4?T2	S2.2	1B.2	
18 Dipodomys heermanni berkeleyensis	Berkeley kangaroo rat	AMAFD03061			G3G4T1	S1		
19 Dirca occidentalis	western leatherwood	PDTHY03010			G2G3	S2S3	1B.2	
20 Elanus leucurus	white-tailed kite	ABNKC06010			G5	S3		
21 Emys marmorata	western pond turtle	ARAAD02030			G3G4	S3		SC
22 Eriogonum luteolum var. caninum	Tiburon buckwheat	PDPGN083S1			G5T3	S3.2	1B.2	
23 Eucyclogobius newberryi	tidewater goby	AFCQN04010	Endangered		G3	S2S3		SC
24 Euphydryas editha bayensis	Bay checkerspot butterfly	IILEPK4055	Threatened		G5T1	S1		
25 Fritillaria liliacea	fragrant fritillary	PMLIL0V0C0			G2	S2.2	1B.2	
26 Geothlypis trichas sinuosa	saltmarsh common yellowthroat	ABPBX1201A			G5T2	S2		SC
27 Gilia capitata ssp. chamissonis	blue coast gilia	PDPLM040B3			G5T2	S2.1	1B.1	
28 Helianthella castanea	Diablo helianthella	PDAST4M020			G3	S3.2	1B.2	
29 Helminthoglypta nickliniana bridgesi	Bridges' coast range shoulderband	IMGASC2362			G2T1	S1		
30 Hemizonia congesta ssp. congesta	seaside tarplant	PDAST4R065			G5T2T3	S2S3	1B.2	
31 Hoita strobilina	Loma Prieta hoita	PDFAB5Z030			G2	S2.1	1B.1	
32 Holocarpha macradenia	Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1.1	1B.1	
33 Horkelia cuneata ssp. sericea	Kellogg's horkelia	PDROS0W043			G4T1	S1.1	1B.1	

California Department of Fish and Game
Natural Diversity Database
Selected Elements by Scientific Name - Landscape
Query for Oaland East and Oakland West USGS 7.5 Minute Topographic Quadrangles

Scientific Name	Common Name	Element Code	Federal Status	State Status	Global Rank	State Rank	CNPS	CDFG
34 <i>Lasionycteris noctivagans</i>	silver-haired bat	AMACC02010			G5	S3S4		
35 <i>Lasiurus cinereus</i>	hoary bat	AMACC05030			G5	S4?		
36 <i>Laterallus jamaicensis coturniculus</i>	California black rail	ABNME03041		Threatened	G4T1	S1		
37 <i>Layia carnosa</i>	beach layia	PDAST5N010	Endangered	Endangered	G2	S2.1	1B.1	
38 <i>Leptosiphon rosaceus</i>	rose leptosiphon	PDPLM09180			G1	S1.1	1B.1	
39 <i>Masticophis lateralis euryxanthus</i>	Alameda whipsnake	ARADB21031	Threatened	Threatened	G4T2	S2		
40 <i>Meconella oregana</i>	Oregon meconella	PDPAP0G030			G2G3	S1.1	1B.1	
41 <i>Melospiza melodia pusillula</i>	Alameda song sparrow	ABPBXA301S			G5T2?	S2?		SC
42 <i>Microcina leei</i>	Lee's micro-blind harvestman	ILARA47040			G1	S1		
43 <i>Monardella villosa</i> ssp. <i>globosa</i>	robust monardella	PDLAM180P7			G5T2	S2.2	1B.2	
44 Northern Coastal Salt Marsh	Northern Coastal Salt Marsh	CTT52110CA			G3	S3.2		
45 Northern Maritime Chaparral	Northern Maritime Chaparral	CTT37C10CA			G1	S1.2		
46 <i>Nyctinomops macrotis</i>	big free-tailed bat	AMACD04020			G5	S2		SC
47 <i>Phalacrocorax auritus</i>	double-crested cormorant	ABNFD01020			G5	S3		
48 <i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>	Choris' popcorn-flower	PDBOR0V061			G3T2Q	S2.2	1B.2	
49 <i>Plagiobothrys diffusus</i>	San Francisco popcorn-flower	PDBOR0V080		Endangered	G1Q	S1.1	1B.1	
50 <i>Potamogeton filiformis</i>	slender-leaved pondweed	PMPOT03090			G5	S1S2	2.2	
51 <i>Rallus longirostris obsoletus</i>	California clapper rail	ABNME05016	Endangered	Endangered	G5T1	S1		
52 <i>Rana boylei</i>	foothill yellow-legged frog	AAABH01050			G3	S2S3		SC
53 <i>Rana draytonii</i>	California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3		SC
54 <i>Reithrodontomys raviventris</i>	salt-marsh harvest mouse	AMAFF02040	Endangered	Endangered	G1G2	S1S2		
55 <i>Sanicula maritima</i>	adobe sanicle	PDAP11Z0D0		Rare	G2	S2.2	1B.1	
56 <i>Scapanus latimanus parvus</i>	Alameda Island mole	AMABB02031			G5T1Q	S1		SC
57 Serpentine Bunchgrass	Serpentine Bunchgrass	CTT42130CA			G2	S2.2		
58 <i>Sternula antillarum browni</i>	California least tern	ABNNM08103	Endangered	Endangered	G4T2T3Q	S2S3		
59 <i>Streptanthus albidus</i> ssp. <i>peramoenus</i>	most beautiful jewel-flower	PDBRA2G012			G2T2	S2.2	1B.2	
60 <i>Taxidea taxus</i>	American badger	AMAJF04010			G5	S4		SC
61 <i>Trachusa gummifera</i>	A leaf-cutter bee	IIHYM80010			G1	S1		
62 <i>Trifolium depauperatum</i> var. <i>hydrophilum</i>	saline clover	PDFAB400R5			G5T2?	S2.2?	1B.2	
63 <i>Tryonia imitator</i>	mimic tryonia (=California brackishwater snail)	IMGASJ7040			G2G3	S2S3		

APPENDIX D.2

Lists of Special Status Species within Study Area – USFWS



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825



July 26, 2010

Document Number: 100726095448

Martha Lowe
Environmental Science Associates
350 Frank H. Ogawa Plaza
Suite 300
Oakland, CA 94612

Subject: Species List for Kaiser Center

Dear: Ms. Lowe

We are sending this official species list in response to your July 26, 2010 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be October 24, 2010.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at

www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division



U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Federal Endangered and Threatened Species that Occur in
or may be Affected by Projects in the Counties and/or
U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 100726095448

Database Last Updated: April 29, 2010

Quad Lists

Listed Species

Invertebrates

- Branchinecta lynchi*
vernal pool fairy shrimp (T)
- Speyeria callippe callippe*
callippe silverspot butterfly (E)

Fish

- Acipenser medirostris*
green sturgeon (T) (NMFS)
- Eucyclogobius newberryi*
tidewater goby (E)
- Hypomesus transpacificus*
delta smelt (T)
- Oncorhynchus kisutch*
coho salmon - central CA coast (E) (NMFS)
- Oncorhynchus mykiss*
Central California Coastal steelhead (T) (NMFS)
Central Valley steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)
- Oncorhynchus tshawytscha*
Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- Rana draytonii*
California red-legged frog (T)

Reptiles

- Masticophis lateralis euryxanthus*
Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)

Birds

- Charadrius alexandrinus nivosus*
western snowy plover (T)
- Pelecanus occidentalis californicus*

California brown pelican (E)

Rallus longirostris obsoletus

California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni

California least tern (E)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Plants

Arctostaphylos pallida

pallid manzanita (=Alameda or Oakland Hills manzanita) (T)

Clarkia franciscana

Presidio clarkia (E)

Suaeda californica

California sea blite (E)

Quads Containing Listed, Proposed or Candidate Species:

OAKLAND EAST (465C)

OAKLAND WEST (466D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](#). Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these

lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be October 24, 2010.

APPENDIX D.3

Lists of Special Status Species within Study Area – CNPS

CNPS Inventory of Rare and Endangered Plants

ECOLOGICAL REPORT						
scientific	family	life form	blooming	communities	elevation	CNPS
<u>Amsinckia lunaris</u>	Boraginaceae	annual herb	Mar-Jun	<ul style="list-style-type: none"> •Coastal bluff scrub (CBScr) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs) 	3 - 500 meters	List 1B.2
<u>Arctostaphylos pallida</u>	Ericaceae	perennial evergreen shrub	Dec-Mar	<ul style="list-style-type: none"> •Broadleafed upland forest (BUFRs) •Closed-cone coniferous forest (CCFRs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr)/siliceous shale, sandy or gravelly 	185 - 465 meters	List 1B.1
<u>Astragalus tener</u> var. <u>tener</u>	Fabaceae	annual herb	Mar-Jun	<ul style="list-style-type: none"> •Playas (Plyas) •Valley and foothill grassland (VFGrs)(adobe clay) •Vernal pools (VnPIs)/alkaline 	1 - 60 meters	List 1B.2
<u>Atriplex joaquiniana</u>	Chenopodiaceae	annual herb	Apr-Oct	<ul style="list-style-type: none"> •Chenopod scrub (ChScr) •Meadows and seeps (Medws) •Playas (Plyas) •Valley and foothill grassland (VFGrs)/alkaline 	1 - 835 meters	List 1B.2
<u>Balsamorhiza macrolepis</u> var. <u>macrolepis</u>	Asteraceae	perennial herb	Mar-Jun	<ul style="list-style-type: none"> •Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/sometimes serpentinite 	90 - 1555 meters	List 1B.2
<u>California macrophylla</u>	Geraniaceae	annual herb	Mar-May	<ul style="list-style-type: none"> •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/clay 	15 - 1200 meters	List 1B.1

CNPS Inventory of Rare and Endangered Plants

ECOLOGICAL REPORT						
scientific	family	life form	blooming	communities	elevation	CNPS
<u>Chorizanthe cuspidata</u> var. <u>cuspidata</u>	Polygonaceae	annual herb	Apr-Jul(Aug) Months in parentheses are uncommon.	<ul style="list-style-type: none"> •Coastal bluff scrub (CBScr) •Coastal dunes (CoDns) •Coastal prairie (CoPrr) •Coastal scrub (CoScr)/sandy 	3 - 215 meters	List 1B.2
<u>Chorizanthe robusta</u> var. <u>robusta</u>	Polygonaceae	annual herb	Apr-Sep	<ul style="list-style-type: none"> •Chaparral (Chprl)(maritime) •Cismontane woodland (CmWld)(openings) •Coastal dunes (CoDns) •Coastal scrub (CoScr)/sandy or gravelly 	3 - 300 meters	List 1B.1
<u>Clarkia franciscana</u>	Onagraceae	annual herb	May-Jul	<ul style="list-style-type: none"> •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)(serpentine) 	25 - 335 meters	List 1B.1
<u>Cordylanthus maritimus</u> ssp. <u>palustris</u>	Scrophulariaceae	annual herb hemiparasitic	Jun-Oct	<ul style="list-style-type: none"> •Marshes and swamps (MshSw)(coastal salt) 	0 - 10 meters	List 1B.2
<u>Dirca occidentalis</u>	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr) Months in parentheses are uncommon.	<ul style="list-style-type: none"> •Broadleafed upland forest (BUFr) •Closed-cone coniferous forest (CCFr) •Chaparral (Chprl) •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFr) •Riparian forest (RpFr) •Riparian woodland (RpWld)/mesic 	50 - 395 meters	List 1B.2
<u>Eriogonum luteolum</u> var. <u>caninum</u>	Polygonaceae	annual herb	May-Sep	<ul style="list-style-type: none"> •Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Valley and foothill grassland (VFGrs)/serpentine, sandy to gravelly 	0 - 700 meters	List 1B.2

CNPS Inventory of Rare and Endangered Plants

ECOLOGICAL REPORT						
scientific	family	life form	blooming	communities	elevation	CNPS
<u>Fritillaria liliacea</u>	Liliaceae	perennial bulbiferous herb	Feb-Apr	<ul style="list-style-type: none"> •Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often serpentinite 	3 - 410 meters	List 1B.2
<u>Gilia capitata ssp. chamissonis</u>	Polemoniaceae	annual herb	Apr-Jul	<ul style="list-style-type: none"> •Coastal dunes (CoDns) •Coastal scrub (CoScr) 	2 - 200 meters	List 1B.1
<u>Helianthella castanea</u>	Asteraceae	perennial herb	Mar-Jun	<ul style="list-style-type: none"> •Broadleafed upland forest (BUFRs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Riparian woodland (RpWld) •Valley and foothill grassland (VFGrs) 	60 - 1300 meters	List 1B.2
<u>Hoita strobilina</u>	Fabaceae	perennial herb	May-Jul(Aug-Oct) <small>Months in parentheses are uncommon.</small>	<ul style="list-style-type: none"> •Chaparral (Chprl) •Cismontane woodland (CmWld) •Riparian woodland (RpWld)/usually serpentinite, mesic 	30 - 860 meters	List 1B.1
<u>Holocarpha macradenia</u>	Asteraceae	annual herb	Jun-Oct	<ul style="list-style-type: none"> •Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often clay, sandy 	10 - 220 meters	List 1B.1
<u>Horkelia cuneata ssp. sericea</u>	Rosaceae	perennial herb	Apr-Sep	<ul style="list-style-type: none"> •Closed-cone coniferous forest (CCFRs) •Chaparral (Chprl)(maritime) •Coastal dunes (CoDns) •Coastal scrub (CoScr)/sandy or gravelly, openings 	10 - 200 meters	List 1B.1
<u>Meconella oregana</u>	Papaveraceae	annual herb	Mar-Apr	<ul style="list-style-type: none"> •Coastal prairie (CoPrr) •Coastal scrub (CoScr) 	250 - 620 meters	List 1B.1

CNPS Inventory of Rare and Endangered Plants

ECOLOGICAL REPORT						
scientific	family	life form	blooming	communities	elevation	CNPS
<u>Micropus amphibolus</u>	Asteraceae	annual herb	Mar-May	<ul style="list-style-type: none"> •Broadleafed upland forest (BUFr) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/rocky 	45 - 825 meters	List 3.2
<u>Monardella villosa</u> <u>ssp. globosa</u>	Lamiaceae	perennial rhizomatous herb	Jun-Jul(Aug) <small>Months in parentheses are uncommon.</small>	<ul style="list-style-type: none"> •Broadleafed upland forest (BUFr)(openings) •Chaparral (Chprl)(openings) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs) 	100 - 915 meters	List 1B.2
<u>Monolopia gracilens</u>	Asteraceae	annual herb	Mar-Jul	<ul style="list-style-type: none"> •Broadleafed upland forest (BUFr)openings •Chaparral (Chprl)openings •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFr)openings •Valley and foothill grassland (VFGrs)/serpentine 	100 - 1200 meters	List 1B.2
<u>Plagiobothrys chorisianus</u> var. <u>chorisianus</u>	Boraginaceae	annual herb	Mar-Jun	<ul style="list-style-type: none"> •Chaparral (Chprl) •Coastal prairie (CoPrr) •Coastal scrub (CoScr)/mesic 	15 - 160 meters	List 1B.2
<u>Plagiobothrys diffusus</u>	Boraginaceae	annual herb	Mar-Jun	<ul style="list-style-type: none"> •Coastal prairie (CoPrr) •Valley and foothill grassland (VFGrs) 	60 - 360 meters	List 1B.1
<u>Potamogeton filiformis</u>	Potamogetonaceae	perennial rhizomatous herb aquatic	May-Jul	<ul style="list-style-type: none"> •Marshes and swamps (MshSw)(assorted shallow freshwater) 	300 - 2150 meters	List 2.2
<u>Sanicula maritima</u>	Apiaceae	perennial herb	Feb-May	<ul style="list-style-type: none"> •Chaparral (Chprl) •Coastal prairie (CoPrr) 	30 - 240 meters	List 1B.1

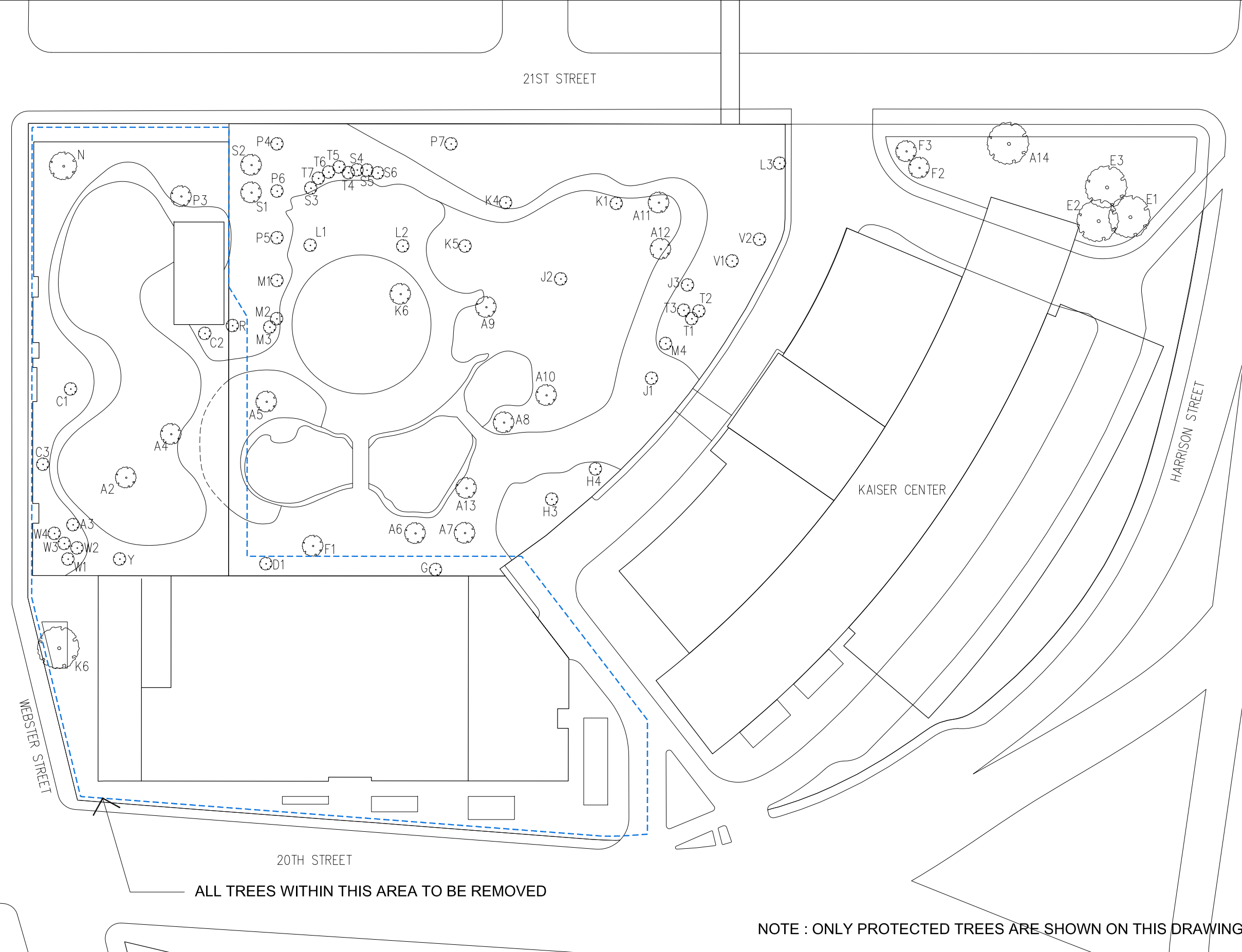
CNPS Inventory of Rare and Endangered Plants

ECOLOGICAL REPORT

scientific	family	life form	blooming	communities	elevation	CNPS
				<ul style="list-style-type: none"> •Meadows and seeps (Medws) •Valley and foothill grassland (VFGrs)/clay, serpentinite 		
<u>Streptanthus albidus</u> <u>ssp. peramoenus</u>	Brassicaceae	annual herb	(Mar)Apr-Sep(Oct) Months in parentheses are uncommon.	<ul style="list-style-type: none"> •Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/serpentinite 	94 - 1000 meters	List 1B.2
<u>Trifolium depauperatum</u> var. <u>hydrophilum</u>	Fabaceae	annual herb	Apr-Jun	<ul style="list-style-type: none"> •Marshes and swamps (MshSw) •Valley and foothill grassland (VFGrs)(mesic, alkaline) •Vernal pools (VnPIs) 	0 - 300 meters	List 1B.2

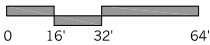
APPENDIX D.4

Tree Removal Plan



TREE	SPECIES	COMMON NAME	TRUNK DIAMETER
A2	OLEA EUROPEA	EUROPEAN OLIVE	30.1"
A3	OLEA EUROPEA	EUROPEAN OLIVE	11.5"
A4	OLEA EUROPEA	EUROPEAN OLIVE	43.3"
A5	OLEA EUROPEA	EUROPEAN OLIVE	24.4"
A6	OLEA EUROPEA	EUROPEAN OLIVE	34.1"
A7	OLEA EUROPEA	EUROPEAN OLIVE	22.9"
A8	OLEA EUROPEA	EUROPEAN OLIVE	36.0"
A9	OLEA EUROPEA	EUROPEAN OLIVE	45.5"
A10	OLEA EUROPEA	EUROPEAN OLIVE	35.0"
A11	OLEA EUROPEA	EUROPEAN OLIVE	33.9"
A12	OLEA EUROPEA	EUROPEAN OLIVE	32.0"
A13	OLEA EUROPEA	EUROPEAN OLIVE	27.3"
A14	OLEA EUROPEA	EUROPEAN OLIVE	33.6"
B	RHUS LANCEA	AFRICAN SUMAC	14.0"
C1	PITTOSPORUM UNDULATUM	VICTORIAN BOX	16.2"
C2	PITTOSPORUM UNDULATUM	VICTORIAN BOX	23.3"
C3	PITTOSPORUM UNDULATUM	VICTORIAN BOX	23.9"
D1	ACER PALMATUM	JAPANESE MAPLE	35.1"
E1	LIQUIDAMBAR STRYACIFLUA	SWEETGUM	14.3"
E2	LIQUIDAMBAR STRYACIFLUA	SWEETGUM	15.8"
E3	LIQUIDAMBAR STRYACIFLUA	SWEETGUM	15.9"
F1	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	23.3"
F2	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	18.5"
F3	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	17.4"
G	PODOCARPUS MACROPHYLLIA	JAPANESE YEW PINE	11.3"
H3	MALUS FLORIBUNDA	JAPANESE FLOWERING CRABAPPLE	11.9"
H4	MALUS FLORIBUNDA	JAPANESE FLOWERING CRABAPPLE	9.2"
J1	QUERCUS SUBER	CORK OAK	29.0"
J2	QUERCUS SUBER	CORK OAK	16.0"
J3	QUERCUS SUBER	CORK OAK	31.5"
K1	RHUS LANCEA	AFRICAN SUMAC	14.3"
K4	RHUS LANCEA	AFRICAN SUMAC	21.2"
K5	RHUS LANCEA	AFRICAN SUMAC	18.5"
K6	RHUS LANCEA	AFRICAN SUMAC	14.0"
L1	PINUS MUGO	SWISS MOUNTAIN PINE	19.1"
L2	PINUS MUGO	SWISS MOUNTAIN PINE	21.0"
L3	PINUS MUGO	SWISS MOUNTAIN PINE	19.0"
M1	ARBUTUS UNEDO	STRAWBERRY TREE	32.4"
M2	ARBUTUS UNEDO	STRAWBERRY TREE	29.5"
M3	ARBUTUS UNEDO	STRAWBERRY TREE	21.7"
M4	ARBUTUS UNEDO	STRAWBERRY TREE	30.3"
N	BETULA PENDULA	EUROPEAN WHITE BIRCH	24.0"
P3	QUERCUS ILEX	HOLLY OAK	9.1"
P4	QUERCUS ILEX	HOLLY OAK	17.2"
P5	QUERCUS ILEX	HOLLY OAK	12.7"
P6	QUERCUS ILEX	HOLLY OAK	15.3"
P7	QUERCUS ILEX	HOLLY OAK	18.6"
R	PRUNUS CAROLINIANA	CAROLINA CHERRY LAUREL	19.4"
S1	GRISELINA LITTORALIS	KAPUKA	32.2"
S2	GRISELINA LITTORALIS	KAPUKA	18.5"
S3	GRISELINA LITTORALIS	KAPUKA	16.6"
S4	GRISELINA LITTORALIS	KAPUKA	29.3"
S5	GRISELINA LITTORALIS	KAPUKA	26.1"
S6	GRISELINA LITTORALIS	KAPUKA	26.1"
T1	FEIJOA SELLOWIANA	PINAPPLE GUAVA	25.5"
T2	FEIJOA SELLOWIANA	PINAPPLE GUAVA	29.3"
T3	FEIJOA SELLOWIANA	PINAPPLE GUAVA	8.4"
T4	FEIJOA SELLOWIANA	PINAPPLE GUAVA	21.0"
T5	FEIJOA SELLOWIANA	PINAPPLE GUAVA	24.2"
T6	FEIJOA SELLOWIANA	PINAPPLE GUAVA	19.8"
T7	FEIJOA SELLOWIANA	PINAPPLE GUAVA	16.6"
V1	MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA	26.3"
V2	MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA	22.8"
W1	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	13.3"
W2	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	16.3"
W3	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	12.1"
W4	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	14.5"

EXISTING TREE DESCRIPTION
ASK - 060R1



June 24, 2009
Scale: 1" = 64'-0"



APPENDIX E

Cultural Resources Correspondence

Appendix E Contents:

- E.1 Historic Resources Evaluation
- E.2 Native American Heritage Commission Communication
- E.3 Exterior Façade Feasibility Analysis

APPENDIX E.1

Historic Resources Evaluation



Historic Resource Evaluation

Final Draft

Kaiser Center

300 Lakeside Drive
Oakland, California

February 2009

Prepared for
City of Oakland
Community & Economic Development Agency

Prepared by
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I. INTRODUCTION.....	3
II. SUMMARY OF DETERMINATION	6
III. CURRENT HISTORIC STATUS.....	7
<i>A. National Register of Historic Places.....</i>	<i>7</i>
<i>B. Oakland Cultural Heritage Survey</i>	<i>7</i>
<i>C. City of Oakland Landmark Status</i>	<i>8</i>
IV. DESCRIPTION.....	10
<i>A. Site.....</i>	<i>10</i>
<i>B. Office Tower Exterior</i>	<i>10</i>
<i>C. Office Tower Interior</i>	<i>12</i>
<i>D. Mall Buildings, Exterior.....</i>	<i>13</i>
<i>E. Mall Buildings, Interior</i>	<i>14</i>
<i>F. Roof Garden</i>	<i>15</i>
V. HISTORIC CONTEXT	17
<i>A. Oakland History.....</i>	<i>17</i>
<i>B. Site History.....</i>	<i>20</i>
<i>C. Design of the Kaiser Center</i>	<i>22</i>
<i>D. Construction Chronology</i>	<i>28</i>
<i>E. Office Center Development on Lake Merritt.....</i>	<i>31</i>
<i>F. Henry J. Kaiser.....</i>	<i>32</i>
<i>G. Welton Becket</i>	<i>34</i>
<i>H. Theodore Osmundson, Landscape Architect.....</i>	<i>36</i>
<i>I. Modern Office Towers.....</i>	<i>37</i>
<i>J. Modern Bay Area Landscape Architecture.....</i>	<i>38</i>
VI. EVALUATION.....	40
<i>A. California Register of Historical Resources.....</i>	<i>40</i>
<i>B. Character-Defining Features.....</i>	<i>45</i>
<i>C. Significance Diagrams</i>	<i>48</i>
VII. EVALUATION OF PROJECT-SPECIFIC IMPACTS UNDER CEQA	49
<i>A. Status of Existing Property as a Historic Resource under CEQA.....</i>	<i>49</i>
<i>B. Determination of Significant Adverse Change under CEQA.....</i>	<i>50</i>
<i>C. Compliance with the Secretary of the Interior's Standards for Rehabilitation.....</i>	<i>50</i>
<i>D. Proposed Project Description</i>	<i>51</i>
<i>E. Compliance with the Secretary of the Interior's Standards for Rehabilitation</i>	<i>55</i>
<i>F. Analysis of Project Specific Impacts under CEQA.....</i>	<i>62</i>

<i>F. Analysis of Cumulative Impacts under CEQA</i>	69
VIII. CONCLUSION	72
<u>IX. REFERENCES CITED</u>	74
<i>A. Published</i>	74
<i>B. Public Records</i>	74
<i>C. Newspapers and Periodicals</i>	75
<i>D. Unpublished Manuscripts and Drawings</i>	76
<i>E. Internet Sources</i>	76
APPENDIX A	A-1
<i>Additional Figures</i>	A-1
<i>Historic Images</i>	A-13
<i>Maps</i>	A-14
APPENDIX B	B-1
<i>Dolomite Panel Cleaning Study and Reuse Feasibility Analysis</i>	B-1
APPENDIX C	C-1
<i>Significance Diagrams</i>	C-1
APPENDIX D	D-1
<i>DPR 523 A & B Form</i>	D-1
APPENDIX E	E-1
<i>Historic Drawings</i>	E-1
APPENDIX F	F-1
<i>Proposed Project Drawings</i>	F-1

I. INTRODUCTION

This Historic Resource Evaluation (HRE) has been prepared at the request of the Swig Company for a project affecting the Kaiser Center, located at 300 Lakeside Drive (also 312-348 20th Street, 2000-2040 Webster Street, and 2059 Harrison Street), Oakland, California. The complex is on a large, irregularly shaped block bounded by 20th, Harrison, 21st, and Webster Streets. The Kaiser Center complex consists of a twenty-eight-story Office Tower, the three-story and basement 20th Street Mall Building, the two-and-three-story Webster Street Mall Building, a three-and-four-story parking garage, and the Roof Garden on the top level of the parking garage. The complex was designed by Welton Becket & Associates and completed in 1959. The Roof Garden was designed by the landscape architecture firm Osmundson & Staley and completed in 1960.

The current owner of the Kaiser Center has proposed to demolish the Mall Buildings and replace them with two office towers, a thirty-four-story tower at the northeast corner of Webster and 20th streets and a forty-two-story tower at the southeast corner of Webster and 21st streets. The roof garden will be reconfigured, removing approximately 18,369 square feet in the Webster and 21st street corner and adding 22,933 square feet along 20th Street. The garden would have a net gain of 4,564 square feet, and the proposed project provides for the inclusion of a grand staircase accessing the roof garden from 20th Street, which would improve public access to the garden. The project sponsor is also considering providing increased access to the roof garden through the new office towers.

This report provides a detailed description and historical context for the Kaiser Center, as well as an examination of the property's existing historical status. Included in this report is an evaluation of the building's eligibility for the California Register of Historical Resources (California Register) and an evaluation of the proposed project under the provisions of the California Environmental Quality Act (CEQA).

The primary author of this report was architectural historian, Cora Palmer, who meets the Secretary of the Interior's Standards for Professional Qualifications in Architectural History. Portions of this report were completed by Cultural Landscape Specialist Gretchen Hilyard and Cultural Resource Specialist, Cara Bertron. The project architects, Skidmore Owings & Merrill, have provided architectural drawings of the Proposed Project for inclusion in this report.

Page & Turnbull prepared this report using research collected at various local repositories, including the Oakland Cultural Heritage Survey, Kaiser Center Archives, the Oakland Public Library, and the University of California, Berkeley Environmental Design Archives.



Figure 1. Aerial of subject property. Google Maps



Figure 2. Site Plan of subject property. SOM, altered by author.
Note that hatched area represents the Roof Garden.

II. SUMMARY OF DETERMINATION

According to the Oakland Cultural Heritage Survey, the Kaiser Center and Roof Garden appears to be individually eligible for listing in the National Register of Historical Places (National Register). The analysis in this report finds the complex to be individually eligible for listing in the California Register of Historical Resources (California Register) under Criteria 1 (Events), 2 (Persons), and 3 (Architecture). Therefore, the Kaiser Center complex is considered a historic resource under the California Environmental Quality Act (CEQA).

According to CEQA, a “project with an effect that may cause a substantial adverse change in the significance of an historic resource is a project that may have a significant effect on the environment.” The significance of a historic resource is materially impaired when a project materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in the California Register. This report determines that the proposed project may cause a change to a historic resource and may have an adverse effect on the environment. However, if suggested mitigation measures were incorporated into the design, the impacts on a historic resource could be reduced to a less than significant level.

III. CURRENT HISTORIC STATUS

A. National Register of Historic Places

The National Register of Historic Places is the nation's most comprehensive inventory of historic resources. The National Register is administered by the National Park Service and includes buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, or local level. Typically, resources over fifty years of age are eligible for listing in the National Register if they meet any one of the four criteria of significance and if they sufficiently retain historic integrity. However, resources under fifty years of age can be listed or determined eligible if it can be demonstrated that they are of "exceptional importance," or if they are contributors to a potential historic district. National Register criteria are defined in depth in *National Register Bulletin Number 15: How to Apply the National Register Criteria for Evaluation*. A resource can be considered significant on a national, state, or local level to American history, architecture, archaeology, engineering, and culture.

The Kaiser Center is not listed in the National Register of Historic Places. However, according to the Oakland Cultural Heritage Survey, the Kaiser Center appears to be potentially eligible for listing in the National Register both individually and as a contributor to a potential Lake Merritt Historic District.¹

B. Oakland Cultural Heritage Survey

The Oakland Cultural Heritage Survey (OCHS) was established in 1981. Since that time, the OCHS has been evaluating resources according to a system adapted from both the San Francisco Downtown Inventory, and Harold Kalman's *The Evaluation of Historic Buildings* (Parks Canada, 1980). The categories, ratings, and guidelines for interpretation closely parallel those of *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, Sections IV, "How to Identify the Type of Significance of a Property;" and V, "How to Determine if a Property has Integrity". Properties are evaluated under seventeen headings in four general areas: Visual Quality/Design, History/Association, Continuity, and Integrity/Reversibility. Buildings are rated on a scale from "A": Highest Importance to "E": Of no particular interest; buildings less than 45 years old or modernized are classified "*" or "F."

¹ Please note that OCHS staff is currently re-examining the boundaries of the Lake Merritt Historic District.

The survey also identifies historic districts. Historic districts are classified in two categories: Areas of Primary Importance (API) and Areas of Secondary Importance (ASI). Both types of districts are historically or visually cohesive areas in which a high proportion of properties contribute to or reflect the area's principal historical or architectural themes. APIs appear eligible for the National Register as districts or historically related complexes while ASIs do not, although they are considered to warrant city preservation efforts. In addition, seriously altered properties that appear restorable may be counted as contributors in an ASI but not in an API. District ratings range from 1 to 3. A rating of 1 means the property is in an Area of Primary Importance (API) or National Register quality district. A rating of 2 means the property is in an Area of Secondary Importance (ASI) or district of local interest. A rating of 3 means the property is not in a historic district.

The Kaiser Center is listed in the OCHS with a rating of A1+, which indicates that the property has an "A"-rating, defined as a property of "Highest Importance." "A" buildings are labeled as buildings with "exceptional historical or architectural value which are clearly eligible individually for the National Register of Historic Places." The building's "1" rating signifies that the property is located within an API, and the "+" rating indicates the property is a contributor to the API.

Lake Merritt District, Area of Primary Importance (API)

The Lake Merritt District was surveyed as part of the OCHS in 1986. The District is considered an Area of Primary Importance (API), a district that appears eligible for the National Register of Historic Places. According to the OCHS Lake Merritt Historic District inventory form, "the district consists of Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries." (See **Appendix A** for a district boundary map and representative photographs of the Lake Merritt Historic District). The Kaiser Center was not over the fifty-year threshold at the time of the survey and therefore was not included as a contributor. However, due to its historic and architectural significance and relation to the lake, currently the Kaiser Center is considered a contributor to the Lake Merritt Historic District. It should be noted that OCHS Staff is currently re-examining the boundaries of the Lake Merritt Historic District.

C. City of Oakland Landmark Status

Like most cities, Oakland has a program for designating historic Landmarks and Preservation Districts. These are considered the most prominent historic properties in the city. They are

nominated by their owners, the City, or the public, and are designated after public hearings by the Landmarks Board, Planning Commission, and City Council. These landmarks and historic districts are called “Designated Historic Properties.” Since the program began in 1973, about 140 individual landmarks and nine districts have been designated, out of a total of nearly 100,000 buildings in the city.² The city has forty individual buildings and the Downtown district listed on the National Register of Historic Places, and a small group of State and National Historic Landmarks. These major landmarks have various legal protections against demolition or changes that would impair their significance.

The Kaiser Center has never been formally designated a City of Oakland Landmark. However, in 2003, members of the City of Oakland’s Landmarks Preservation Advisory Board particularly interested in Modern design began the process of pursuing a Landmark nomination for the Kaiser Center. While the process was never completed, it likely indicates that the Kaiser Center would be determined eligible for listing as a City of Oakland Landmark.

² City of Oakland, CEDA, Oakland General Plan, Historic Preservation Element, Appendix C, Oakland Cultural Heritage Survey Evaluation Methods (Oakland: City of Oakland, Sept. 1993), C-3.

IV. DESCRIPTION³

A. Site

The Kaiser Center is located on a large irregularly shaped lot on the west side of Lakeside Drive bounded by Harrison, Webster, 20th, and 21st streets. The complex is located adjacent to Lake Merritt and is part of a group of high-rise commercial office buildings designed in the Modern style at the northwest shore of the lake. The Kaiser Center complex is made up of four elements: Mall Buildings that form a strong horizontal base, a curving high-rise Office Tower, a utilitarian parking lot, and a roof garden. The Office Tower's facade interprets the arc of Harrison Street which curves between 21st and 20th Street. The immediate area is composed of high-rise commercial office towers, mid-rise commercial buildings, the Cathedral of Christ the Light, parking lots and Snow Park. The area has a mid- and high-rise character and is made up of historic and non-historic buildings. The site slopes up from south to north; as a result, the building at the south end of the lot (20th Street Mall) is approximately one story lower than the building at the north end of the lot (Webster Street Mall). The site features planting beds and capitalizes on views to Lake Merritt to the southeast.

B. Office Tower Exterior



Figure 3. Kaiser Center Office Tower. View from southeast.
Page & Turnbull, 2008

Completed in 1959, the Kaiser Center Office Tower is a twenty-eight-story office tower with three basements that features a T-shaped plan, and a curved main facade. The building is made up of two basic components: a T-shaped tower with a straight stem and curved wings; and an asymmetrically located two-story podium supported by square piers at the first floor that extends beyond the plane of the T-shaped tower and follows the curve of the main facade.

³ See Appendix A for additional photographs of the Kaiser Center.

The main façade of the tower features fourteen bays separated by burnished aluminum piers. Each bay includes six windows surrounded by gold toned and natural aluminum frames. The side facades of the curved plane feature concrete panels with dolomite, a rock-like mineral product, aggregate. Other than the penthouse floor which features a higher ceiling height, all floors and bays on the main façade are identical. The straight vertical portion or stem of the tower features the same fenestration pattern as the main façade at the east and west façade and the same concrete panels with dolomite aggregate at the north and south façades. The north façade features signage reading, “Kaiser.”

The first floor of the podium is supported by square piers, effectively creating a *porte cochere* at the front facade, and features a space which is occupied by the auditorium and tenant office space. The building’s *porte cochere* features square piers with metal cladding, dolomite panels, and stucco walls and ceilings with recessed incandescent lighting at the recessed portion. The first floor lobby includes an aluminum storefront with glazed aluminum doors featuring rectangular aluminum hardware that reads, “Kaiser Center.” To the left of the *porte cochere* are retail spaces which feature glazed aluminum storefronts capped by a cantilevered canopy clad in stucco which features recessed incandescent lighting.

To the rear of the main façade is a two-story podium that is supported by square piers with metal cladding. This portion of the podium parallels the curve of the main façade and includes office space and features a skybridge with access to the parking garage. This podium features a glazed curtain wall with burnished aluminum panels, similar to but simpler than the main façade.

Parking Garage

The parking garage is a three-and-four-story reinforced concrete rectangular plan building with a curved east façade that parallels the tower. The building is utilitarian and the only ornamentation present on



Figure 4. Parking Garage, north façade. View from northwest.
Page & Turnbull, 2008

the parking garage is a grid of narrow aluminum ribs and aluminum signage reading, “Kaiser Center Garage.” The top level of the building is occupied by the Kaiser Center Roof Garden.

C. Office Tower Interior

Lobby

The first floor lobby is a one-story and mezzanine space that features terrazzo floors, marble walls, oversize round piers, and two escalators. The escalators have been enclosed with marble cladding and a circular fountain has been installed in the escalator enclosure. The lobby features round raised planters, a seating area, and a coffee kiosk. Many of the lobby features were replaced in a renovation designed by Charles Jennings that took place in the mid-1990s.

First Floor Retail

The first floor of the tower includes a single level of retail with mixed use commercial space on a mezzanine level. This portion of the complex features terrazzo floors and walls, square piers, glazed aluminum storefronts with clear and frosted glass, spray acoustical ceilings, large replacement pendant light fixtures, and glazed aluminum doors with decorative aluminum door handles, some exterior door hardware features cut outs reading, “Kaiser Center.”

Second Floor Lobby

The second floor lobby features plaster walls and ceilings, oversize round piers, and terrazzo floors. The second floor functions as a mezzanine and a glass half wall with metal handrail surrounds the central opening which is occupied by the central lobby escalators. The opening includes oversize replacement pendant lights and the remainder of the ceiling includes recessed incandescent lighting. The second floor lobby features interpretive plaques, a bust of Henry J. Kaiser, a film on Kaiser, and comics celebrating Kaiser’s legacy.



**Figure 5. Lobby, view from southeast.
Page & Turnbull, 2008**

Auditorium

The corridor leading to the auditorium features polished stone wall panels, decorative aluminum wall cladding, and hanging incandescent light fixtures. The auditorium was occupied and not available during the time of the site visit.

Office Spaces

Typical office spaces include a curving corridor with offices flanking the central lobby space. The majority of offices have undergone multiple tenant improvements and feature partition walls, carpeted floors, recessed fluorescent lighting, and hollow-core wood doors. However, some offices retain original details such as aluminum partition systems, aluminum doors in a variety of finishes, and suspended ceilings with original perforated aluminum ceiling tiles.



Figure 6. Tenant space, showing original aluminum door. Page & Turnbull, 2008

D. Mall Buildings, Exterior

The Mall Buildings appear as a strong horizontal base that is contrasted by the verticality of the Office Tower. Constructed in 1959, the 20th Street Mall Building is a three-story and basement building located at the corner of 20th and Webster streets with a rectangular plan and flat roof. The building features oversize circular piers and glazed aluminum storefronts at the first floor giving the main mass of the building the appearance of floating. The first floor features stucco and white brick veneer cladding. The second floor has no fenestration but feature dolomite concrete panels with aluminum cantilevered canopies and vertical granite panels and aluminum fins above the entrances. The penthouse level occupies approximately three-quarters of the floor plate and is set back from the plane of the lower floors. The penthouse level features stucco cladding and closely arranged aluminum sash windows. The remainder of the penthouse level features an aluminum pergola. As of the date of this evaluation, a portion of this floor is vacant, but has traditionally been occupied by a restaurant that accesses the roof garden.

Constructed in 1959, the Webster Street Mall Building is a two-and-three-story building located at the corner of 21st and Webster streets with a rectangular plan and a flat roof covered by the roof garden. The first floor features stucco cladding and fixed full-height aluminum windows. The upper two floors feature slightly protruding dolomite concrete panels with no fenestration. Similar to the 20th Street Mall Building, the main mass of the building appears to float above the first floor.



**Figure 7. 20th Street Mall Building, view from southeast.
Page & Turnbull, 2008**

E. Mall Buildings, Interior

The first floor of the 20th Street Mall Building includes terrazzo floors, gypsum board walls, some clad with brick veneer, a projecting paneled frieze, and spray acoustical ceiling. Lighting fixtures include recessed fluorescent and incandescent lights. Storefronts are glazed aluminum with glazed aluminum doors. The central space includes narrow, free-standing escalators. Other unique finishes, such as the



**Figure 8. 20th Street Mall Building, interior. View of escalator lobby.
Page & Turnbull, 2008**

wood-clad column at the 20th Street lobby, were tenant improvements. The interior of the 20th Street Mall Building retains few original finishes, limited to terrazzo floors. The second and third floors include escalators, gypsum board walls and ceilings, carpeted floors, rubber base, and recessed fluorescent and incandescent lighting. Office spaces have been significantly altered over time and include partition walls, carpeted floors, rubber base, suspended ceilings, and recessed fluorescent lighting.

The Webster Street Mall has also undergone similar alterations and the first floor features gypsum board walls with dolomite panels, terrazzo and rubber base, fully glazed aluminum storefronts, glazed aluminum doors, metal doors, spray acoustical ceilings, and recessed fluorescent lighting. The original finishes include terrazzo floors and dolomite panels. The Webster Street Mall is situated slightly above the 20th Street Mall due to the change in grade.

The staircase connecting the two sections of the Mall features terrazzo treads and risers, and aluminum handrails. The corridor features display cases with aluminum surrounds. The main entrance to the 24 Hour Fitness is recessed and features a marble surround with a replacement aluminum storefront. The northern section of the corridor features polychrome asphalt tiles in a random pattern and stairs with tubular aluminum handrails up to a secondary entry to the gym. This northern section of the Mall includes a glazed aluminum storefront with glazed aluminum door and sidelight. This portion of the corridor features a suspended ceiling, recessed fluorescent lighting, and access to the parking garage.

F. Roof Garden

The Kaiser Center roof garden was constructed between 1959 and 1960 and is located on the top level of the parking garage at the northwest corner of the complex. The roof garden is rectangular in plan, except at the eastern edge, where the garden parallels the arc of the tower's main façade. The



Figure 9. Roof Garden, view from tower. Page & Turnbull, 2008

garden features curvilinear aggregate pathways, a series of irregularly-shaped undulating lawns, a circular lawn located in the center of the garden, low concrete curbing, specimen trees, shrub plantings, concrete benches and related site furnishings, and an 8,800 square foot reflecting pool. The pool features a wood bridge which was added between 1973 and 1975. A visual axis begins at the main entrance to the garden at the 20th Street Mall Building and runs through the reflecting pool and central circular lawn. A concrete HVAC building is located in the northwest corner of the garden. The building is approximately eighteen feet in height, clad in stucco and capped by a flat roof. The HVAC building is screened by specimen trees to alleviate the visual intrusion of this building within the garden.

V. HISTORIC CONTEXT

This historic context statement contains three sections; an overview of the history of Oakland since its incorporation, a brief history of the Kaiser Center site including a construction chronology, and an account of individual persons and trends significant to the development of the Kaiser Center.

A. Oakland History

On March 25, 1852, the town of Oakland was incorporated.⁴ Named for an oak grove that stretched from Lake Merritt to the bay, the city encompassed the present-day downtown and West Oakland to 22nd Street.⁵ It had less than one hundred citizens, who elected Horace W. Carpentier, a graduate of Columbia University's law school and early developer, as the city's first mayor.⁶

Oakland saw rapid growth and improvement after transportation connections were established with other communities.⁷ Ferry service to San Francisco began in 1854, and San Antonio and Clinton were connected with Oakland by a bridge built in 1856. Commercial and industrial businesses were established near the wharves, and a railroad ran through downtown Oakland by 1863.⁸

In 1868, Oakland was chosen as the western terminus for the Transcontinental Railroad. Beginning in 1869, the train, a "great 'Iron Horse' with tireless lungs," brought tourists and workers to California and made Oakland a major port city and manufacturing center.⁹ West Oakland became a shipping hub for western U.S. factories and a processing and manufacturing center for raw commodities such as agricultural products and lumber. As Oakland became an increasingly popular industrial core, residential and commercial communities expanded in the city limits. In 1873, Oakland became the county seat of Alameda County.¹⁰ By 1880, the city's population rose to 34,555, more than twenty times what it was in 1860.¹¹ Many of the new residents were San Francisco commuters drawn by Oakland's relatively low density and the ferry service across the bay and railroad workers, many of whom were African Americans.¹²

⁴ *Ibid.*, 27.

⁵ Historic Preservation Element, 1-4.

⁶ Bagwell, 27.

⁷ Historic Preservation Element, 1-4.

⁸ *Ibid.*, 1-5.

⁹ Rather, 53-54.

¹⁰ Historic Preservation Element, 1-5.

¹¹ Bagwell, 59.

¹² Historic Preservation Element, 1-5.

Promotional materials advertised Oakland's "world-renowned" climate, the prosperity of its citizens, its paved streets and extensive streetcar lines, and the culture found in "the Athens of America."¹³ It was home to several colleges, including the College of California (the precursor of the University of California), Mills Seminary (later Mills College), and St. Mary's College. By 1895, the city held four daily newspapers in English, fifty churches, fourteen schools, and four theaters or opera houses. Hospitals, literary societies, and a public library rounded out Oakland's cultural offerings.

The city expanded by annexing existing settlements and developing new districts.¹⁴ Clinton, San Antonio, and Lynn (or Brooklyn) were annexed in 1872, pushing Oakland's city limits out to 36th Street.¹⁵ Fruit Vale (later Fruitvale) and Jingtletown grew around fruit orchards to the east, and Melrose, Fitchburg, and Elmhurst developed around railroad stations.¹⁶ The small Temescal community expanded in the 1860s with the installation of a telegraph line down present-day Telegraph Avenue and the establishment of a streetcar line to the University of California Berkeley. Klinknerville, later Golden Gate, developed around Stanford and San Pablo avenues. Recreational facilities like the Tubbs Hotel and Idora Park spurred expansion into areas such as East Oakland and North Oakland. Neighborhoods north of Lake Merritt were annexed in 1891, and Temescal, Golden Gate, and other North Oakland neighborhoods were annexed in 1897.¹⁷ By 1900, Oakland's population numbered almost 67,000.

The 1906 Earthquake and Fire sent thousands of San Francisco residents to the East Bay for temporary and permanent housing. Oakland continued to grow geographically, increasing nearly to its present size in 1909, with the annexation of the hills area, Fruitvale, Melrose, Elmhurst, and the area south to San Leandro.¹⁸ With that move, the city's area increased from 22.9 to 60.25 square miles. Meanwhile, private developers saw an opportunity to plan communities for both the affluent and working classes in North Oakland, West Oakland, and East Oakland neighborhoods.

Post-earthquake development reinforced the city center at 14th Street and Broadway. The First National Bank of Oakland (now the Broadway Building), the Oakland Bank of Savings, the Security Bank Building, the Oakland Hotel, and the Federal Realty Building (now Cathedral Building) were constructed in this area between 1907 and 1914. Oakland's City Hall was the first city hall in the

¹³ Rather, 63.

¹⁴ Bagwell, 59.

¹⁵ Historic Preservation Element, 1-5.

¹⁶ *Ibid.*, 1-6.

¹⁷ *Ibid.*, 1-7.

¹⁸ *Ibid.*, 1-7.

United States designed as a skyscraper. Other civic projects included the Civic Auditorium, new fire stations, and parks around the city.¹⁹

In 1910, the City of Oakland assumed control of its waterfront, which was previously held by private entities. The change of ownership prompted the expansion of the Port of Oakland. The increased presence of the port, combined with the rail network and its geographic position, boosted the city to a leading industrial and warehousing center.²⁰ During World War I, Oakland's shipyards provided a "fleet of steel and concrete ships that...within the short space of a year put the Oakland estuary in the national limelight."²¹ By 1918, at least 50,000 people were employed by the shipyards.

The 1920s saw continuing prosperity in Oakland.²² Civic works abounded, including a new lighting system turned on by Charles Lindbergh, and land for an airport was purchased. Several automobile manufacturers located assembly plants in East Oakland, making Oakland "the Detroit of the West."²³ The city was proclaimed "One of the Nation's Richest, Greatest Communities" in 1929.

Development slowed during the Great Depression, but Oakland grew into a major shipbuilding center during World War II.²⁴ Henry J. Kaiser, the developer of the Kaiser Center, was influential in shipbuilding in area. In fact, the Kaiser Shipyards in Richmond were responsible for constructing more ships during World War II than any other shipyard in the United States.²⁵ The city expanded with wartime workers, including many African Americans who migrated from the south. The Bay Bridge, which opened in 1936, eased the commute to San Francisco and likely attracted more Oakland residents. In 1945, the city's population was 405,301.

After the war, the Port continued to grow, largely because of its ability to capitalize on the rise of containerized shipping. This shipping method favored the Port's large landholdings, spacious waterfront, and access to rail and truck transportation routes over the older, more crowded Port of San Francisco.²⁶ By the late 1960s, Oakland had the second largest container port in the world.²⁷

¹⁹ Ibid., 1-8.

²⁰ Ibid.

²¹ Florence B. Crocker, *Who Made Oakland?* (Oakland: Clyde Dalton, 1925), quoted in Rather, 87.

²² Rather, 89.

²³ Historic Preservation Element, 1-8.

²⁴ Ibid., 1-9.

²⁵ For more information on Henry Kaiser, please see **V. Historic Context, F: Henry J. Kaiser, page 32.**

²⁶ Michael Corbett with Marjorie Dobkin and William Kostura. "National Register of Historic Places Registration Form: Port of San Francisco Embarcadero Historic District" (January 2006), 21.

²⁷ Corbett, 43.

Transportation has directly impacted Oakland's physical development. The postwar emphasis on the automobile led to the development of suburbs and new freeways to reach these outlying areas.²⁸ Freeway construction and redevelopment enticed or forced businesses and residents away from the city center and destroyed historic fabric in downtown and West Oakland.

In the 1970s, Oakland became the headquarters of the Bay Area Rapid Transit (BART) system.²⁹ A tight real estate market in San Francisco in the early 1980s sparked new development and preservation projects in Oakland, especially downtown.³⁰ Homebuyers began seriously considering Oakland neighborhoods, many of which retained strong local character.³¹

Although the 1989 Loma Prieta earthquake damaged many of Oakland's historically significant buildings, in recent years there has been an effort to attract residents to downtown, redevelopment projects have been undertaken around the city, crime has decreased, and homeownership has increased.³²

B. Site History

Lake Merritt

Lake Merritt was originally a wide, tidal estuary known as Laguna Peralta. At low tide, the marsh would turn into a mud flat and due to its location on the Pacific Flyway; it was (and remains) a stopping place for thousands of migratory birds. In 1867, Dr. Samuel Merritt, then Mayor of Oakland, donated 155 acres of tidal water from the headwaters of Indian Slough to the City. It became known as Merritt's Lake and later Lake Merritt. In 1870 the area was declared a National Wildlife Refuge, said to be the first in North America. Merritt envisioned the estuary as a regular level lake, and proposed a dam at what is now 12th Street to reduce the tidal flow. Merritt had the dam constructed mostly with his own money, and later the lake was deepened by dredging and a retaining wall was built around the lake's perimeter. The road around the lake was paved some time between 1907 and 1915.

After the lake was dammed its shores became an attractive real estate location. By the 1860s to 1870s, the perimeter of the lake was home to the city's wealthy residents who had large houses and boat

²⁸ Historic Preservation Element, 1-9.

²⁹ Annalee Allen, *Oakland* (San Francisco: Arcadia Publishing, 2005), 109.

³⁰ Bagwell, 260-262.

³¹ *Ibid.*, 263.

³² Historic Preservation Element, 1-9; Mayor Jerry Brown, "Oakland Now: State of the City Report 1999-2005" (Oakland: City of Oakland, 2006), 6, 8, 11.

houses on the lakeshore. The Camron-Stanford House was constructed in 1876 by Merritt and was one of the first of many stately homes that lined the lake.

College of the Holy Names

The subject property was first developed when the Convent of the Sacred Heart was constructed in 1868. Father Michael King, the priest of the Church of the Immaculate Conception, purchased the five-acre campus site in 1866 for \$4,922.³³ Though the site on Lake Merritt was considered “far out in the country, wild and brush-covered,” King envisioned a large convent and novitiate that would not fit on the city blocks near the church. Two years later, the two-and-a-half-story convent was built in time for the arrival of the Sisters of the Holy Names. An addition to the convent was constructed later that year; it likely contained additional living quarters and classrooms. In 1873, a four-story multi-purpose building was built to house the sisters’ growing school, and a chapel was constructed in 1885.³⁴ An auditorium and music hall building was constructed in 1909.³⁵

According to the 1889 Sanborn Fire Insurance Maps, the area surrounding the subject property was sparsely developed with residential buildings. The blocks to the south included one and two-story single family dwellings, the larger more ornate homes were located near the lake and included guest houses and boat houses. The blocks to the north included a three-story single family dwelling, a one-story dwelling, and three one-story shed buildings.



Figure 10. Sanborn Fire Insurance Map, 1899
Altered by author to show
approximate boundaries of subject property

In 1903, the area surrounding the subject property remained sparsely developed. The 1903 Sanborn Fire Insurance Map indicates the proposed Harrison Street at the edge of Lake Merritt. The blocks to

³³ “Site of College of the Holy Names” (n.d.), 1.

³⁴ One article puts the construction date of the four-story building at 1871. (“Negotiations Start for Purchase of Holy Names College Lakeside Campus” (*Oakland Tribune*, n.d.))

³⁵ *Ibid.*

the north included an old water tankhouse and a two-story dwelling. The blocks to the south include elaborate single-family residences. The block to the east of Alice Street included a large parcel with a two-story single family dwelling, outhouse and servants building, playhouse, boat house, outbuildings, arbor, and ornamental gardens. The block to the west of Alice Street included one- and two-story single-family dwellings.

In 1912, the area surrounding the subject property was primarily residential, with some industrial uses west of Franklin Street. The blocks to the north included a three-story apartment building on Harrison Street, one and two-story single family dwellings, and a Home for the Aged of the Little Sisters of the Poor. The blocks to the south of the subject property were occupied by apartment buildings and single family homes.

According to the 1950 Sanborn Fire Insurance Maps, the area surrounding the subject property was occupied by a mixture of commercial and residential buildings. The block to the north included a Buick car dealership and car-related businesses including a gas station, and auto repair. The block also included a Federal government building, small offices, a store, and multiple family apartment buildings as well as single family homes and a boarding house.³⁶

Purchase of the Kaiser Center Site

By the mid-1950s, the Holy Names campus was considered close to downtown. Various commercial interests began to discuss the potential of purchasing the site, which covered a large parcel over a city block in area.³⁷ On June 27, 1955, Kaiser Industries acquired the Holy Names site for a reported sum of \$2,560,000.³⁸ Kaiser had based his headquarters in Oakland since 1921 and at the time of the acquisition the main office was located at 1924 Broadway. After the sale, the College of the Holy Names was relocated to a hillside site at Redwood Road and Mountain Boulevard. The Kaiser Center site was cleared beginning on June 24, 1957.

C. Design of the Kaiser Center

Kaiser Center Buildings

From the beginning, Henry J. Kaiser, the magnate of the Kaiser industrial empire, intended to consolidate the Kaiser offices located around Oakland. Welton Becket and Associates, a Los Angeles

³⁶ Sanborn Fire Insurance Map, Oakland, 1950, v 2, sheet 156.

³⁷ "Negotiations Start for Purchase of Holy Names College Lakeside Campus" (*Oakland Tribune*, n.d.)

³⁸ "Kaiser Buys College Site on Lake for Huge Project" (*Oakland Tribune*, June 28, 1955).

architecture firm that designed prominent office and hotel buildings, was hired as the project architect.³⁹ Welton Becket had recently designed Kaiser's Hawaiian Village, a resort in Honolulu, Hawaii; therefore the Kaiser Center appears to have been a continuation of their working relationship.

At the time of the commission, it had not been determined whether the Kaiser Center would be designed with a large footprint and low profile or as a tower.⁴⁰ In 1956, a model of the Kaiser Center was unveiled that showed the building configuration and design, including a twenty-five-story office tower and a hotel.⁴¹ Kaiser had told Becket that the building should be "an outstanding piece of architecture...a showcase in the use of Kaiser products," and Becket complied.⁴² The building employed 1,000 tons of anodized aluminum; 8,000 tons of steel; 60,000 cubic yards of concrete; 98,000 tons of aggregates and dolomite; and 250,000 yards of gypsum products from Kaiser Industries.⁴³ Aluminum alone was used in exterior curtain walls and as sheets, strips, fluted panels, and artwork.⁴⁴ As a result of these efforts, the Kaiser Center contained 80 percent Kaiser products or Kaiser raw materials.⁴⁵

Kaiser Center Roof Garden ⁴⁶

The Kaiser Center roof garden is sometimes credited to Henry J. Kaiser, the magnate of the Kaiser industrial empire, who purportedly wanted a more pleasant view from his twenty-eighth-floor office than a rooftop parking lot. A later account credits Edgar F. Kaiser, Henry Kaiser's son, with the impetus for the garden as a semi-public park.⁴⁷ Edgar Kaiser had previously worked in a New York office that overlooked the Rockefeller Center roof gardens, and it is likely that his support of his father's idea helped make the roof garden a reality.

Whoever made the decision, it was made before construction on the Kaiser Center began; the top floor of the parking garage was not designed for parking, and plans for the garden were developed as early as 1956. References in Kaiser's papers include a proposal for a hotel overlooking a roof garden

³⁹ Theodore Osmundson, Jr., "Kaiser Center Roof Garden" (*Landscape Architecture*, October 1962), 15; "I Want a Showcase" (*Oakland Tribune*, September 27, 1960), K-7.

⁴⁰ "Kaiser Buys College Site."

⁴¹ "Raft Foundation for Kaiser Building" (*Oakland Tribune*, May 11, 1956).

⁴² "I Want a Showcase" (*Oakland Tribune*, September 27, 1960), K-7.

⁴³ "Kaiser Center...A Kaiser Product" (Kaiser Center brochure, ca. 1964).

⁴⁴ Alfred Frankenstein, "Glass Curtain for Aluminum" (*San Francisco Chronicle*, September 27, 1960).

⁴⁵ "I Want a Showcase."

⁴⁶ Unless otherwise noted, all material in this section is drawn from the Historic American Landscape Survey (HALS) research material on the Kaiser Center Roof Garden.

⁴⁷ Theodore Osmundson, *Roof Gardens: History, Design, and Construction* (New York: W.W. Norton & Company, 1999), 92.

on the parking garage. A 1957 Kaiser press release announced that the garage roof would include an outdoor ice skating rink and an aluminum geodesic dome. The Oakland City Planning Commission approved the plans in April 1957. The Commission's approval was subject to three conditions, and the first two dealt with roof areas: "All roof areas up to and including the roof of the top floor will be properly landscaped...No tar and gravel roofs will be visible."⁴⁸ Perhaps as a tradeoff the commission granted variances on height and setback requirements, and part of Lake Merritt was filled for project-related street widening. However, regardless of the conditions placed on development, it appears the only roof area to be landscaped was the Kaiser Center Roof Garden.⁴⁹

In 1956, the landscape firm Osmundson & Staley, that had previously completed work for Edgar Kaiser at his house in Lafayette, was recommended to design the roof garden. Osmundson & Staley assembled a project team that included Theodore Osmundson, John H. Staley, David Arbegast, John Sue, and Walt Guthrie.

Design of the Roof Garden

Associate David Arbegast served as the principal designer for the roof garden project. He produced twenty plans for the three-and-one-half-acre garden, which were reviewed by A. B. Ordway, Vice President of Kaiser Industries. Ordway was not in favor of the garden installation and rejected most of the original plans. Finally, he chose one design from the final three in 1959.

According to Staley, the garden plan was organized along a north-south axis running from the main garden entrance at the third floor of the 20th Street Mall across the reflecting pool to the central circular lawn and plaza.⁵⁰ The 16-inch-deep reflecting pool, which a 1960 *Oakland Tribune* article described as the approximate shape of Lake Merritt, was designed to contain water circulated by perimeter jets. Curving concrete walkways wound around the planting areas, which were mounded around the trees and in some lawn spaces.

All plans for landscaping, planting, grading, and irrigation were completed by John Sue. Sue added more graded mounds to Arbegast's original design, which was essentially flat save for mounds of soil around the trees. The garden's gently undulating landscape reflects this change. Sue left the firm before the garden installation was completed, and Walt Guthrie may have worked on the plans after Sue's departure from the firm.

⁴⁸ "Initial Plans Approved for Giant Kaiser Center" (*Oakland Tribune*, April 11, 1957).

⁴⁹ No documentation was located which could clarify why only one of the three original conditions of approval was met.

⁵⁰ John Staley to Jack Rasmussen (KCI Public Relations, September 20, 1960), quoted in Historic American Landscape Survey (HALS) research material

Materials and Plants

Weight was a primary consideration in the roof garden design, as the Kaiser Center roof was not designed to support large loads. The roof had a load-bearing capacity of just 135 pounds per square foot, with a capacity of 15,000 pounds per square foot for the supporting columns and roof drains. To accommodate the limited capacity, a specialized version of the University of California's Basic Mix B (also called Soil Mix and Soiless) was developed by the U.C. Davis Soils Laboratory in concert with Osmundson & Staley. Developed to be lighter than ordinary soil and the original Basic Mix B, the mix substituted fine expanded shale for heavier sand. It also contained crushed lava rock, peat moss, and fertilizers. The soil mix proved effective at retaining air and water, maintaining an aerated growing medium.⁵¹

The load-bearing capacity affected the tree species chosen for the garden. The selected trees had fibrous root systems that can spread out horizontally. Forty-two olive, holly oak, Japanese maple, and southern magnolia trees were installed as "specimen trees" over load-bearing columns. Nearly 13,500 small flowering plants and shrubs in thirty varieties were planted around the garden.⁵² Plants included 1,800 small shrubs (such as rhododendrons and azaleas), 735 rose bushes, and 10,700 ground cover plants.

The concrete paving, which covers about 30,000 square feet, was composed of lightweight materials with a surface of exposed Kaiser river gravel stained black with oxide. Benches in the garden were made of lightweight cement with white Kaiser Dolomite aggregate at the surface. The twenty-four large boulders included in the garden are lightweight pumice stone.

The garden was originally lit at night with walk lights, pedestal lights, and mercury vapor lights that highlighted the trees. Automatic underground irrigation was controlled by timers.⁵³

⁵¹ Osmundson, *Roof Gardens*, 172.

⁵² "Kaiser Center Features Aerial [sic] Garden."

⁵³ "The View from Above" (*Architectural Review*, February 1964), 144.

Construction

John Staley supervised the roof garden installation. Loose construction materials such as soils and wet concrete were lifted by a construction elevator that filled vehicles waiting on the roof. Heavy equipment was restricted to paths on the grid line of supporting columns, and tractors, loaders, and spreaders were required to have rubber tires.



Figure 11. Kaiser Center Roof Garden, ca. 1960. Kaiser Center Archives

After the basic garden design was laid out on the roof's concrete surface, the garden was built up with layers of materials. Concrete forms were poured for elements such as the pond curbs. A four-inch layer of lightweight aggregate drain rock was spread over the entire roof surface to facilitate drainage. A filter layer of rice straw covered the rock layer, holding the soil in place until a natural structure developed.⁵⁴ Normal topsoil was used to cover relatively shallow areas such as lawns, which were six inches deep.⁵⁵ The lightweight U.C. mix was used to build the rolling landscape and tree mounds to depths of thirty inches.⁵⁶ Together, these soil types constituted six thousand cubic yards of fill. After plants were installed, fir bark chips were spread over planting beds and ground cover.

Drainage was an important consideration. Every other supporting column contained a downspout that led to a storm sewer in the basement.⁵⁷ When the garden was installed, the existing roof drains were extended upward to be flush with the roof garden grade. Where that was not possible, a new catch basin was installed at the low point and the water was piped to a roof drain.

⁵⁴ Ibid.

⁵⁵ Ibid., 93.

⁵⁶ "Landscaping is distinctive" (*Oakland Tribune*, September 27, 1960), 32-K.

⁵⁷ Osmundson, "Kaiser Center Roof Garden."

Cranes lifted trees to the roof. The trees were placed over supporting columns, as these were the only places that could support their weight. They were planted in their plank delivery boxes, which formed part of a wood subsurface bracing system that made visible guylines unnecessary. The designers expected a natural subsurface system to stabilize the trees by the time the bracing decayed.

The 3½-acre roof garden atop the parking garage opened to the public on October 3, 1960.⁵⁸ One reporter marveled, “One has no sense of being on a roof at all, but in a small park from which the immense, skyward lunge of Becket’s building can be seen...”⁵⁹ The Kaiser Center roof garden received early recognition: in 1962, the American Society of Landscape Architects awarded the garden the Industrial Landscape Design award.⁶⁰ The garden was documented by a variety of publications, including *Sunset* magazine, *Landscape Architecture*, and *Landscape Design and Construction*. Overall, the garden was highly regarded by landscape architects, and was the center piece of the Kaiser Center complex.

⁵⁸ “‘Park in the Sky’ to Open at Kaiser Center” (*Oakland Tribune*, October 2, 1960).

⁵⁹ Frankenstein.

⁶⁰ Osmundson, “Kaiser Center Roof Garden.”

D. Construction Chronology

Kaiser Center Buildings

Construction of the steel-frame, aluminum-and-glass-clad Kaiser Center began in May 1958 and was completed in late 1959.⁶¹ Final construction costs reached \$46 million, and Henry Kaiser could boast of having the largest building west of Chicago, with 976,000 square feet of space.⁶² The first employees moved into the office tower on December 20, 1959.⁶³ The Kaiser Center officially opened on September 27, 1960.⁶⁴ It included a twenty-eight-story office tower, with three basement levels; a three-story department store; and a five-level, 1,200-car parking garage.



Figure 12. Kaiser Center, ca. 1960. Kaiser Center Archives

Ordway Building

By 1967, the growth of the Kaiser industries created the need for additional office space.⁶⁵ An office tower was planned to the north of the existing tower. The twenty-eight-story new tower was called the Ordway Building after A. B. Ordway, the vice president of Kaiser Industries.⁶⁶ Designed by Skidmore, Owings & Merrill, construction of the Ordway Building began in 1968 and was completed in 1970. The building cost \$30 million and, like the Kaiser Center, employed Kaiser products extensively.⁶⁷

⁶¹ "Kaiser Center" (likely Kaiser publication, received in Oakland Public Library on August 14, 1959); "Twenty-Eight Stories High" (*Oakland Tribune*, January 7, 1959); "New Kaiser Center" (*San Francisco Examiner*, August 27, 1959).

⁶² "New Kaiser Center"; "Glass Curtain for Aluminum" (*San Francisco Chronicle*, September 27, 1960); "Gross Area Near Million Square Feet" (*Christian Science Monitor*, October 16, 1959).

⁶³ "Kaiser Starts Move to New Headquarters" (*Oakland Tribune*, December 20, 1959).

⁶⁴ "Glass Curtain for Aluminum."

⁶⁵ "City Hails Kaiser's New High Rise" (*Oakland Tribune*, August 20, 1967).

⁶⁶ "A. B. Ordway Opens New Building Named for Him" (*Oakland Tribune*, February 28, 1971).

⁶⁷ "New Kaiser Tower – 28 Stories High" (*Oakland Tribune*, September 5, 1968); "Pedestrian Bridge" (*Oakland Tribune*, August 9, 1970); "Ordway Building Vital Statistics" (*Oakland Tribune*, February 28, 1971).

Master Plans

Even before the Ordway Building opened, the consulting firm of Cushman & Wakefield was engaged to prepare a long-range plan for the Kaiser Center.⁶⁸ The plan, released in early 1971, recommended an \$85 million expansion project including a third office tower, motor hotel, engineering center, and a combined industrial museum and library.⁶⁹ No new construction resulted from the Cushman & Wakefield plan, likely due to an economic slowdown.

More master plans were developed for the Kaiser Center complex in 1982 and 1987. Both master plans saw a natural growth for an office campus in the form of additional skyscraper office towers connected with pedestrian walkways, roof top gardens, and sky bridges. According to the 1987 document, “The Master Plan builds on the unique quality of the existing complex and provides the framework to make Kaiser Center one of the world’s finest corporate urban centers.”⁷⁰

The 1987 Master Plan completed by David Stringer & Associates of Honolulu, Hawaii called for the addition of four major towers connected to the existing Kaiser Center with a large pedestrian plaza. The Master Plan recommended closing vehicular access to 21st, 22nd, and Kaiser Plaza and creating the



Figure 13. Master Plan Model, 1986. Kaiser Center Archives

Kaiser Center as a pedestrian-oriented office park. The Ordway Building, at the center of the planned development, was envisioned to become the focus of the plaza. In addition to new construction, the Master Plan also called for the remodeling of the Mall Buildings. However, these master plans were never realized.

⁶⁸ John Dengel, “Kaiser Plans Major Expansion” (*Oakland Tribune*, April 28, 1970).

⁶⁹ Bill Martin, “Kaiser Maps \$85 Million Expansion” (*Oakland Tribune*, February 28, 1971).

⁷⁰ Kaiser Center, Inc., *Kaiser Center Master Plan*. 1986.

Later Alterations

In the 1990s, the lobby of the office tower was renovated according to designs by Charles F. Jennings, Architect. The lobby renovations included new marble wall cladding, removal of the aluminum finishes in the elevators, enclosures for the escalators, the insertion of a new circular fountain in the escalator enclosure, and the replacement of hanging pendant lighting fixtures in the lobby and first floor retail at the office tower.

In 2003, Summit Commercial, a Los Angeles real estate company, acquired the Kaiser Center for \$100 million.⁷¹ Swig Company of San Francisco purchased the Kaiser Center in 2005 for \$200 million.⁷² The Kaiser Center remains in use as a commercial complex with a central office tower with retail at the first floor, a three-and-four-story parking garage with Roof Garden, and two Mall Buildings with retail and office space.

Mall Buildings

Designed for the White House Department Store, the Mall Buildings were vacated by the original tenant early in their history; the White House was replaced by the Joseph Magnin Department Store in 1961. In 1965, the Joseph Magnin Department Store was replaced by multiple tenants. After the Loma Prieta Earthquake, repairs and cosmetic changes were made to the Mall Buildings. Charles F. Jennings, Architect designed the alterations which included aluminum covers over the columns; granite veneer tile, aluminum fins and canopies above the entries of both buildings; and a new pyramidal roof above a portion of the 20th Street Mall Building. Over time the Mall Buildings have been occupied by retail shops, an airline center, banks, restaurants, and office space. Due to the changes in use, the Mall Buildings have undergone significant interior alterations due to tenant improvements.

20th Street Mall

According to building permits, tenant improvements affecting the interior of the 20th Street Mall took place in 1965, 1966, 1978, 1981, 1989, 1990, 1993. Such extensive interior remodeling is characteristic of commercial spaces that commonly change use over time. Exterior alterations at 344 20th Street took place as early as 1966, when the owners received a permit to install new canopies at 20th Street, Webster Street, and the Driveway entry. In April 1966, the owners received a permit to

⁷¹ "Oakland's Landmark Kaiser Center Is Sold" (*San Francisco Chronicle*, March 19, 2003).

⁷² "Swig Co. of S.F. Acquires Kaiser Center in Oakland" (*San Francisco Chronicle*, June 16, 2005).

add new windows at the 3rd floor. Both of the 1966 improvements were designed by Welton Becket and constructed by MacDonald & Nelson, builders.

The 20th Street Mall Building was damaged in the 1989 Loma Prieta Earthquake and exterior changes included the repair and replacement of elements damaged in the earthquake. These damaged elements included: exterior soffits, the trellis at the roof of the 20th Street Mall, and a stairwell.

Webster Street Mall

According to building permits, tenant improvements affecting the interior of the Webster Street Mall took place in 1961, 1963, 1972, 1979, 1981, 1985, 1986, 1987, 1991. According to building permits, the 20th Street Mall underwent exterior changes as early as 1961 when the building was remodeled by architect Victor Gruen to serve as the Joseph Magnin department store. The owners received a permit to remove existing glass windows in 1981. In 1982, the owners received a permit to insert automatic teller machines (ATMs) into the exterior walls.

Kaiser Center Roof Garden

The original design included a semicircular wood and aluminum garden shelter and an aluminum and concrete bridge across the reflecting pool. These elements were not built when the garden was installed in 1960. A wooden bridge was constructed across the pool sometime between 1973 and 1975.

Around 1967, an interpretive sign was installed showing the garden plan and a list of plants. In 1974, a storage shed was added to the HVAC and elevator housing building. A handicap access ramp may have been added at that time. The 1989 Loma Prieta earthquake damaged some garden walks, which were repaired.⁷³ A few trees have been replaced.⁷⁴

E. Office Center Development on Lake Merritt

The construction of the Kaiser Center marked the beginning of the expansion of the city's office center from downtown Oakland to the shores of Lake Merritt. Prior to the Kaiser Center, nearly all large commercial buildings were centered on Broadway and between 11th and 20th Streets.

⁷³ Osmundson, *Roof Gardens*, 171.

⁷⁴ *Ibid.*, 171.

According to the *Architect & Engineer*, “Kaiser Center, just southeast of downtown, is in itself a second skyline slightly stronger than the first.”⁷⁵ The Kaiser Center marked the first development of modern high-rise office towers on the northwest shore of Lake Merritt. The Ordway Building (1970), also constructed by Kaiser was built across Merritt View Place from the Kaiser Center, and the buildings were connected by a sky bridge. Other modern office buildings were constructed in the area including the twenty-seven-story Lake Merritt Plaza (1986) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s, including the twenty-five-story Kaiser Engineering Building (1984) and the twenty-story Pacific Bell Building (1985), are located on prominent intersections in the immediate area.

F. Henry J. Kaiser

Henry J. Kaiser was born to German immigrants on May 9, 1882 on a farm in upstate New York.⁷⁶ Kaiser grew up as the youngest of four children, and the only boy. He quit school at age 13 and found a job at a dry-goods store in a nearby town. Three years later, he began working in a photography studio, and invested in his own studio in Lake Placid, New York, in 1901. At the age of 19, he moved to Florida, where he managed several photography studios until his future father-in-law, lumberman Edgar Fosburgh, commanded him to go west in 1906. Kaiser, hoping for the hand of Bess Fosburgh after he had established himself in a more “substantial” business than photography, went west.

He landed in a hardware store in Spokane, where he worked for four years. Kaiser and Bess Fosburgh were married in 1907, and their son Edgar was born in 1908. In 1910, Kaiser joined a fuel company, then a construction company in



Figure 14. Henry J. Kaiser, *Honolulu Star Bulletin*

⁷⁵ “Lakeside Colossus,” *Western Architect and Engineer* 1.1 (December 1960): 17.

⁷⁶ Mark S. Foster, *Henry J. Kaiser: Builder in the Modern American West* (Austin, TX: University of Texas Press, 1989).

1911. The construction company built roads, providing Kaiser with the experience he would need to open a road-paving contracting business in Vancouver in 1914.

It was a good time to be in the paving business. The U.S. passed a federal highway bill in 1916, creating the beginning of the national highway system. State and local governments followed the national lead and funded many road improvements, especially in areas beyond town limits where roads were often rutted and unpaved. Americans bought cars and took to the open road in droves. Kaiser prioritized speed, quality, and constant improvement in his work and soon won paving contracts in Washington, Oregon, California, and even Cuba. In 1921 he located the headquarters of his growing company in Oakland, California.

By the late 1920s, Kaiser won contracts to lay pipeline for natural gas companies in the southern Great Plains. He also began building dams, steady business during the otherwise bleak Depression-era economy. His first project was the Hoover Dam; later, he was involved in building the footings for the Bay Bridge.

After Kaiser lost the contract for the Shasta Dam in 1938, he launched a cement company to provide the raw materials for building the dam. This was his first foray into manufacturing durable goods. By 1942, when World War II broke out, he was preparing to compete in magnesium, steel, aircraft, and shipping.

Kaiser opened shipyards in Richmond, California and Portland, Oregon in 1940 and 1941, with yards built at Ryan Point in Vancouver, Washington and Swan Island in Portland, Oregon in 1942. The shipyards first built British ships but later turned out American ships at a prodigious rate, launching one Liberty Ship per month out of Richmond. Competition between the Kaiser shipyards helped break production records, and improvements in shipbuilding techniques also contributed. Kaiser further developed the British subassembly method of prefabricating parts of ships apart from the ship's hull. He also took lessons from the Ford assembly method to achieve greater efficiency and worker productivity. Furthermore, to help meet the demand for steel for shipbuilding, Kaiser moved into the steel business.

Kaiser anticipated peacetime needs and quickly moved to adapt his wartime ventures to meeting those needs. His steel plant produced overtime, shipping steel to Los Angeles and San Francisco. In 1945, the Kaiser Permanente Medical Care Program which was formerly offered to shipyard workers, opened enrollment to the general public. Kaiser began constructing steel-frame homes through

Kaiser Community Homes, a project that lasted only a few years. He coordinated the manufacture of automobiles and cargo planes, increased magnesium production, and launched a successful aluminum business.

In 1954, Henry Kaiser moved to Hawaii, where he became involved in building hotels, beaches, a new city, a hospital, and a cement plant. He also invested in radio and television in the islands. Edgar F. Kaiser took over the management of the Kaiser empire when his father “retired” to Hawaii.⁷⁷ Henry Kaiser died in 1967, but the success of Kaiser Industries continued. By the early 1980s, Kaiser Companies were successful multi-national businesses with highly diversified interests ranging from aluminum and steel to engineering to television broadcasting to real estate development.

G. Welton Becket

Welton Becket was born in Seattle on August 8, 1902.⁷⁸ He was determined to be an architect at an early age, and studied architecture at the University of Washington. After his graduation in 1927, Welton Becket studied at the École des Beaux Arts, Fontainebleau, for a year, and then worked several years as a junior designer for firms in Los Angeles and Seattle. He settled in Los Angeles permanently in 1933, forming a partnership with established Los Angeles architect Charles F. Plummer and Washington classmate Walter Wurdeman. The trio gained considerable local publicity with their design for the Pan Pacific Auditorium in 1935, which won a large international competition and facilitated their entry into Hollywood film circles. The following years saw a series of residential commissions for movie stars such as James Cagney, Cesar Romero, and Robert Montgomery. These were generally executed in traditional Period Revival styles.

Incorporated as Wurdeman and Becket after Plummer’s death in 1939, the firm prospered and expanded during the World War II era, completing public housing and defense projects and positioning themselves well for the region’s post-war construction boom. A commission to build the widely-publicized House of Tomorrow in 1943 in Los Angeles helped highlight the firm.

⁷⁷ “Edgar F. Kaiser, 1908-1981” (Oakland Symphony Program, February 1982).

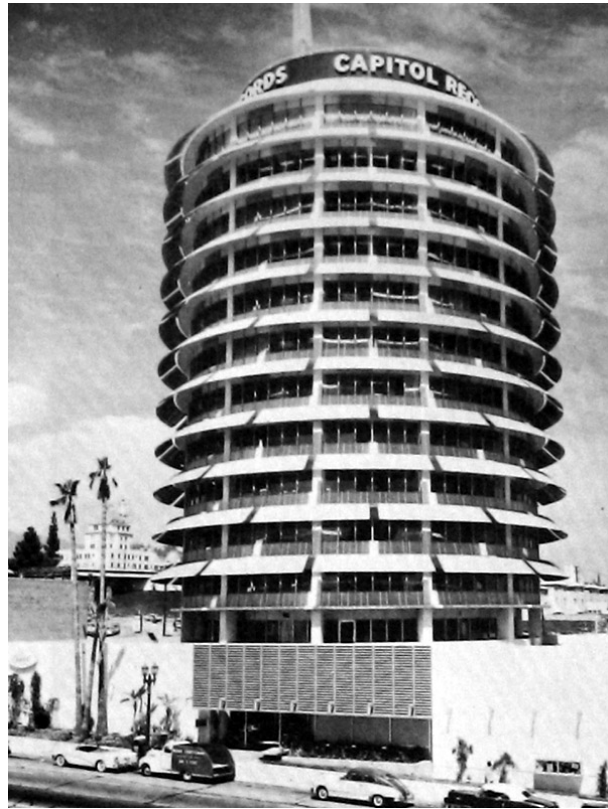
⁷⁸ William Dudley Hunt, Jr., *Total Design* (San Francisco: McGraw-Hill Book Company, 1972).

Now focused on larger commercial and office projects, Wurdeman and Becket's work of the mid- to late-1940s took on aspects of the Late Moderne and International styles. Their best-known commissions included Bullock's Department Store in Pasadena (1944) and office buildings for General Petroleum (1946) and Prudential Insurance (1947) in Los Angeles. These projects soon led to others as the firm expanded its reputation, capacity, and experience in designing many building types.

Following Wurdeman's untimely death in 1949, Becket took over sole leadership of the firm as Welton Becket and Associates. It grew to be one of the largest architectural firms in the United States, with headquarters in Los Angeles and offices in

San Francisco, New York, Houston, and Chicago. Welton Becket and Associates completed numerous high-profile projects around Los Angeles, including such icons of mid-twentieth century Modernism as the Capitol Records Building (1954-56) and the Cinerama Dome, the world's first concrete geodesic dome (1963-1964). The firm was also responsible for the Beverly Hilton Hotel (1955), Memorial Sports Arena (1959), Los Angeles International Airport Theme Building (1962, with Pereira & Luckman and Paul R. Williams), and the Federal Office Building in Los Angeles (1966, with Paul R. Williams and A.C. Martin & Associates).

In addition to the Kaiser Center, commissions in the San Francisco Bay Area included a variety of building types, primarily office buildings and shopping centers. Office buildings in San Francisco include the Bethlehem Steel Company Headquarters Building at 100 California Street (1959) and the Aetna Life and Casualty Company Building at 600 Market Street (1969). The Stonestown Mall, the firm's first shopping center, was located in San Francisco. Stonestown Mall was designed in 1949 and "pioneered the concept of the large regional shopping center with stores clustered around a central



**Figure 15. Capitol Records Building.
*Progressive Architecture.***

mall.”⁷⁹ The Hillsdale Shopping Center in San Mateo was completed in stages during 1954-1967. Despite later alterations, the Hillsdale Shopping Center retains its original pedestrian mall. The Stanford Shopping Center in Stanford was completed in 1957. The Serramonte Center in Daly City (1967) was a contemporary suburban shopping center which features an enclosed, pedestrian mall. Other commissions in the Bay Area included “The Meadows,” a planned unit development in Lucas Valley, Marin County (1965); and the Cathedral at the Crossroads in Castro Valley, Alameda County (1969).

Welton Becket was named master planner for UCLA in 1948 and continued as supervising architect for the campus until 1968. At UCLA, Becket worked closely with Ralph D. Cornell (later Cornell, Bridgers and Troller), supervising landscape architect for the campus, and the companies collaborated on a number of independent projects, such as the Pomona Civic Center and the Ford Motor Company in Dearborn, Michigan.

While working with Walter Wurdeman in the 1930s, Becket embraced the philosophy of “total design,” which guided the firm’s approach thereafter. He encouraged clients to allow the firm to control all aspects of a design, including master/site planning, engineering, all interior work, finishes, fixtures, and landscaping, so that a unified and coherent building would be achieved.

Becket died in 1969, and his son MacDonald Becket assumed leadership of the firm. In 1987, Ellerbe Associates acquired Welton Becket Inc. to become Ellerbe Becket Inc. The firm continues today as Ellerbe-Becket.⁸⁰

H. Theodore Osmundson, Landscape Architect

Theodore Osmundson received a degree in Landscape Architecture from Iowa State University in 1943. Along with Douglas Baylis, Robert Royston, and Lawrence Halprin, Osmundson worked in the office of Thomas Church in San Francisco in the 1940s and was a part of the first generation of Bay Area modern landscape architects. In the 1950s, he became a partner in the firm of Osmundson & Staley of Berkeley. In the 1960s, Osmundson and his son, Gordon, were principals in the firm Theodore Osmundson & Associates. Osmundson’s projects included urban parks, institutional grounds, residences, and office parks. In addition to the Kaiser Center Roof Garden, likely his most

⁷⁹ Ibid, 13.

⁸⁰ This biography is excerpted from the Historic American Building Survey of the Los Angeles Music Center prepared by Teresa Grimes. It was obtained through the Music Center/Performing Arts Center of Los Angeles County (<http://www.musiccenter.org/about/wb.html>, accessed June 16, 2008).

important commission, Osmundson also designed the roof garden for the Standard Oil Building in San Francisco, the roof garden for the Pacific Telephone and Telegraph Company in Sacramento; Marine World in Redwood City; and a master plan for the California State University, Chico campus. In 1967, he was elected president of the American Society of Landscape Architects (ASLA), and was the youngest person at that time to assume the responsibility. He served as ASLA president until 1979. He received the ASLA medal in 1983 and the ASLA president's medal in 1987. He has taught at the University of California at Berkeley and Harvard and has lectured extensively. Publications by Osmundson include major sections of the *Reader's Digest Practical Guide to Home Landscaping* 1972, "Roof and Deck Landscapes" in *Time-Saver Standards* (1988), *Roof Gardens* (1990), and many articles in *Landscape Architecture*.⁸¹ In 1999, Osmundson's book *Roof Gardens: History, Design, and Construction* was published.

I. Modern Office Towers

After World War II as before the war, office towers in America continued to search for new heights. The corporate world of post-War America, which had been spurred on by new ideas and innovation, manifested itself in unabashedly modern glass and steel towers. The masonry cladding and exuberant ornamentation which was common in earlier office buildings such as the Empire State Building in New York City (1931) and the Tribune Tower in Oakland (1923) was replaced by glazed curtain walls and a Modern design aesthetic which eschewed nearly all ornamentation. The forward-looking designs conjured up efficiency, cleanliness, organization and standardization, and were considered suitable icons for 1950s corporate America.



Figure 16. Crown Zellerbach Building, ca. 1959.
National Trust Guide: San Francisco

⁸¹ William A. Mann, *Landscape Architecture: An Illustrated History in Timelines, Site Plans, and Biography* (Hoboken, NJ: John Wiley & Sons, 1993), 360.

The Lever House (1951) designed by Gordon Bunshaft of Skidmore, Owings, and Merrill in New York City was an early archetypal example of the International style commercial high rise. The building featured many elements characteristic of the Modern style. The building included a podium for its mezzanine offices, which created a courtyard at the ground level. The main slab of the building rose vertically, clad in glass and chrome. The building had nearly identical fenestration; the only variation was the expression of mechanical areas with a different glazing pattern. Common variations of commercial skyscrapers included *pilotis* or structural columns at the first floor, effectively raising the volume and creating a courtyard area; and concrete or aggregate panel cladding, especially at secondary façades.

Modern Office Towers in the San Francisco Bay Area

The San Francisco Bay Area followed the commercial office tower trend during the post-war era as evidenced by the number of Modern skyscrapers constructed in the area. One of the earliest and most significant commercial buildings constructed during this time in San Francisco's Financial District was the Crown Zellerbach Building at 1 Bush at Market Street which was completed in 1959, the same year as the Kaiser Center. Designed by Hertzka & Knowles and Skidmore, Owings, and Merrill, the nineteen-story building was the first International style glass curtain wall tower in San Francisco. The services were located in a mosaic tile clad tower. Utilities, elevators, and stairways were located in the attached service tower which allowed the office floors to be entirely open and free of columns. The building is set in a triangular landscaped plaza with a circular one-story building used for branch bank operations.

Like many office buildings across the United States including the Kaiser Center, the Crown Zellerbach building followed the basic tenets of Modern office building architecture and exhibited common design features, such as a park-like landscaped plaza, columns at the first floor elevating the mass of the building, geometrical massing, an emphasis on verticality, glass curtain walls with uniform bays, sparingly used masonry veneer cladding, and relatively few decorative details.

J. Modern Bay Area Landscape Architecture

In the late 1930s and 1940s, a group of landscape architects led by Thomas Church began to formalize the practice of landscape architecture in the San Francisco Bay Area. The first generation of Bay Area modern landscape architects included Church, Robert Royston, Dan Kiley, James Rose, and Garret Eckbo, as well as Douglas Baylis, Robert Royston, and Lawrence Halprin, and Theodore Osmundson, who all worked in the office of Thomas Church in San Francisco in the 1940s.

The influence of Thomas Church and his contemporaries led to the creation of the California Style, which continues to dominate the practice of modern landscape architecture in the Bay Area. The California Style emphasizes the concept of indoor/outdoor living achieved by gardens that “appeared as subtle extensions of the architecture into the landscape.”⁸² Modern landscape designs in the Bay Area were created in attempts to unite aesthetic and functional requirements to provide useable landscaped spaces for inhabitants. This concept broke with the tradition of earlier garden design history, where designers often focused on collections of species and aesthetics, instead of functionality and space.⁸³ Typical characteristics of modern landscape design include: the use of simple materials such as brick and concrete, geometrically-shaped lawns, curvilinear paths, the use of undulating topography to create movement through the site, hierarchical circulation, terraces, trimmed hedges, shrubs, specimen trees, and pools.⁸⁴

The majority of the designs by modern landscape architects in the early years of the movement were for private residential gardens. However, as the influence of modern landscape architecture and the California Style dispersed, modern landscape architects were commissioned to design larger-scale projects for institutional clients including universities, cities, and private companies such as Kaiser.

⁸² Dorothee Imbert, “Thomas Church: Defining Styles—The Early Years” *Studies in the History of Gardens & Designed Landscapes* vol. 20(2) (Summer 2000), 96.

⁸³ Marc Treib, “Introduction” *Studies in the History of Gardens & Designed Landscapes* vol. 20(2) (Summer 2000), 93.

⁸⁴ Imbert, 103.

VI. EVALUATION

A. California Register of Historical Resources

The California Register of Historical Resources (California Register) is an inventory of significant architectural, archaeological and historical resources in the State of California. Resources can be listed in the California Register through a number of methods. State Historical Landmarks and National Register-eligible properties are automatically listed on the California Register.⁸⁵ Properties can also be nominated to the California Register by local governments, private organizations or citizens. This includes properties identified in historical resource surveys with Status Codes of 1 to 5 and resources designated as local landmarks through city or county ordinances. The evaluative criteria used by the California Register for determining eligibility are closely based on those developed for use by the National Park Service for the National Register. In order for a property to be eligible for listing in the California Register, it must be found significant under one or more of the following criteria:

Criterion 1 (Event): Resources that are associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.

Criterion 2 (Persons): Resources that are associated with the lives of persons important to local, California, or national history.

Criterion 3 (Architecture): Resources that embody the distinctive characteristics of a type, period, region, or method of construction, or represent the work of a master, or possess high artistic values.

Criterion 4 (Information Potential): Resources or sites that have yielded or have the potential to yield information important to the prehistory or history of the local area, California or the nation.

Criterion 1 (Events)

The Kaiser Center appears to be eligible under Criterion 1 (Events) as a complex that reflects “events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.” In this case, the event is the influence of the Kaiser Industries on the history of California and the West Coast. As the only remaining headquarters building of Kaiser Industries, the multinational corporation that influenced the World War II war effort, infrastructure in California, and throughout the West Coast, and changed the health care industry, the Kaiser Center is a significant landmark testifying to an important industrial

⁸⁵ National Register-eligible properties include properties that have been listed on the National Register, and properties that have formally been found eligible for listing.

institution that helped Oakland remain a significant site of commercial and industrial activities in the post-War era.

The complex is also significant as a reminder of the expansion of Oakland's Downtown office core to include Grand Avenue and Lake Merritt. The Kaiser Center led the expansion of the downtown office core to include Lake Merritt. The Kaiser Center was the first modern commercial skyscraper complex to be located on Lake Merritt. Other modern office towers were located on the lake, including the Ordway Building (1970), the twenty-seven-story Lake Merritt Plaza (1986) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s which are located on prominent intersections in the immediate area.

Criterion 2 (Persons)

The Kaiser Center appears eligible for the California Register under Criterion 2 (Persons) for its association with Henry J. Kaiser. Kaiser is significant as an innovative industrialist with a larger than life personality who built more ships than any other builder during World War II, completed massive construction projects like the Hoover Dam, headed the first company to manufacture steel on the West Coast, and developed a health care organization for workers that became a model for Health Maintenance Organizations (HMOs) across the country. Kaiser was influential in the design of the Kaiser Center; purportedly telling the management team and the architects to "double it" when asked his opinion of the proposed size of the building. Kaiser is also frequently credited for the creation of the roof garden. Additionally, Kaiser held his offices, where he oversaw his multitude of companies and had an apartment at the 27th floor of the building. While many of Kaiser's industrial buildings, such as the shipyards in Richmond, and Portland, Oregon, and ten Kaiser Aluminum fabrication facilities still exist in the United States, the Kaiser Center in Oakland is the only remaining corporate headquarters connected to Kaiser Industries. Kaiser's earlier Oakland headquarters building, at 1924 Broadway, was demolished in the 1990s and therefore the Kaiser Center is an important building that expresses the importance of Oakland as the world headquarters of Kaiser Industries.

Criterion 3 (Architecture)

The Kaiser Center appears eligible for the California Register under Criterion 3 for embodying the distinctive characteristics of the Modern style. The Kaiser Center is a well-preserved example of the style as applied to a corporate headquarters complex. Characteristic features of the complex include its variety of building types: office tower, retail wings, and parking garage all designed as a coordinated whole; its site in a landscaped plaza with views to Lake Merritt. The complex appears as a strong horizontal base that is contrasted by a vertical office tower. The office tower features

structural piers elevating the building's mass above the plaza, a mezzanine podium at the base, a T-shaped plan, a sweeping curved façade, flat roof, polychrome aluminum and glazed wall surfaces, aggregate concrete panels at secondary facades, and standardized bays with little variation. The Mall Buildings are completed in the same style and feature rectangular plans, flat roofs, structural piers elevating the building's mass above the first floor, and dolomite panel cladding. The materials used throughout the complex were selected to showcase the variety of Kaiser manufactured materials including aluminum and dolomite.

The Kaiser Center is also important as a designed office and retail complex, with an office tower, retail, landscaped open space, and parking incorporated on one site. Kaiser's headquarters was not envisioned as solely an office building, but as a group of associated buildings and landscapes that were intended to be used by both Kaiser Industries employees and Oakland community members.

In addition to being an example of a type, the Kaiser Center is also significant as the work of a master, Welton Becket & Associates. Welton Becket & Associates was an important modernist architecture firm working throughout the United States. The firm specialized in corporate headquarters, hotels, and cultural centers and was the largest architecture firm in the United States in the 1950s. The Kaiser Center is an excellent example of Welton Becket's work for corporate clients, who relied upon the firm to embody the corporation's philosophy in physical form. Welton Becket's design for the Kaiser Center showcases not only the materials produced by Kaiser Industries but also the characteristics Kaiser Industries were known for: innovation, in the use of a curved façade; and concern for employee well-being embodied in the inclusion of a roof garden.

The roof garden is significant for its design and as the largest contiguous roof garden in North America at the time of its construction. The garden features many of the hallmarks of modern landscape design including undulating topography, curvilinear pathways, geometrically shaped lawns, simple materials such as concrete pathways, planters, and benches; trimmed hedges, shrubs, specimen trees, and an asymmetrical pool. The design by Osmundson & Staley is indicative of the Bay Area Modern landscape architecture popularized by designers such as Thomas Church, Robert Royston, and Lawrence Halprin. The Kaiser Center roof garden by Osmundson & Staley exemplifies the mid-century California Style first popularized by Church and his contemporaries in the 1940s. The California Style emphasized the importance of indoor/outdoor living and relied heavily on a modern landscape architectural vocabulary to achieve this effect. The decision to include a roof garden as part of the Kaiser Center complex marked an important recognition of the potential of the roof garden to create a more healthful and attractive office environment within the city.

Criterion 4 (Information Potential)

The analysis of the Kaiser Center for eligibility under California Register Criterion 4 (Information Potential) is beyond the scope of this report. This Criterion is typically reserved for archeological resources, and therefore it is not evaluated as part of this report.

Integrity

The process of determining integrity is similar for both the California Register and the National Register. The California Register uses the same seven variables, or aspects of a property, to define integrity as the National Register: location, design, setting, materials, workmanship, feeling and association. According to the National Register Bulletin, *How to Apply the National Register Criteria for Evaluation*, these seven aspects of integrity are defined as follows:

- **Location** is the place where the historic property was constructed.
- **Design** is the combination of elements that create the form, plans, space, structure and style of the property.
- **Setting** addresses the physical environment of the historic property inclusive of the landscape and spatial relationships of the building/s.
- **Materials** refer to the physical elements that were combined or deposited during a particular period of time and in a particular pattern of configuration to form the historic property.
- **Workmanship** is the physical evidence of the crafts of a particular culture or people during any given period in history.
- **Feeling** is the property's expression of the aesthetic or historic sense of a particular period of time.
- **Association** is the direct link between an important historic event or person and a historic property.

The Kaiser Center

Office Tower

The Kaiser Center office tower retains a high degree of integrity of location, setting, design, materials, workmanship, feeling, and association. The property remains situated on its original lot with the same access pattern, site layout, and designed and natural landscape features as when the building was first constructed. The driveway, access walks, rooftop garden, and foot paths around the property remain largely unchanged, or with similar designs in new materials.

The building has had minimal modifications to the exterior since construction. The office building retains original exterior finishes and materials. The building remains in office use, and retains the appearance and feeling of a mid twentieth-century Modern office building. The lobby underwent a renovation in the mid-1990s and many changes were made including the replacement of wall cladding, enclosing the escalator and inserting a new circular fountain, new lighting, and interpretive panels. Despite these changes, the lobby's double height space, second floor mezzanine, and central escalator retain a sense of the original space. The majority of the tower's public spaces have been retained other than the original cafeteria space which has been converted to tenant office space. The interior public spaces, such as hallways, have retained many character-defining features including polished stone paneled walls or terrazzo walls, terrazzo floors, spray acoustical ceilings, glazed aluminum storefronts and period hardware. The interior of the office spaces have been altered over time to accommodate tenant needs. However, the offices retain the characteristic curve, and the windows and exterior walls remain unchanged. Some of the offices retain original features such as aluminum partition wall systems, ribbed aluminum doors, and perforated aluminum ceiling tiles.

Mall Buildings

The Mall Buildings retain a high degree of integrity of location, setting, design, workmanship, feeling, and association. The Mall Buildings remain in their original location and their setting remains intact. The interior of the buildings have been substantially altered due to tenant improvements, but the exterior of the buildings have undergone few substantial alterations which were typically limited to storefront alterations, changes in signage, and the installation of ornament above the entrances. Overall, the Mall Buildings retain sufficient integrity to convey their historical significance.

Roof Garden

The Kaiser Center Roof Garden retains a high degree of integrity of location, setting, design, materials, workmanship, feeling, and association. The only additions to the garden appear to have been the bridge over the pool which was incorporated in the design in the 1970s. The cooling tower and elevator shaft building which is an eighteen foot building with a flat roof, stucco cladding, and paired metal doors remains intact. Many of the original hardscape design components of the garden remain intact including the low perimeter walls, aggregate paths, planters, benches, and an original water fountain. While many of the plant materials have been replaced over time, the replacement plantings have been consistent with the original design and have not compromised the garden's historic integrity.

The “Fifty Year Rule”

In order to be determined eligible for listing in the National Register, resources less than fifty years of age must be shown to have “exceptional importance.” This is not the case with the California Register. According to the California Office of Historic Preservation:

In order to understand the historic importance of a resource, sufficient time must have passed to obtain a scholarly perspective on the events or individuals associated with the resource. A resource less than fifty years old may be considered for listing in the California Register if it can be demonstrated that sufficient time has passed to understand its historical importance.⁸⁶

The Kaiser Center is just under fifty years of age, but the complex has exceptional importance for its association with the expansion of Oakland’s office core to include Lake Merritt, with Kaiser Industries, with Henry J. Kaiser, and for its Modern design. The Kaiser Center is significant as the first Modern skyscraper in Oakland on the shore of Lake Merritt. The complex is also significant for its connection to Henry J. Kaiser and Kaiser Industries as the headquarters of Kaiser Industries. The complex is also significant for its design including the building’s Modern design, use of Kaiser Industries products, and as an example of the work of Welton Becket & Associates. The Kaiser Center Roof Garden is significant as the largest contiguous roof garden in North America at the time of its construction, as an example of Bay Area modern landscape architecture, and is significant for its association with landscape architects Osmundson & Staley.

B. Character-Defining Features

For a property to be eligible for national or state designation under criteria related to type, period, or method of construction, the essential physical features (or character-defining features) that enable the property to convey its historic identity must be evident. These distinctive character-defining features are the physical traits that commonly recur in property types and/or architectural styles. To be eligible, a property must clearly contain enough of those characteristics to be considered a true representative of a particular type, period, or method of construction, and these features must also retain a sufficient degree of integrity. Characteristics can be expressed in terms such as form, proportion, structure, plan, style, or materials.

⁸⁶ California Office of Historic Preservation, *How to Nominate a Resource to the California Register of Historical Resources*, 11.

The character-defining features of the Kaiser Center include, but are not limited to:

Office Tower

- Site on Lake Merritt
- Site Landscaping
- Height
- Massing
- T-shaped plan
- Curved main façade
- Curtain walls
- Polychrome aluminum cladding
- Aggregate wall panels
- Interior aluminum detailing, including but not limited to: original aluminum doors, elevator bank walls, perforated aluminum ceiling tiles
- Interior aggregate panels
- Terrazzo floors

Mall Buildings

- Height
- Massing
- Rectangular plans
- Aggregate wall panels
- Appearance of main massing of the buildings “floating” above the first floor
- Terrazzo floors

Roof Garden

- Axial plan (north-south axis from 20th Street Mall garden entrance to central lawn)
- Central lawn with surrounding curvilinear paths
- Low perimeter wall with concrete base and aluminum railing
- Irregularly shaped pool
- Curvilinear aggregate walkways
- Raised planters
- Irregular-shaped lawns
- Original furnishings including benches and water fountain

- Undulating topography
- Perimeter plantings (creating a buffer of privacy)

C. Significance Diagrams

Please see Significance Diagrams in Appendix C.

This section discusses a series of diagrams illustrating the relative zones of significance present at the Kaiser Center. For the purposes of this analysis, Page & Turnbull surveyed the building, including all exterior façades and public interior spaces, and evaluated their relative significance by placing them in three categories: Primary Significant (Primary), Secondary Significant (Secondary) and Non-Contributing. These categories are defined below.

Primary Significant

Definition: Spaces, elements or materials characterized by a high degree of architectural significance and a high degree of historic integrity.

Preliminary Guideline: All primary significant exterior and interior features and materials should be retained and preserved, or where alterations have occurred, be restored. Deteriorated materials shall be repaired rather than replaced. Where replacement is necessary due to extensive material deterioration or failure, replacement materials shall match the original materials and forms.

Secondary Significant

Definition: Elements characterized by a lesser degree of architectural significance, yet retain a high degree of historic integrity, or historically important, yet altered elements.

Preliminary Guideline: It is recommended that secondary significant elements be retained wherever possible. Where required, alterations and additions shall be designed to be compatible with the existing elements and materials. New materials and assemblies at reconstructed areas shall be similar to the original.

Non-Contributing

Description: Non-Contributing elements are generally non-historic elements or elements that have been altered to the extent that their original character is absent.

Preliminary Guideline: Non-Contributing elements are not specifically limited by preservation recommendations, except to note that the overall character of alterations to an historic building must meet the general requirements set forth in the *Secretary of the Interior's Standards*.

Please see Significance Diagrams in Appendix C.

VII. EVALUATION OF PROJECT-SPECIFIC IMPACTS UNDER CEQA

This section will analyze the project-specific impacts of the proposed project on the environment, as required by CEQA. Included as part of this evaluation is an examination of the Proposed Project pursuant to the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.

A. Status of Existing Property as a Historic Resource under CEQA

In the City of Oakland, an historical resource under CEQA is a resource that meets **any** of the following criteria:

- 1) A resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources;
- 2) A resource included in Oakland's Local Register of historical resources (defined below), unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
- 3) A resource identified as significant (e.g., rated 1-5) in a historical resource survey recorded on a Department of Parks and Recreation Form 523, unless the preponderance of evidence demonstrates tat it is not historically or culturally significant;
- 4) Meets the criteria for listing on the California Register of Historical Resources; **or**
- 5) A resource that is determined by the City Council to be historically or culturally significant even though it does not meet the other four criteria listed here.

The City of Oakland's Local Register (Historic Preservation Element Policy 3.8) includes the following:

- All Designated Historic Properties (Landmarks, Heritage Properties, Study List Properties, Preservation Districts, and S-7 and S-20 Preservation Combining Zone Properties ; and
- Those Potential Designated Historic Properties that have an existing rating of A or B or are located within an Area of Primary Importance.⁸⁷

⁸⁷ Public Resources Code Section 21084.1, citing sections 5020.1(k) and 5024(g); CEQA Guidelines section 15064.5; Oakland's Historic Preservation Element.

Based on our analysis, (pages 7-9, 40-45) the Kaiser Center appears to qualify as a historical resource under CEQA.

B. Determination of Significant Adverse Change under CEQA

According to CEQA, a “project with an effect that may cause a substantial adverse change in the significance of an historic resource is a project that may have a significant effect on the environment.”⁸⁸ Substantial adverse change is defined as: “physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historic resource would be materially impaired.”⁸⁹ The significance of an historical resource is materially impaired when a project “demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance” and that justify or account for its inclusion in, or eligibility for inclusion in, the California Register.⁹⁰ Thus, a project may cause a substantial change in a historic resource but still not have a significant adverse effect on the environment as defined by CEQA as long as the impact of the change on the historic resource is determined to be less-than-significant, negligible, neutral or even beneficial.

C. Compliance with the Secretary of the Interior's Standards for Rehabilitation

The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines for Rehabilitating Historic Buildings (Standards) provide guidance for reviewing proposed work on historic properties.⁹¹ The Standards are used by Federal agencies in evaluating work on historic properties. The Standards have also been adopted by local government bodies across the country for reviewing proposed rehabilitation work on historic properties under local preservation ordinances. The Standards are a useful analytic tool for understanding and describing the potential impacts of substantial changes to historic resources. Conformance with the Standards does not determine whether a project would cause a substantial adverse change in the significance of an historic resource. Rather, projects that

⁸⁸ CEQA Guidelines subsection 15064.5(b).

⁸⁹ CEQA Guidelines subsection 15064.5(b)(1).

⁹⁰ CEQA Guidelines subsection 15064.5(b)(2).

⁹¹ W. Brown Morton III, Gary L. Hume, Kay D. Weeks, and H. Ward Jandl, *Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines for Rehabilitating Historic Buildings* (Washington, D.C.: U.S. Department of the Interior, National Park Service, Cultural Resources, Preservation Assistance Division, 1992). The *Standards*, revised in 1992, were codified as 36 CFR Part 68.3 in the July 12, 1995 Federal Register (Vol. 60, No. 133). The revision replaces the 1978 and 1983 versions of 36 CFR 68 entitled *The Secretary of the Interior's Standards for Historic Preservation Projects*. The 36 CFR 68.3 *Standards* are applied to all grant-in-aid development projects assisted through the National Historic Preservation Fund. Another set of *Standards*, 36 CFR 67.7, focuses on “certified historic structures” as defined by the IRS Code of 1986. *The Standards* in 36 CFR 67.7 are used primarily when property owners are seeking certification for Federal tax benefits. The two sets of *Standards* vary slightly, but the differences are primarily technical and are not substantive in nature. The *Guidelines*, however, are not codified in the Federal Register.

comply with the Standards benefit from a regulatory presumption that they would have a less-than-significant adverse impact on an historic resource.⁹² Projects that do not comply with the Standards may or may not cause a substantial adverse change in the significance of an historic resource. The following analysis applies each of the Standards to the proposed project.

The Secretary of the Interior offers the following four sets of Standards to guide the treatment of historic properties: Preservation, Rehabilitation, Restoration, and Reconstruction. According to the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, the four distinct treatments are defined as:

Preservation: The *Standards for Preservation* “require retention of the greatest amount of historic fabric, along with the building’s historic form, features, and detailing as they have evolved over time.”

Rehabilitation: The *Standards for Rehabilitation* “acknowledge the need to alter or add to a historic building to meet continuing new uses while retaining the building’s historic character.”

Restoration: The *Standards for Restoration* “allow for the depiction of a building at a particular time in its history by preserving materials from the period of significance and removing materials from other periods.”

Reconstruction: The *Standards for Reconstruction* “establish a limited framework for re-creating a vanished or non-surviving building with new materials, primarily for interpretive purposes.”⁹³

Typically, one set of standards is chosen for a project based on the project scope. In this case, the proposed project scope includes altering Kaiser Center to meet the evolving use of the complex while retaining its character-defining features. Therefore, in the case of this project affecting the Kaiser Center, the *Standards for Rehabilitation* should be applied, and the Guidelines for Rehabilitating Historic Buildings should be followed.

D. Proposed Project Description

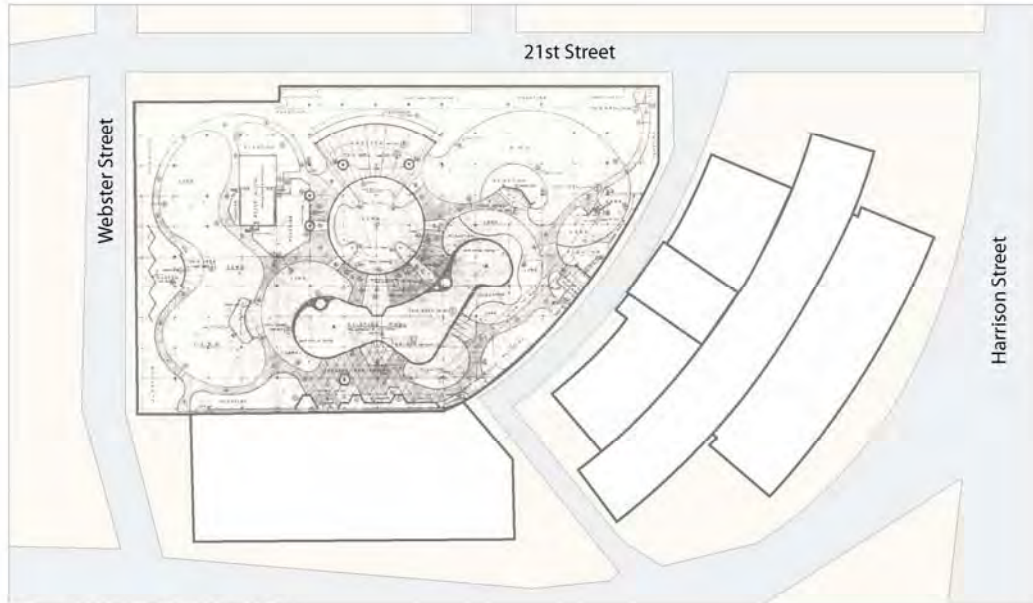
The proposed project includes the redevelopment of portions of the Kaiser Center site. The project would add approximately 1,474,992 square feet of new development. The project includes the demolition of the 20th Street and Webster Street Mall Buildings which comprise approximately 280,002 square feet of retail/commercial space. The project includes the construction of two towers:

⁹² CEQA Guidelines subsection 15064.5(b)(3).

⁹³ Kay D. Weeks and Anne E. Grimmer, *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Washington, D.C.: U.S. Department of the Interior, 1995), 2.

a thirty-four-story tower (436 feet) with an irregularly shaped footprint at the northeast corner of Webster and 20th streets, and a forty-two-story tower (566 feet) at the southeast corner of Webster and 21st streets. These proposed additions are largely consistent with earlier master plans that envisioned the Kaiser Center as a campus of office towers.

The proposed project would also include the construction of approximately 22,500 square feet of ground floor retail and an addition of 828 parking spaces. The 122,606 square foot roof garden located above the parking garage and Mall Buildings would be reconfigured, removing approximately 18,369 square feet in the Webster and 21st Street corner and adding 22,933 square feet along 20th Street. Approximately 15,157 square feet of the garden, in the Webster and 20th Street corner, would be a reconstruction. The garden would have a net gain of 4,564 square feet, and the proposed project provides for the inclusion of a grand staircase accessing the roof garden from 20th Street, which would improve public access to the garden. The project sponsor is also planning to increase access to the roof garden through the new office towers. Please see **Figures 17 and 18** below for details of the alterations and additions to the Roof Garden.



Kaiser Center Roof Garden, 1960



Kaiser Center Roof Garden, proposed

Figure 17. Comparison of original and proposed Roof Garden site plan



Figure 18. Site plan showing the proposed alterations and additions to the Roof Garden.
SOM, altered by the author

E. Compliance with the Secretary of the Interior's Standards for Rehabilitation

This section evaluates each element of the proposed project (Office Tower, Mall Buildings, Garage, and Roof Garden) for compliance with each of the 10 rehabilitation standards in the *Secretary of the Interior's Standards for Rehabilitation*. Architectural drawings of the proposed project by Skidmore, Owings & Merrill dated March 14, 2008 were used in this analysis (see **Appendix F: Proposed Project Drawings**).

Rehabilitation Standard 1: *A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.*

The Kaiser Center office tower would retain its historic use as office space, and this portion of the complex would not undergo any changes to its materials, features, spaces, or spatial relationships.

The Mall Buildings would be demolished and two new office towers would be constructed on the site. While the new towers would feature retail on the ground floor as is currently present in the Mall Buildings, the Mall Buildings themselves would be demolished, destroying their materials, features, spaces and spatial relationships including the height, massing, rectangular plans, dolomite wall panels, terrazzo floors, and the appearance of the main massing of the buildings “floating” above the first floor.

The parking garage would retain its original use as a parking garage, and would remain intact.

The Kaiser Center Roof Garden would remain a publicly accessible passive recreational space that would be privately owned and managed. At the garden level, the new south office tower would occupy part of the 20th Street Mall footprint at the southwest corner of the property, while the new north tower would replace the HVAC structure and a portion of the existing garden in the northwest corner of the property. A new grand staircase at the south façade would increase public access to the roof garden. Although the overall size of the roof garden would be increased and would have a greater level of public access, construction of the north tower in particular would require demolition of a portion of the existing historic roof garden, and would introduce new garden area, requiring changes to some of the garden's distinctive materials, features, spaces, and spatial relationships. Increased shadow from the new towers would alter the climate of the roof garden. The proposed

new towers would also obscure some existing views of the historic Kaiser Center office tower from certain public viewpoints, as well as views from the garden looking west toward Downtown Oakland.

The project sponsor intends to retain as many of its character-defining features of the garden as possible, including its axial plan, central lawn with surrounding curvilinear paths, low perimeter wall with concrete base and railing, irregularly shaped pool, curvilinear aggregate walkways, raised planters, irregular-shaped lawns, original furnishings, undulating topography, and perimeter plantings. Regardless, construction of two towers would substantially impact the roof garden.

The proposed project would include the demolition of the Mall Buildings and construction of two towers, which would require a substantial change to a portion of the Kaiser Center's distinctive materials, features, and spatial relationships.

Therefore, the proposed project does not comply with Rehabilitation Standard #1.

Rehabilitation Standard 2: *The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize the property will be avoided.*

The Kaiser Center Office Tower would remain intact. The proposed project would retain the historic character of the office tower and would not remove or alter and features, spaces or spatial relationships that characterize the property.

The Mall Buildings would be demolished and two new office towers would be constructed on the site. The demolition of the mall buildings would remove distinctive materials, features, spaces and spatial relationships that characterize this portion of the property.

The parking garage would retain its original use as a parking garage, and this portion of the property would remain intact.

The Roof Garden would be altered, but the majority of the garden would remain intact. The 122,606 square foot roof garden would be reconfigured, removing approximately 18,369 square feet in the Webster and 21st Street corner and adding 22,933 square feet along 20th Street. Approximately 15,157 square feet of the garden, in the Webster and 20th Street corner, would be a reconstruction.

The garden would have a net gain of 4,564 square feet, for a total garden size of 127,170 square feet when completed. While the project sponsors intend to create a new roof garden design that would be differentiated from the original roof garden, yet compatible with existing historic fabric, the proposed new towers would also alter views of Downtown Oakland from the roof garden, and would add new shadow resulting in a change to the garden's climate.

The proposed project calls for the removal of the two Mall Buildings and a portion of the roof garden, which would remove distinctive materials, features, spaces and alter the spatial relationships of the Kaiser Center complex.

Therefore, as designed the proposed project does not comply with Rehabilitation Standard #2.

Rehabilitation Standard 3: *Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historical properties, will not be undertaken.*

The proposed project is still in the early design phases, and would need to undergo further review as the design develops. However, the project sponsor intends that the proposed project would not feature alterations or additions that would create a false sense of historical development and that new construction would be undertaken in a manner that clearly differentiates new features from the existing.

The new roof garden area, at the southern edge, would be differentiated from the original roof garden yet compatible with existing historic fabric and design. For example, the new portion of the garden could be differentiated by plant materials, paving materials, etc. while still maintaining a connection to the original Modern landscape design. While the existing Office Tower currently shades portions of the roof garden, the proposed towers would create new shadows on the garden, which could further affect all existing and proposed plant materials. In accordance with Mitigation Measure 2.0 (discussed below), and as a condition of approval, an historic landscape expert shall be retained to ensure that character-defining features of the garden are preserved; and that the design of the new portion of the garden is compatible but differentiated from the original portion of the garden. Shade-tolerant plantings may also need to be selected for the new garden design.

If the proposed project meets these conditions, then it would comply with Rehabilitation Standard #3.

Rehabilitation Standard 4: *Changes to a property that have acquired significance in their own right will be retained and preserved.*

The Kaiser Center has undergone few alterations, including remodeling the lobby of the Office Tower, remodeling the original cafeteria in the Office Tower to serve as tenant office space, tenant improvements at the Mall Buildings, and storefront remodeling, signage, and ornamentation at the entrances of the Mall Buildings. None of these alterations have acquired significance in their own right. Therefore, as designed, the proposed project would be in compliance with Rehabilitation Standard #4.

Rehabilitation Standard 5: *Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.*

The Kaiser Center Office Tower would remain intact. The proposed project would retain the distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize this portion of the property.

The Mall Buildings would be demolished and two new office towers would be constructed on the site. The demolition of the Mall Buildings would remove the distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize this portion of the property.

The parking garage would remain intact. No changes are proposed to the parking garage. The Roof Garden would be altered, but the majority of the garden would remain intact. A portion of lawn and walkway in the northwest corner of the roof garden would be demolished and replaced by an office tower. The portion of the roof garden to be removed is relatively small (18,369 square feet or less than 15 percent of the total garden in square feet). Approximately 15,157 square feet portion of plantings, lawn and walkway near the southwest corner of the extant garden over the Webster Street Mall would be demolished and reconstructed between the new towers. A new garden area, at the southern edge of the garden fronting on 20th Street, would be differentiated from the original roof garden yet compatible with existing historic fabric. Despite these interventions, approximately 85 percent or about 104,237 square feet of the original garden would be retained. New shadows on the garden from the proposed new towers would affect all existing and proposed plant materials.

The demolition of the two Mall Buildings would adversely impact the Kaiser Center since it would remove distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize the property. Although demolition of the Mall Buildings does not comply with the Standards, the impact on the resource may be lessened if the character and feeling of the original Mall Buildings could be interpreted in the design of the base of the new structures. In a letter dated November 20, 2008, Turner Construction Company has stated that reuse of the existing dolomite panels as part of the new structures is infeasible due to the manner in which the panels were attached to the Mall Buildings during their original construction in the 1960s (please also see Appendix B of this report). Staff reviewed the report, completed a site inspection, and agreed with the report's conclusion that the dolomite panels cannot be reused. Mitigation Measure 1.1, below, requires that the project sponsor redesign the base of the proposed new towers to retain the character and qualities of the original Mall Buildings.

As proposed, the project would not comply with Rehabilitation Standard #5.

Rehabilitation Standard 6: *Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.*

The majority of the Kaiser Center complex is in excellent condition, but where repair is needed, this standard would be followed. According to Rehabilitation Standard #6, deteriorated historic features should be repaired rather than replaced. If severe deterioration makes replacement necessary, in-kind replacements would be used. There is ample documentation for the repair and/or replacement of deteriorated features and/or the replacement of missing features.

As per the Turner Construction report, the dolomite panels 'as-built' precludes their reuse; therefore, the project sponsor should incorporate into the design of the new buildings wall cladding that is of comparable character and quality as the dolomite panels, if not the actual materials (see Mitigation Measure 1.1, below).

As designed, the proposed project would be in compliance with Rehabilitation Standard #6.

Rehabilitation Standard 7: *Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.*

The proposed project does not include chemical or physical treatments. Therefore, Rehabilitation Standard #7 is not applicable.

Rehabilitation Standard 8: *Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measure will be undertaken.*

The proposed project would include excavation as part of the construction of the office towers. The site has already been excavated for the current buildings, but if any archeological resources are encountered during this work, construction would be halted and a proper analysis undertaken by qualified specialists to comply with Rehabilitation Standard #8.

Rehabilitation Standard 9: *New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and environment.*

The Office Tower would remain intact and the historic materials and features of this portion of the property would not be damaged by the new additions. The proposed new towers would, however, alter the existing tower's spatial relationship to the Kaiser Center, as it would no longer be the only tall building at the Kaiser Center.

The Mall Buildings would be demolished to allow for the construction of the two new office towers. Therefore, the new additions would destroy the historic materials, features and spatial relationships of this portion of the property.

The Parking Garage would remain intact. No changes are proposed to the parking garage and this portion of the property would not be damaged by the new additions.

A portion of the Roof Garden would be removed and replaced by a new office tower, another portion would be removed and reconstructed, and the garden would be expanded to the south as

part of the project. A portion of the roof garden would be destroyed by the new additions. The proposed new towers would also obscure some views of Downtown Oakland from the garden. The spatial relationship between the garden and the existing office tower would be altered with the introduction of two new towers, creating a new garden ‘wall’ on the western side of the garden where none exists currently.

The proposed project includes two new office towers and an addition to the roof garden at the 20th Street edge. The new additions would destroy some historic features, materials and spatial relationships, including both Mall Buildings and a portion of the roof garden.

The new garden area would be differentiated from the original roof garden yet compatible with existing historic fabric. As part of the design process for the buildings, an historic landscape expert must be retained to ensure that character-defining features of the garden are preserved; and that the design of the new portion of the garden is compatible but differentiated from the original portion of the garden (see Mitigation Measure 2.0).

As design details for the new office towers are lacking, it is unknown whether the proposed new towers would be differentiated from the Kaiser Center office tower, yet compatible in terms of materials, features, size, scale and proportion, and massing.

The proposed project calls for the removal of the two Mall Buildings which would adversely impact the Kaiser Center complex since it would destroy historic materials including the Mall Buildings’ character-defining features and the historic spatial relationships between the Mall Buildings and the Office Tower and the Roof Garden and the Office Tower that characterize the complex.

Therefore, the proposed project does not comply with Rehabilitation Standard #9.

Rehabilitation Standard 10: *New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

The proposed project includes the addition of two office towers and the demolition of the two Mall Buildings and a portion of the roof garden. If the new additions were removed in the future, the essential form and integrity of the historic resource, the Kaiser Center complex, would be impaired since the Mall Buildings and a portion of the roof garden would have been removed as part of the

project. The removal of the Mall Buildings and a portion of the Roof Garden would be irreversible in terms of historic materials.

Therefore, the proposed project does not comply with Rehabilitation Standard #10.

Conclusion

We conclude that the proposed project as currently designed does not conform to Standards 1, 2, 5, 9, 10 of the *Secretary of the Interior's Standards for Rehabilitation*.

F. Analysis of Project Specific Impacts under CEQA

As the above analysis demonstrates, the project as it is currently designed would not comply with the *Secretary of the Interior's Standards for Rehabilitation*. Provided below is an analysis of the proposed project's potential impacts to historic architectural resources in terms of CEQA criteria (determination of significant adverse impact).

Impact 1.0 – The proposed project would demolish the Mall Buildings, which are components of a qualified historical resource on the project site (Conservatively deemed Significant and Unavoidable because the project lacks design details)

The proposed project would demolish the two Mall Buildings, which are components of a qualified historic resource. Demolition is considered to be a significant adverse impact, since it would materially alter in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the federal, state, and local registers. The physical characteristics of the Mall Buildings that would be materially altered by the project would include the Mall Buildings' height, massing, rectangular plans, dolomite wall panels, the appearance of main massing of the buildings "floating" above the first floor, the strong, solid horizontally-oriented band at the base of the tower, the relationship between the tower building's exterior finishes with the base of the complex, and the terrazzo floors. Mitigation Measures 1.1 to 1.3 described below would help reduce the significance of the impact to historic architectural resources. However, because design details are not yet available, this impact is conservatively identified (i.e., worst case scenario) as significant and unavoidable. Specifically, this is a Preliminary Development Plan application and the project sponsor has not prepared or submitted detailed architectural designs of the proposal for consideration by the City. Without those details, the impact must conservatively

be determined to be significant and unavoidable at this point. The final, approved design may mitigate the impacts to less than significant levels, but such cannot be determined at this time.

Policy 3.8.1 of the Historic Preservation Element (HPE) of the City of Oakland General Plan states that measures appropriate to mitigate significant effects to an historic resource may include one or more of the following depending on the extent of the proposed addition or alteration:

- 1) Modification of the project design to avoid adversely affecting the character-defining elements of the property.
- 2) Relocation of the affected Historical Resource to a location consistent with its historic or architectural character.

If the above measures are not feasible, then other measures may be considered including, but not limited to the following:

- 3) Modification of the project design to include restoration of the remaining historic character of the property.
- 4) Modification of the project design to incorporate or replicate elements of the building's original architectural design.
- 5) Salvage and preservation of significant features and materials of the structure in a local museum or within the new project.
- 6) Measures to protect the Historical Resource from effects of on-site or other construction activities.
- 7) Documentation in a Historic American Buildings Survey report or other appropriate format: photographs, oral history, video, etc.
- 8) Placement of a plaque, commemorative marker, or artistic or interpretive display on the site providing information on the historical significance of the resource.
- 9) Contribution to a Facade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource.

The following provides a list of measures appropriate to mitigate significant impacts to the historic resource:

Mitigation Measure 1.1. The sponsor shall modify the design of the base of the new structures to retain the existing street level design and character, and shall prepare a salvage program: The sponsor shall modify the design of the base of the new tower structures to retain the existing street level design and character of the Mall Buildings, which include its height, massing, flat roofs, dolomite panels, the strong, solid horizontally-oriented band at the base of the tower “floating” above the first floor, the relationship between the Office Tower’s side exterior dolomite panels with the Mall Building’s side exterior dolomite panels, and the terrazzo floors. Other than the terrazzo floors, the majority of the remaining historic fabric is expressed on the exterior of these buildings. This mitigation would satisfy Policy 3.8.1 (1) of the Historic Preservation Element of the City of Oakland General Plan (Modification of the project design to avoid adversely affecting the character defining elements of the property).

Historic features such as dolomite panels and terrazzo flooring are easily replicated. All replicated elements should retain the character and quality of the original design, but not necessarily the individual physical elements of the dolomite panels themselves. In addition, the modified design would not be required to retain the precise dimensions of the existing Mall Buildings, but rather, should allow reasonable flexibility in their interpretation, consistent with this report and the purpose of the mitigation measure. Retention of the quality and character of the Mall Buildings could reduce the impact on the environment to a less than significant level. However, because design details are not yet available, and it is therefore unknown whether the proposed project would meet *Secretary of the Interior’s Standards* described above, this impact is conservatively deemed to be significant and unavoidable at this time.

The project sponsors shall also undertake a salvage program to save and reuse historically significant materials and features from the Mall Buildings at the site, such as terrazzo flooring, or possibly other materials or features not yet identified herein. As such the project sponsors shall conduct a full survey of *all* historic architectural elements and elements suitable for re-use at the site, develop a reuse/salvage plan, whose goal is to maximize reuse of materials at the site, and submit such for Landmarks Preservation Advisory Board (LPAB) consideration. The LPAB would make advisory recommendations either to the Planning Commission or Development Director. The applicant shall implement the approved plan. Implementation of a salvage program would satisfy Policy 3.8.1 (5) of the Historic Preservation Element of the City of Oakland General Plan (Salvage and preservation of significant features and materials of the structure in a local museum or within the new project). While salvage and reuse of historic materials would help to reduce the impact of the loss of the Mall

Buildings, the impact to historic resources is conservatively considered to be significant and unavoidable at this time since design and salvage details are not yet available.

Impacts to historic resources could be mitigated to a less-than-significant level if the project sponsor modifies the design of the base of the new structures to retain the existing street level design and character in accordance with the *Secretary of the Interior's Standards*, and completes the salvage program. However, because these activities have not yet been completed, the impact is conservatively deemed to be significant and unavoidable.

Mitigation Measure 1.2. HABS /HALS Level Recordation: The project sponsor shall complete a recordation of the Kaiser Center which meets the requirements of the National Park Service's Historic American Buildings Survey (HABS) and the Historic American Landscape Survey (HALS). A complete set of HABS/HALS documentation typically consists of a set of measured drawings (or a copy of original drawings if available), large-format black and white photographs, and a written history. A complete set of the HABS/HALS recordation photos, drawings, and report should be presented to following repositories:

- Library of Congress
- Oakland History Room at the Oakland Public Library.
- Oakland Heritage Alliance, and
- Oakland Cultural Heritage Survey.

This mitigation would satisfy Policy 3.8.1 (7) of the Historic Preservation Element of the City of Oakland General Plan (Documentation in a Historic American Building Survey report or other appropriate format: photographs, oral history, video, etc.)

While applications of HABS/ HALS efforts are common mitigation strategies used to reduce the significance of an adverse impact to historic resources, they do not alter the loss to community character and collective history. Section 15126.4(b)(2) of the Public Resources Code is clear in this regard: "In some circumstances, documentation of an historical resource, by way of historic narrative, photographs or architectural drawings, as mitigation for the effects of demolition of the resource will not mitigate the effects to a point where clearly no significant effect on the environment would occur."

Mitigation Measure 1.3. Financial Contributions to the Oakland Façade Improvement

Program: If Mitigation Measure 1.1 is not satisfied, the project sponsors shall make a financial contribution to the City of Oakland, which can be used to fund other historic preservation projects at the project site or in the immediate vicinity. This mitigation would satisfy Policy 3.8.1.(9) of the Historic Preservation Element of the City of Oakland General Plan (Contribution to a Façade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource. Contributions to the fund shall be determined by staff based on the linear feet of the facades to be demolished. Potential preservation projects that may benefit from the fund could include, without limitation; 1) an update of the Lake Merritt Historic District survey and/or Lake Merritt historic context statement, or, 2) physical improvements to potential contributor(s) to the District so that they may become a formal contributor in the future, or improvements to existing contributor(s) that are currently in a state of disrepair. However, such financial contribution, even in conjunction with Mitigation Measure 1.2 (HALS/HABS Recordation), would not reduce the impacts to less than significant levels. Thus, the impact would remain significant and unavoidable if Mitigation Measure 1.1 is not satisfied.

The City of Oakland would not impose Mitigation Measure 1.3 (financial contribution) if the project sponsors can demonstrate through the subsequent submission and review and approval by the City (with review by the LPAB) of design modifications to the proposed project that they would meet the requirements of Mitigation Measure 1.1. For conservative purposes, however, and because no such designs are currently available for review, Mitigation Measure 1.3 is included in this document.

Impact 2.0 – The proposed new construction would affect remaining portion of the qualified historic resource on the project site (Conservatively deemed Significant and Unavoidable because the project lacks design details).

The proposed project would retain the Kaiser Center Office Tower, the majority of the Kaiser Center Roof Garden, and the Parking Garage, and construct two new commercial towers on the site of the existing Mall Buildings. The new construction would affect the resource's integrity of setting, since the Mall Buildings would be removed and the view corridor from the west on 21st Street to the rear of the Office Tower would be altered by the construction of the new commercial towers. The new construction would remove a portion of the historic roof garden and introduce new garden area. The impacts to the resource's setting and roof garden design are considered to be significant adverse impacts, since new construction would impact the character-defining features of the historic resource. Mitigation Measure 2.0, described below, would help reduce the significance of the impact

to historic architectural resources by modifying the project design to ensure that new additions to the Kaiser Center would be designed to relate to the architectural and landscape character, spatial relationships, and organizing principles of the existing design. (See Mitigation Measure 2.0, below). However, because design details are not yet available, this impact is conservatively identified as significant and unavoidable.

Mitigation Measure 2.0. Historically-Sensitive Roof Garden Design: The project sponsor shall ensure that a qualified Landscape Architect familiar with landscape history and historic resources designs a roof garden addition that is differentiated from the old and compatible with the historic design to protect the integrity of the historic roof garden, specifically with respect to the following character-defining features of the garden; the viability of the plant palette under new shadows and altered micro-climate created by the proposed new towers; the north-south axial plan, curvilinear shaped lawns, and curvilinear aggregate pathways, original furnishings, undulating topography, irregularly shaped pools, and raised planters. Since the Kaiser Center Roof Garden was included in articles in many landscape architecture journals at the time of its construction, historic images of the roof garden are easily located. The landscape plan shall be submitted the LPAB for review and approval. The LPAB would make advisory recommendations either to the Planning Commission or Development Director, and the Applicant shall implement the approved plan.

The proposed alterations to the lawns and walkways can be mitigated by clearly demarcating the original garden material and new configuration with signage and design features. As part of the design process for the buildings, garden entrances, and new garden area, the architects and landscape architect should consult with a historic landscape expert who would prepare a landscape plan to ensure that new designs are compatible yet differentiated from the historic garden material and plans. The restored portion of the garden must adhere to the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. In this way, the design of the new roof garden addition could reduce the impact to historic resources.

Mitigation Measure 2.1. Historically Sensitive Tower Design. The project sponsors shall ensure that the design of the new towers is compatible with, yet clearly differentiated from, the existing Kaiser Center Office Tower. Existing views of Downtown Oakland to the southwest and northwest should be maintained to the greatest extent possible, through the use of highly-transparent glass for the design of the towers at the roof garden level. Plans should be reviewed and approved by the LPAB, which would make advisory recommendations either to the Planning Commission or Development Director.

To further reduce Impact 2.0, the project sponsor shall also implement Mitigation Measure 1.2 (*HALS Level Recordation*). For conservative purposes, however, because no designs are currently available for review, this impact is conservatively deemed to be significant and unavoidable at this point in time.

Impact 3.0. The Proposed Project Would Have a Less-Than-Significant Impact on the Eligibility of the Lake Merritt Historic District as an API or NRHP historic district.

According to the inventory form completed in 1986, the Lake Merritt Historic District consists of “Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries.”⁹⁴ As of 1986, the Lake Merritt Historic District included approximately 92 total resources, of which 64 were contributors, five were contingency contributors and 23 were non-contributors. It should be noted that contributors included six parks and two objects. As with most historic districts, changes have been made over time within the boundaries of the district. According to the inventory form, “the Lakeside area has gradually changed from a neighborhood of 19th century single family dwellings to one of 20th century apartment, civic, and office buildings.”⁹⁵

Since the district was identified, a number of additions have been made including the Lake Merritt Plaza a 27-story office tower constructed in 1986, at 1999 Harrison Street, the 20-story The Essex on Lake Merritt, a residential building constructed in 2001, at the corner of Lakeside Drive and 17th Street, and the Cathedral of Christ the Light, constructed in 2008, on Harrison Street between 21st Street and Grand Avenue. One contributor, located at 1330 Lakeshore Drive was demolished and replaced by a non-contributor. Other smaller-scale development along the shores of Lake Merritt has also taken place during this time. However, these projects have retained the basic nature of the district, which includes a combination of residential, institutional, and commercial uses and a variety of building heights all focused on and respecting the lake. The northwest shore is predominantly high-rise, the southwest shore is predominantly mid- and high-rise, the southeast shore is predominantly mid-rise, and the northeast shore is predominantly mid-rise.

⁹⁴ OCHS, Lake Merritt District Inventory Form, 1986.

⁹⁵ OCHS, Lake Merritt District Inventory Form, 1986. 8.

The proposed projects, located along the northwest shore, appear to be an adaptation of the district to meet the needs of the current day. As stated previously, the Kaiser Center Office tower was the first Modern high-rise office complex on Lake Merritt and led to an expansion of high-rise office tower development from downtown Oakland to the shores of Lake Merritt. While the proposed project includes towers that are substantially taller than extant towers in the district, they would not adversely affect the district's integrity. The proposed towers would be non-contributors to the district. The proposed towers would not directly front on the lake; they would be placed behind other existing historic buildings that contribute to the district, lessening the visual impact on the district. They would also perpetuate a pattern of building heights stepping down toward the lake.

The Lake Merritt Historic District currently includes approximately 107 total resources, of which 90 are contributors, and 17 are non-contributors. The proposed project would demolish a portion of one contributor to the district (the Mall Buildings at the Kaiser Center) and add two non-contributing buildings (two new office towers at the Kaiser Center) to the district. However, the district would retain over two-thirds contributing properties, therefore retaining its integrity and its API and NRHP status. Since the proposed deletions and additions to the district would not adversely affect the district's potential eligibility as an API or NRHP historic district, the proposed project would not cause a significant impact on the Lake Merritt Historic District. No mitigation would be required.

F. Analysis of Cumulative Impacts under CEQA

CEQA defines cumulative impacts as follows:

“Cumulative impacts” refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.⁹⁶

In addition to the proposed Kaiser Center project, there are thirteen reasonably foreseeable projects within the project area (generally defined to be a five block radius from the project site), some of which could combine with the loss of a portion of the Kaiser Center complex to form a significant cumulative impact to historic resources. The following list includes the project names, project

⁹⁶ CEQA Guidelines, Article 20, subsection 15355.

description including effect to historic resources if any, and Major Projects List number from CEDA's website [accessed October 30, 2008] in parentheses. These projects were identified at the time of the release of the Kaiser Center Notice of Preparation (NOP) on May 19, 2008.

Proposed Projects with No Effects on Historic Resources:

- 1309 Madison Street (17); 72 condominium units.
- 1538 Broadway (31); 69 residential units, ground floor food sales.
- Valdez & 23rd Street Project (48); 281 residential units, 500 car parking structure including 250 public spaces, 12,000 square feet retail.
- 1755 Broadway (53); Conversion of floors 2-5 of office to 24 live/work condominiums.
- Jackson Center Two (58); 110 condominium units, 5,000 square feet retail.
- 1331 Harrison Street (59); 98 condominium units, 9,000 square feet commercial, structured parking.
- 100 Grand (61) 241 residential units.
- 1640 Broadway Mixed Use Project (85) 177,600 square feet of office, 4,710 square feet ground floor retail, structured parking, alternative approved for 254 residential units with ground floor retail.

Proposed Projects including Rehabilitation of Historic Resources

- 1930 Broadway (75); approximately 85,200 square foot retail/fitness club, approximately 829,500 square feet of office space, 220 residential units, 444 parking stalls, Rehabilitation of the Tapscott Building, a historic resource.
- 1100 Broadway (92); 310,285 square feet of office, 9,810 square feet of retail; Rehabilitation of the Key System Building, a historic resource.

Proposed Projects with Possible Effects on Historic Resources:

- 1443 Alice Street/1434 Harrison Street (15); 245 residential units; alterations to a historic resource.
- Emerald Views, 222 19th Street (21); 42-story residential high-rise (457'-9" to the top of the pyramidal roof form), containing 370 residential units, 357 parking spaces in five levels of underground parking, 933 square foot café; and demolition of a historic resource (the garden associated with the historic August Schilling estate). Located within Lake Merritt Historic District.
- Broadway West Grand (86); 367 residential units, 8, 500 square feet retail; demolition of seven historic resources (mostly former brick auto showrooms).

Impact 4.0. The Proposed Project Would Have a Less-Than-Significant Cumulative Impact to Historic Architectural Resources.

Cumulative Impacts to the Lake Merritt Historic District

Aside from the proposed project, the only other reasonably foreseeable project within the Lake Merritt Historic District boundaries is the proposed 42-story Emerald Views Development project. The proposed 34- and 42-story office towers associated with the Kaiser Center project, in combination with the proposed 42-story Emerald Views development, may form a cumulative impact to historic resources within the Lake Merritt Historic District, as both would demolish contributors to the district (an historic garden and the Mall Buildings at the project site), and would introduce a total of three new non-contributing towers to the District.

As described above under Impact 3.0, the proposed towers of the Kaiser Center and Emerald Views can be understood as a continuation of the development of modern towers on the northwestern shores of Lake Merritt, a characteristic of the district that has already been established. Collectively, these projects would continue the trend of redevelopment along this portion of Lake Merritt. With approximately 90 contributory resources to the District, the combination of these projects would retain over two-thirds of its contributing properties, thereby retaining its integrity and its API and NRHP status. Since these proposed changes to the district would not adversely affect the district's potential eligibility to the NRHP or as an APE, no significant cumulative impacts to the Lake Merritt Historic District are anticipated. No mitigation would be required.

Cumulative Impacts to Historic Resources in the Immediate Project Vicinity and to the City of Oakland

Taken collectively, the reasonably foreseeable projects listed above, such as those along Broadway and Harrison Streets, contribute to the on-going demolition or alteration of historic resources within the project vicinity. The proposed Kaiser Center project would demolish a portion of a historic resource, therefore contributing to this trend. However, the proposed project is consistent with the typical development found in this area and would not directly or indirectly affect the eligibility of any other historic resources within the vicinity.

While these projects may affect individual historic resources, the affected resources include a broad range of building typologies, and would not have a clear, measurable impact on an individual type of

historic resource. For example, the proposed Kaiser Center project would demolish a portion of a Modern historic resource in the Lake Merritt Historic District. None of the other proposed projects would affect Modern historic resources, and only one other proposed project, the Emerald Views project, would affect the Lake Merritt area or a resource in the Lake Merritt Historic District. Since these projects do not have a clear, measurable impact to an individual type of historic resource, or a type that is particularly rare or threatened, the cumulative impact would be less than significant.

Other reasonably foreseeable projects throughout the City of Oakland which may affect citywide historic resources and have been considered in the cumulative analysis include alterations to the Ninth Avenue Terminal Building along the Oakland waterfront, and alterations to buildings at the former Oakland Army Base. Other projects that have been approved/constructed include those in the Waterfront Warehouse District along the Oakland Waterfront, and the Courthouse Condominiums project at 29th and Telegraph Avenue. However, such citywide projects are too far away from the project site (and would affect such different types of historical buildings compared with the Modern Kaiser Center, that such projects would not be cumulatively considerable. As such, the proposed project would have no significant cumulative impacts to historic resources on a citywide basis. No mitigation would be required.

VIII. CONCLUSION

Designed in 1958 as the headquarters building for Kaiser Industries, the Kaiser Center complex is an excellent example of an intact 1950s Modern style office campus with a high-rise office tower, low-rise shopping mall and parking garage, and modern, podium roof-top designed landscape. The twenty-eight-story glass and aluminum curtain wall building is currently used as office space and anchors the commercial high-rise area at the northwest corner of Oakland's Lake Merritt. The three-story Mall Buildings remain in retail use and create a strong horizontal base that is juxtaposed by the tower's verticality. The Kaiser Center Roof Garden remains an important publicly accessible private open space and is an iconic example of Bay Area Modern Landscape Architecture. The Kaiser Center is an excellent example of an intact Modern style office campus.

The Kaiser Center is rated A by the Oakland Cultural Heritage Survey and appears to be individually eligible for listing in both the California and National Register under Criteria A/1 (Events), B/2 (Persons), and C/3 (Design). The Kaiser Center also appears to be eligible to the National Register as a contributor to the potential Lake Merritt Historic District. Because the Mall Buildings are an integral part of the Kaiser Center Complex, their proposed demolition would not comply with the

Secretary of the Interior's Standards for Rehabilitation and would materially alter in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the federal, state, and local registers. As such, the proposed project would have a significant adverse impact on the historic resource under CEQA. Mitigation measures are available to reduce the impact of the proposed project, such as a modified design which retains the street level design and character and quality of materials of the Mall Buildings. However, because design details are not yet available, this impact would conservatively be deemed to be significant and unavoidable at this time.

The project-specific impacts of the proposed new construction has been conservatively deemed to be significant and unavoidable at this time because design proposals have not been submitted to the city, and design details are not yet available for review, as described above. No significant cumulative impacts were identified to the Lake Merritt Historic District, or from other proposed developments in the project vicinity or in the City of Oakland as a whole. Therefore, no mitigation measures were identified.

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Perez, Rob. “Developer Leaves Lasting Marks.” Honolulu Star-Bulletin. September 11, 1999.

<<http://starbulletin.com/1999/09/11/news/story4.html>> Accessed July 8, 2008.

APPENDIX A

Additional Figures



Figure A1. Office Tower, rear façade.
Page & Turnbull, 2008



Figure A2. Office Tower, detail of *porte cochere*.
Page & Turnbull, 2008



**Figure A3. Kaiser Complex from 21st Street
Page & Turnbull, 2008**



Figure A4. Office Tower, porte cochere. Page & Turnbull, 2008



**Figure A5. Office Tower, second floor lobby.
Page & Turnbull, 2008**



Figure A6. Garage, south façade. Page & Turnbull, 2008



Figure A7. 20th Street Mall, south façade. Detail of entrance.
Page & Turnbull, 2008



Figure A8. 20th Street Mall, First Floor Lobby.
Page & Turnbull, 2008



Figure A9. 20th Street Mall, Third floor
Page & Turnbull, 2008



Figure A10. Webster Street Mall, view from northwest.
Page & Turnbull, 2008



**Figure A11. Webster Street Mall, Hall. View from north.
Page & Turnbull, 2008**



**Figure A12. Webster Street Mall, Hall. View from south.
Page & Turnbull, 2008**



**Figure A13. HVAC, Kaiser Center Roof Garden. View from southwest.
Page & Turnbull, 2008**



**Figure A14. Roof Garden, water fountain.
Page & Turnbull, 2008**



**Figure A15. Lake Merritt Historic District
Page & Turnbull, 2008**



**Figure A16. Lake Merritt Historic District, northwest shore.
Page & Turnbull, 2008**



**Figure A17. Lake Merritt Historic District, southwest shore.
Page & Turnbull, 2008**



**Figure A18. Lake Merritt Historic District, northeast shore.
Page & Turnbull, 2008**



Figure A19. Lake Merritt Historic District, northwest shore.
Page & Turnbull, 2008



Figure A20. Lake Merritt Historic District, showing Kaiser Center.
Page & Turnbull, 2008



**Figure A21. Lake Merritt Historic District, showing Kaiser Center (center),
The Essex (left), Cathedral of Christ the Light (Right)
Page & Turnbull, 2008**



**Figure A22. Lake Merritt Historic District,
244 Lakeside Drive
Page & Turnbull, 2008**



Figure A23. Lake Merritt Historic District, Snow Park
Page & Turnbull, 2008



Figure A24. Lake Merritt Historic District,
The Essex at Lake Merritt
Page & Turnbull, 2008

Historic Images



Figure H1. Model of Kaiser Center Tower. Kaiser Center Archives.

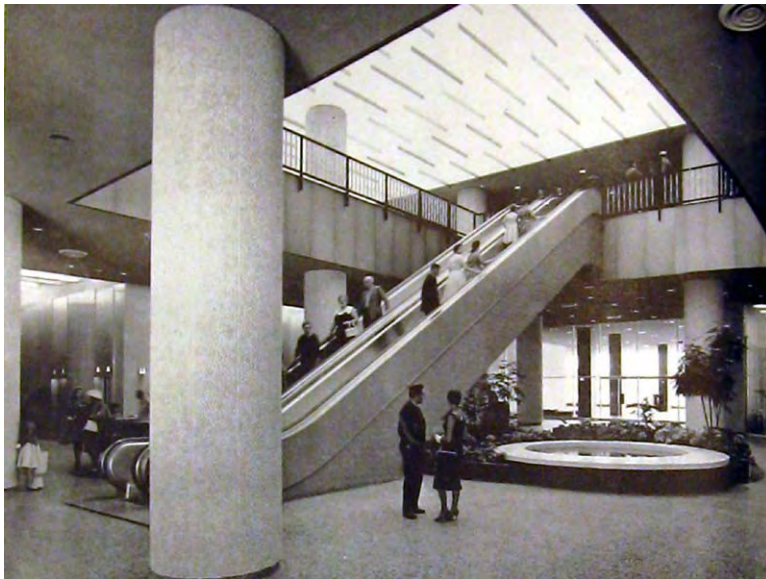


Figure H2. Office Tower, Lobby, ca. 1960.
Architectural Record, December 1960

Maps



Figure M1. Sanborn Fire Insurance Map, 1899. Showing approximate location of subject property

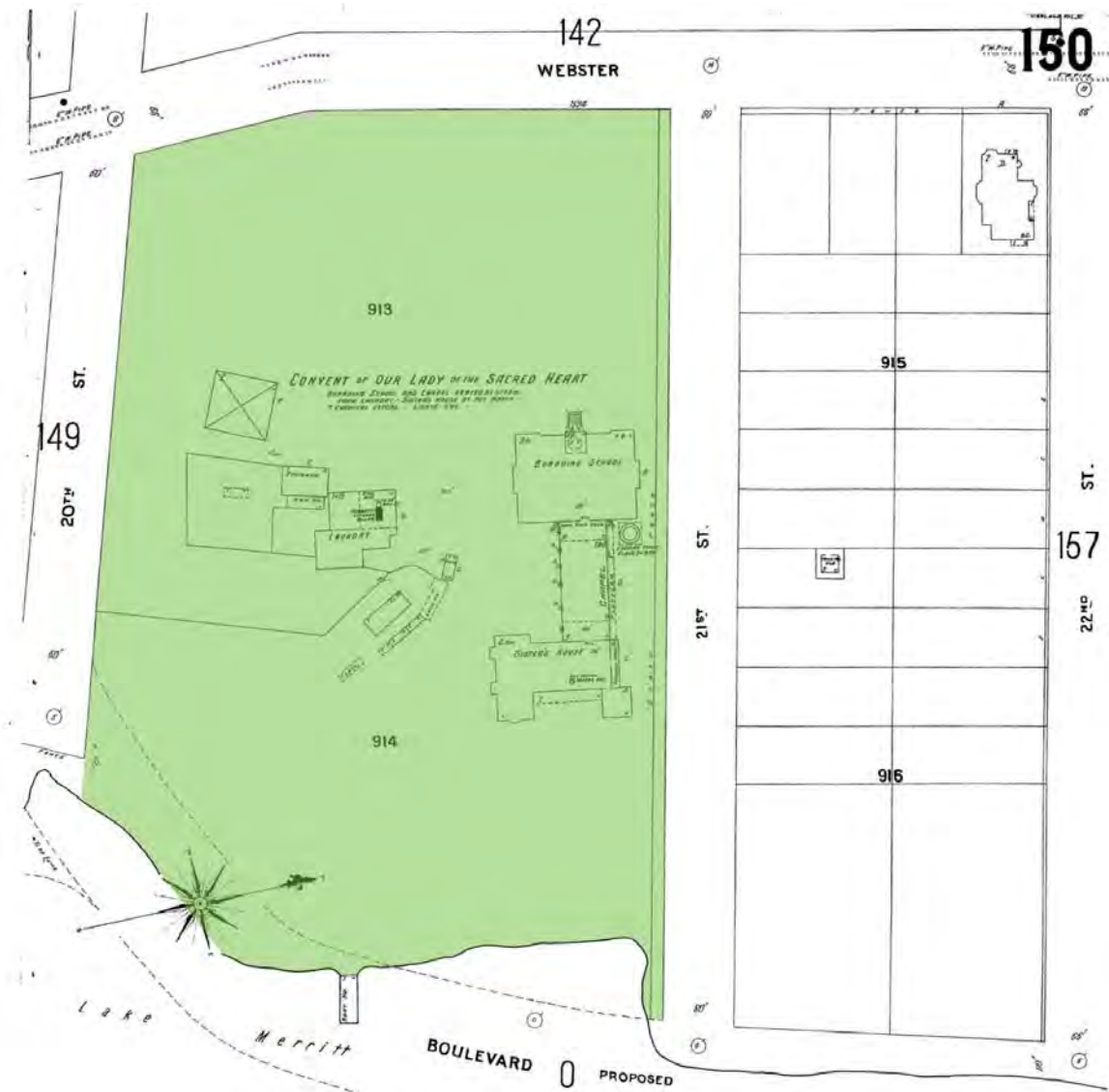


Figure M2. Sanborn Fire Insurance Map, 1903. Showing approximate location of subject property

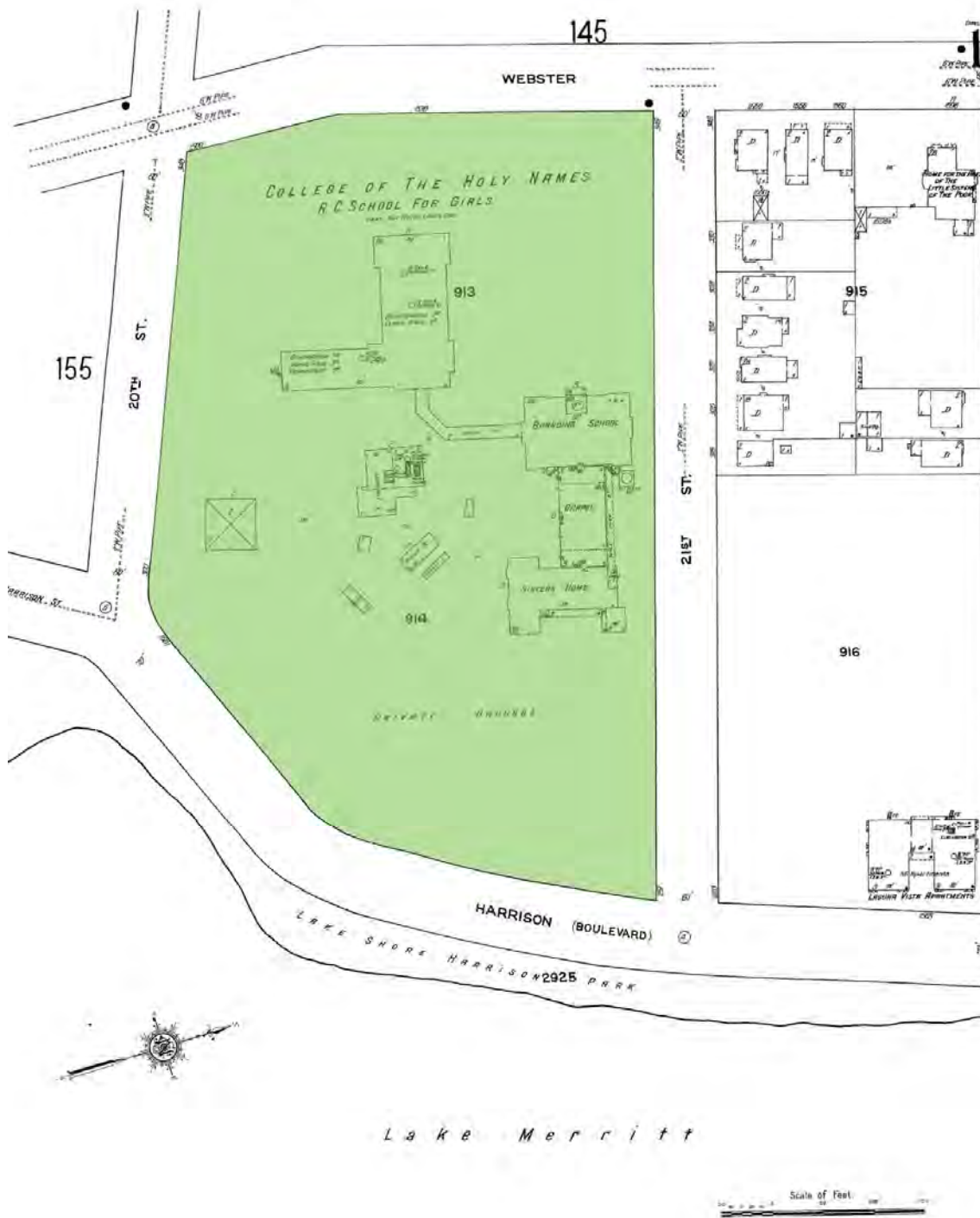


Figure M3. Sanborn Fire Insurance Map, 1912. Showing approximate location of subject property



Figure M4. Sanborn Fire Insurance Map, 1950. Showing approximate location of subject property

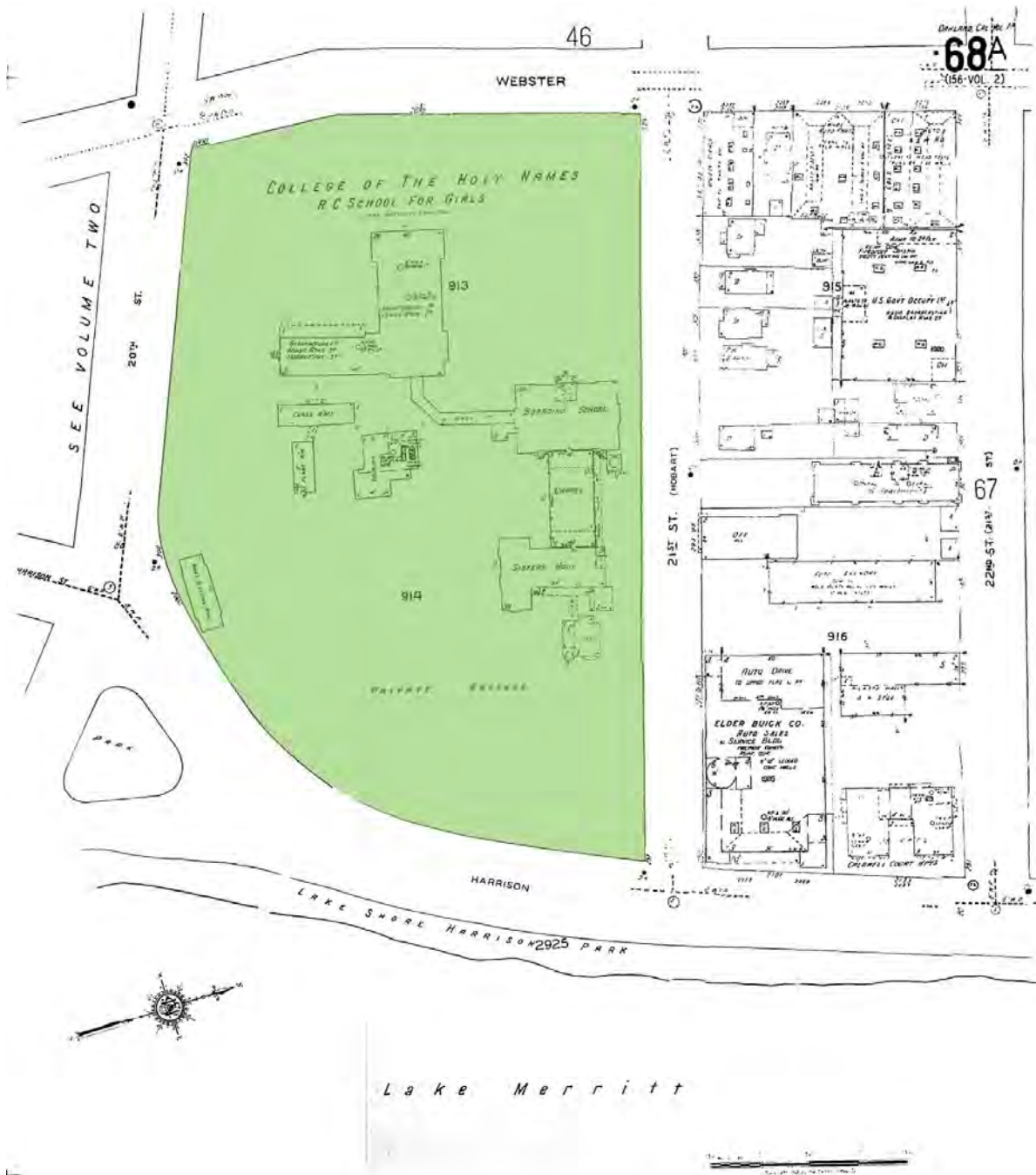


Figure M5. Sanborn Fire Insurance Map, 1952. Showing approximate location of subject property



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

Continuation Page 3 of 4

HISTORIC RESOURCES INVENTORY

CP

© 1986 City of Oakland

Street or rural address: Lake Merritt District

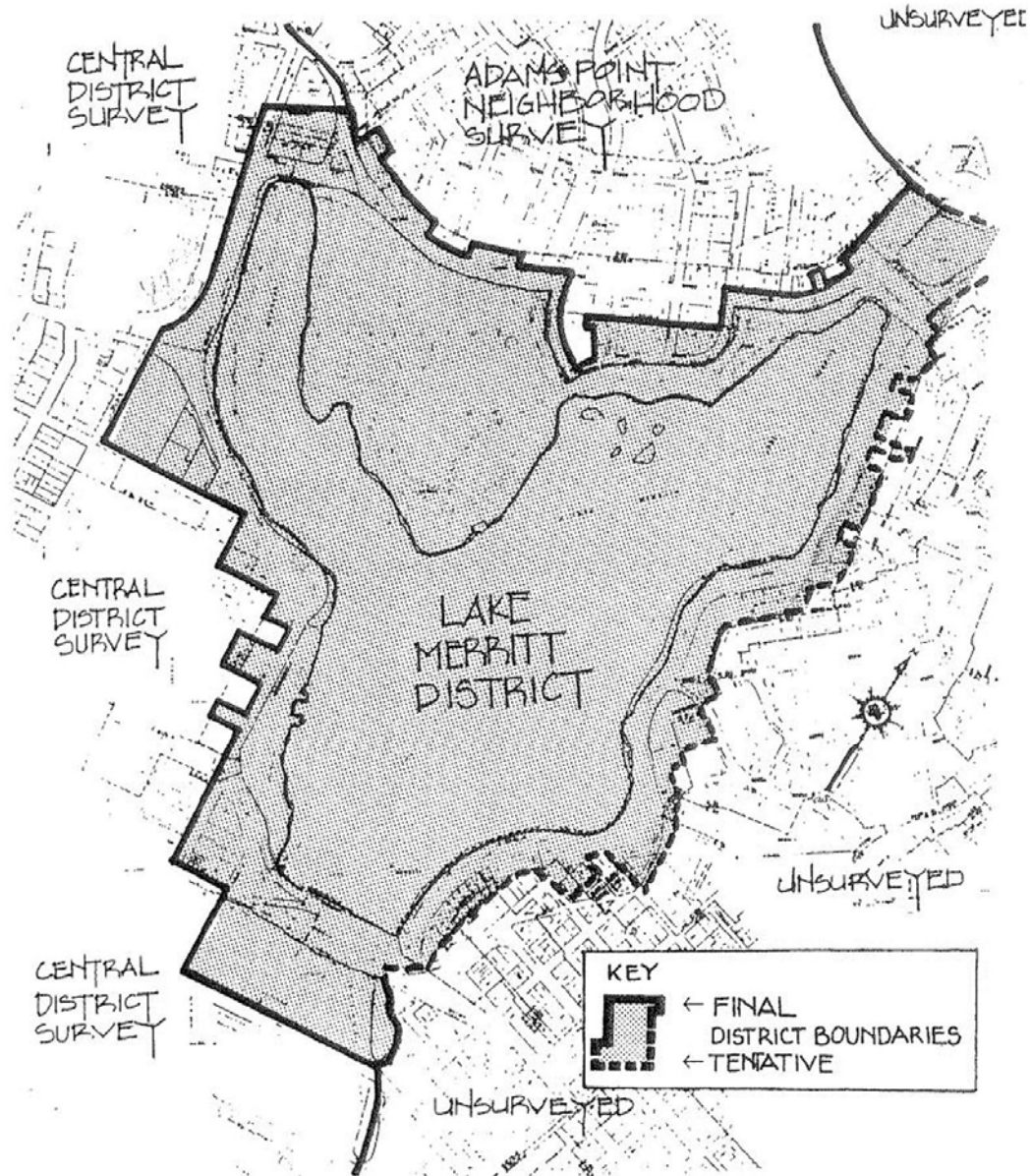


Figure M6. OCHS, Lake Merritt Historic District Boundary Map, 1986.

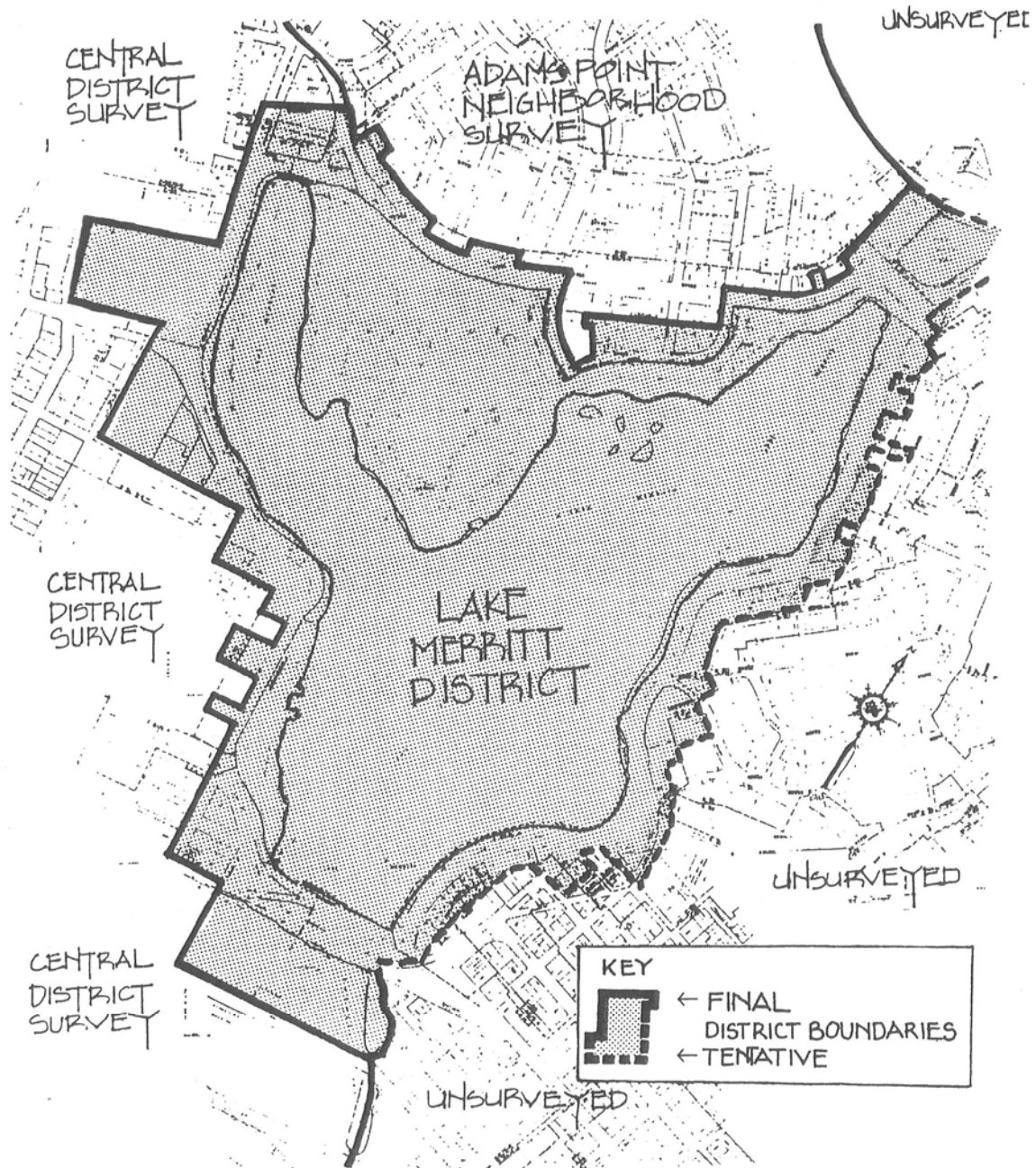


Figure M7. OCHS, Lake Merritt Historic District Boundary Map, 1986,
Altered by author per the request of OCHS staff.
Note that the map boundary has been altered to include the Kaiser Center.

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APPENDIX B

Dolomite Panel Cleaning Study and Reuse Feasibility Analysis



Simpson Gumpertz & Heger Inc.
Consulting Engineers

Arlington, MA / San Francisco, CA

BY FAX AND U.S. MAIL

10 March 2000

Ms. Deborah A. Boyer
Director of Operations & Construction
Kaiser Center, Inc.
300 Lakeside Dr., Suite 130
Oakland, California 94612-3534

Comm. 98843.01 — Construction Administration, Concrete Wall Repairs, Kaiser Center,
Oakland, CA

Dear Ms. Boyer:

This letter is in response to your request for maintenance guidelines of the rehabilitation work performed by Western Waterproofing at the above referenced project. Western Waterproofing's rehabilitation scope included sealant replacement, concrete spall repair, sealing concrete panels, and aluminum coping installation. The maintenance guidelines for each of these items are listed below.

Sealant

In accordance with the manufacturers recommendations, the Sikaflex 2c replacement sealant should be visually inspected every five years to check the performance of the sealant. The Sikaflex 2c normally will not require repair or replacement for at least ten years dependent on exposure. If a failure is observed, that portion of the sealant joint should be removed and the surface of the panels should be cleaned and free of foreign materials that would inhibit bonding. The sealant should then be replaced with Sikaflex 2c using a joint width-to-depth ratio of 2 to 1 using new backing material to set the joint depth. We recommend that a qualified waterproofing contractor perform any sealant repairs to assure that the joints are prepared properly.

Concrete Spall Repairs

The exposed aggregate panels should be monitored for further spalling. If additional spalls should occur, the spalls should be removed, and the area prepared and repaired according to the specifications. The spalls should be repaired by a company with experience in restoration and concrete patching.

Note that the final mix design included one part lime, one part grey Portland Type II cement and two parts sand. This mix was developed as part of the submittal process and is not in the specifications.

Concrete Sealer

The Dynasylan BH-N clear penetrating sealer is a surfaced-applied sealer which affects the top 1/2 inch of the wall surface. The sealer is colorless and therefore it is impossible to determine the condition of the sealer over time by visual observation. The condition of the sealer can only be assessed by coring the wall and doing a chemical analysis of the surface. For maintenance, the manufacturer suggests recoating the wall in 10 to 15 years. This product is affected by environmental exposure so the condition of the sealer on the three facades may vary by the time of resealing. Prior to resealing, it is prudent to conduct an inconspicuous mock-up on each facade to determine any negative aesthetic results, such as darkening. Concrete coating and sealing technology changes constantly. We would recommend consulting product representatives of Dynasylan or other consultants for an evaluation of then current products and compatibility with the Dynasylan BH-N.

Aluminum Coping

The aluminum coping extension should be checked biyearly from the roof to verify the condition of the sealants used at the metal joints. Because of its exposure to weather, the coping seals experience a lot of movement. If a failure is observed, that portion of the sealant joint should be removed and the surface of the panels should be cleaned and free of foreign materials that would inhibit bonding. The sealant should then be replaced with Sikaflex 2c using a bond breaker at the fillet-type joints. We recommend that a qualified waterproofing contractor perform any sealant repairs to assure that the joints are prepared properly.

Conclusion

The above guidelines are meant to assist you in maintaining your property. A periodic inspection of every five years should help Kaiser Center monitor the performance of exterior concrete walls. There are many factors which affect the performance of the exterior cladding materials, especially environmental factors, such as sun, wind, rain and airborne contaminants. Therefore, the various products will require repair or replacement at different times. Any failures within the warranty periods, however, should be brought to Western Waterproofing and Simpson Gumpertz & Heger's attention.

We hope this letter assists you in the long-term maintenance of your building. If you have any questions or concerns, please do not hesitate to call.

Sincerely yours,



Jonathan T. Stafford, Engineer
I:\COMMISS\1998\98800\98843\01KCAL16JTS99.WPD

Encl.

cc: Mr. Robert P. Browne, Western Waterproofing (w/o encl.)

Sikaflex®-2c Maintenance Procedure

1) Preconditions:

- a) As a premium-grade two component polyurethane elastomeric joint sealant Sikaflex-2c is suitable for sealing properly designed working joints. The self-leveling grade for horizontal joints and the non-sag consistency for vertical and overhead joints.
- b) Sikaflex-2c is normally applied at a minimum thickness of 1/4 inch by use of a bulk gun or by manually pouring the self-leveling grade.
- c) Sikaflex-2c is normally used to seal joints between concrete, masonry, aluminum or coated metal panels and EIFS systems that have been suitably prepared, repaired or conditioned in accordance with Sika's current technical data sheets.

2) Maintenance Procedure:

These maintenance recommendations given below relate to the product correctly applied in accordance with the preconditions above.

In accordance with standard good practices all sealant systems, including Sikaflex-2c, should at least be visually inspected every 5 years. Sikaflex-2c will normally not require maintenance (i.e. resealing) for at least 10 years dependent on exposure. When eventual maintenance is required, the following procedure should be closely observed:

- a) Cut out all damaged sealant with a manual or mechanical device. By mechanical means remove all other foreign or deleterious materials that might prevent bond.
- b) When the substrate is clean, sound and dry, reapply the sealant in accordance with the original Sikaflex-2c specification.
- c) The sealant shall be applied with a minimal thickness of 1/4 inch and in the industry acceptable ratio, width to depth, of 2:1. Note that a 1:1 ratio is also tolerable in various situations.

- d) Allow the sealant to cure normally and plan the next visual inspection in 5 years and possible routine maintenance in 10-15 years dependent on exposure and requirements.

3) Warranties:

Subject to satisfactory compliance with all of the above, Sika Corporation will issue a further warranty for this system in accordance with our standard policies.

KAISER CENTER INC.

MAR 13 2000

ADMINISTRATION

Simpson Gumpertz & Heger Inc.

Consulting Engineers

San Francisco
Arlington222 Sutter Street
Suite 300
San Francisco, CA
94108Telephone:
415 495 3700
Fax:
415 495 3550

TRANSMITTAL

Date:	10 March 2000	Comm. No.	98843.01
Project:	Kaiser Center		
To:	Kaiser Center, Inc.	From:	Chris Decareau
Attention:	Ms. Deborah A. Boyer Director of Operations & Construction	Tel No:	(510) 271-6113
Address:	300 Lakeside Dr., Suite 130	Fax No:	(510) 271-6103
City, State, Zip:	Oakland, California 94612-3534	No. Pages:	3
Delivered Via:	<input checked="" type="checkbox"/> U.S. Mail <input type="checkbox"/> Federal Express	<input checked="" type="checkbox"/> Fax <input type="checkbox"/> Messenger	<input type="checkbox"/> UPS <input type="checkbox"/> Pick up
Action Required:	<input type="checkbox"/> Sign and return to this office <input type="checkbox"/> Indicated on item transmitted	<input type="checkbox"/> Comment / return <input type="checkbox"/> See remarks below	<input type="checkbox"/> No action required <input type="checkbox"/>
For your:	<input type="checkbox"/> Approval <input type="checkbox"/> Review / Comments	<input type="checkbox"/> Records <input type="checkbox"/> Distribution	<input type="checkbox"/> Use <input type="checkbox"/> Information
Quantity:	Description / Remarks:	Dated:	
1	Letter	10 March 2000	

cc:

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Simpson Gumpertz & Heger Inc.
Consulting Engineers

Arlington, MA / San Francisco, CA

LETTER REPORT

EXTERIOR WALL CLEANING AND COATING STUDY

**KAISER CENTER
OAKLAND, CALIFORNIA**

Prepared for:

Kaiser Center Inc.
300 Lakeside Dr., Suite 130
Oakland, California 94612-3534

Comm. 98843.00

25 February 1999



Simpson Gumpertz & Heger Inc.
Consulting Engineers

25 February 1999

Arlington, MA / San Francisco, CA

Ms. Deborah A. Boyer
Director of Operations and Construction
Kaiser Center Inc.
300 Lakeside Drive, Suite 130
Oakland, California 94612-3534

Comm. 98843.00 — Exterior Wall Cleaning and Coating Study, Kaiser Center, Oakland, CA

Dear Deborah:

Introduction

At your request, Simpson Gumpertz & Heger Inc. (SGH) has conducted an investigation of methods to clean and repair the exterior walls at the Kaiser Center. The Kaiser Center is a 28-story office building (Photo 1), built in the early 1960's, located in Oakland, California. Most of the exterior wall is an aluminum and glass curtain wall. Solid stair tower walls are clad in precast concrete with exposed dolomite aggregate finish.

You identified two problems for us to investigate:

1. The aluminum curtain wall panels are dirty and unsightly.
2. The concrete walls are streaked and dirty.

Our work to date has consisted of a review of original construction documents, visual surveys of the exterior walls, close-up inspections from swing stages, laboratory analysis of samples, cleaning test mock-ups, recommendations for cleaning and repair, and an estimate of probable construction cost.

Information Obtained From Others

We reviewed the original drawings and specifications, by architect Welton Becket & Associates and found the following pertinent information:

- Four types of finishes were used on the aluminum (Sheet 1008, dated 1-29-58):
 - Column covers are a dark grey color identified as "material: .125#7BP with finish C1-A2."
 - Beam fascias are a light grey color identified as "material: 6063-T5 with finish C1-A2."
 - Mullions are a light grey color identified as "material: 6063-T5 with finish C1-A2."
 - Spandrel panels are a gold color identified as "material: 125 gold alloy, ribs embossed vertically, with finish C1-A2."
- Precast concrete panels are lightweight concrete with a decorative dolomite aggregate finish. (Specification Section XIII)

We interviewed personnel familiar with the building:

- According to the building engineer, George, pieces of concrete have spalled from the panels since shortly after construction. A small, tan colored aggregate particle is at the apex of the spalls, and appears to be the point of origin of the spalls. The concrete was coated with an epoxy sealer to prevent water from reaching the aggregate particle and causing expansion of the particle and spalling. There have been fewer spalls since the sealer was applied.
- According to Dick Schroter of SGH, who worked for Kaiser at the time of construction, the aggregate causing the spalls was reported to be burnt dolomite, which was transported in the same trucks as the exposed aggregate dolomite. The burnt dolomite became mixed into the aggregate for the precast panels, and caused the spalls.

We reviewed two letter reports by Western Restoration, dated 23 September 1991 and 24 October 1991, regarding exterior cleaning.

- Western Restoration conducted cleaning tests on the north concrete wall at ground level, using various chemical cleaners manufactured by ProSoCo. They recommended a cleaning program consisting of:
 - a. Water blast
 - b. Apply poultice and allow to dwell for 24 hours
 - c. Remove poultice
 - d. Pressure wash
 - e. Apply ProSoCo limestone restorer
 - f. Apply ProSoCo Weather Seal Siloxane

Steps a, d and e would have to be done after hours, and the poultice removed in step c would have to be disposed of as hazardous waste.

- Western Restoration recommended cleaning the aluminum with Sure Klean Aluminum Cleaner.

Field Observations

Carolyn Searls made a visual survey of the entire building from street level and a close up survey of the lower portion of the north concrete wall on 18 July 1998:

Concrete Walls

All concrete walls are streaked and dirty. The epoxy sealer is cracked and brittle. It has worn off in some areas but is intact in other areas. There are incipient spalls and previously patched spalls visible on all concrete walls. The concrete panels are dirtier on the tower than at the lower podium.

North Wall

We accessed the north wall up to the fourth floor using a lift. We removed two incipient spalls from the concrete panels. A tan-colored aggregate particle was found at the base of each spall. The particles were cracked and disintegrating. In the area up to the sixth floor we could see five other incipient spalls and 17 previously patched spalls (Photo 2).

Aluminum and Glass Curtain Wall

The aluminum is dirtier at the north and east sides of the building (Photo 3). The louvers near the top of the building appear especially dirty. The aluminum on the south side of the podium has been scuffed and scratched (Photo 4).

We made further inspections on 27 August 1998.

East Concrete Wall

Carolyn Searls and George (the building engineer) made a close up inspection of the east concrete wall on 27 August 1998. The swing stage covered the south half of the wall only. We made the following observations:

- We identified and removed 31 incipient spalls. Photo 5 shows a typical spall. Most of the spalls were easy to remove by hand or with a little prying with a screwdriver.
- We saw many incipient spalls at the half of the wall we could not reach from our swing stage. (Photo 6)
- We saw one area where concrete had recently spalled. (The concrete where the spall had been was still clean.) (Photo 7)
- The spalls range in size from 2 in. to 9 in. in diameter, and ½ in. to 1-3/4 in. deep.
- Most spalls have one tan, disintegrating aggregate particle at the apex of the spall. One spall has two particles.
- While on the wall, we noticed that the sealant is in fairly good condition with some small areas of adhesive failure. The sealant is still fairly elastic. It is placed over a fibrous backer rod.
- The epoxy sealer is worn off the dolomite aggregate, but remains on some of the cement paste between the aggregate. It is brittle and flaky.
- The metal roof coping does not cover the top of the precast panels, leaving the top horizontal concrete surface exposed. (Photo 8)
- The ends of steel rods are sticking out at the 26th and 27th floors. These rods may have originally been installed to support the "Kaiser Center" sign shown on the drawings. The sign is no longer in place on this elevation.

Aluminum and Glass Curtain Wall

Carolyn Searls observed the aluminum curtain wall close up at the fourth floor roof and from a swing stage on the east elevation, and made the following observations:

- All aluminum elements are dirty. The ribbed gold panels are more dirty than the smooth grey column covers and mullions.
- Some gold panels have patches of oxidation product, as shown in Photo 9. If the oxidation product is scraped off, a pit in the aluminum remains.
- The pitting on the drop we surveyed was worse at about the mid height of the building.

Field Tests

Aluminum Cleaning

On 15 September 1998, AMS Architectural Technologies Inc. performed mock-ups of the cleaning of the aluminum. The first mock-up is located at the 17th floor, south elevation, between Column Lines 7 and 8. We selected this panel for the mock up because it was representative of the most severe corrosion and pitting we saw. The gold, ribbed panel was cleaned. Before cleaning the aluminum was dirty and had irregular shaped spots of oxidation products from corrosion of the aluminum, as shown in Photo 9.

AMS cleaned the panel by hand scrubbing with nylon abrasive pads and detergent. After rinsing and drying, they applied a surface protectant.

After cleaning, some dirt remained in the grooves, but the panel was fairly and uniformly clean. We could see the pits in the aluminum from the swing stage (Photo 10), but not from the street. The cleaned panel is much cleaner than the adjacent panels and is readily visible from the street (Photo 11).

AMS cleaned a second mock up at the fourth floor roof level, north elevation, at the east end of the building, as shown in Photo 12:

- Gold ribbed panels: AMS cleaned two gold panels — one especially pitted and one heavily soiled panel. After cleaning and applying the surface protectant, the pitting is still visible. Both panels are uniformly clean except at a strip at the lower 2 in. of the panels. It was difficult to clean this area because of interference from the horizontal mullion below the panel.
- Light grey spandrels and mullions: AMS found that these elements have a lacquer coating. They removed the lacquer, cleaned the panels and applied the surface protectant. The panels are visibly cleaner than the adjacent uncleaned areas.
- Dark grey column covers: These elements also have a lacquer coating. AMS removed the lacquer and cleaned the panels. The cleaned panels are visibly cleaner than the adjacent uncleaned areas.

On 12 December 1998, Stuart Dean Co, Inc. performed a mock up of the cleaning of the aluminum on the fourth floor roof level on the north elevation of the building. The cleaning included two gold ribbed panels, two light grey horizontal mullions and a six foot section of the dark grey column covers.

The panels were cleaned using 3M nylon pads and a liquid detergent. The gold ribbed panels had to be cleaned using an additional lacquer stripper in order to remove the shipping coating. After the cleaning, the panels were allowed to dry and were then sealed with a surface protectant.

Before cleaning the panels were very dirty, showed signs of pitting and oxidization, and were scratched in places, assumed to be caused by the window washing equipment.

After cleaning the panels were fairly clean with minimal dirt remaining on the surface. The pitting on the surface and scratches from the window washers equipment were still visible. The cleaned panels stood out against the dirty panels around them.

Concrete Cleaning

On 13 October 1998, Western Waterproofing and JOS/Quintek performed cleaning mock ups of the concrete panels. The mock-ups are located at ground level on the north side of the building. Four cleaning methods were tried:

- JOS System. This system uses a microabrasive fine dolomite powder mixed with water applied at low pressures. The process was not successful in removing the epoxy coating, and was extremely messy, requiring large amounts of the microabrasive. This system is not recommended.
- Black Beauty: This is a dry blast method. It damaged the dolomite aggregate and is not recommended.
- Rotec steam cleaning. The Rotec system uses steam projected in a flat fan spray (Photo 13). A variety of pressures from 1000 psi to 3000 psi, with a small and large nozzle were tested. The 3000 psi pressure using the small nozzle was most effective (Photo 14).
- Rotec steam cleaning with polymer cracker. A chemical "polymer cracker" was brushed on the concrete and allowed to dwell for 6 ½ hours. It was then removed with the steam cleaning at 2500 psi. The improvement over the steam cleaning alone was marginal.

We observed further cleaning tests conducted by Western Waterproofing on 14 January 1999. They tested:

- Peel Away 7 paint stripper, dwell time 1-1/2 hours, removed with a power wash.
- High pressure cold water power wash.

Neither of the techniques was as effective as the Rotec steam cleaning.

Laboratory Tests

We performed a microscopic examination of two spalls removed from the concrete and x-ray diffraction analysis of the tan aggregate particles found at the apex of the spalls. The complete report is attached, and our findings are summarized herein. The spalls are caused by fragments of burnt dolomite within the concrete which experience up to a 200% increase in volume when exposed to moisture over long periods. When the burnt dolomite expands, it fractures the surrounding concrete, creating the spalls. The previously applied coating has trapped moisture behind the outer surface of the concrete and probably exacerbated the spalling.

Unreacted aggregate particles are still present in the concrete; therefore, the spalling can be expected to continue as long as a source of moisture is provided. However, the concrete provides some restraint of expanding particles, and spalls only occur to a certain depth. At some time, all shallow particles will have expanded and spalled, and the spalling will stop. Determining the number of spalls on the building over several years is the best method of determining if the spalls have slowed or stopped.

We had Sivento, Inc., a manufacturer of water repellents, perform tests of the efficacy of water repellent coating for the concrete. The complete report is attached, and our findings are summarized herein.

We submitted two steam-cleaned concrete spalls (which we had removed from the east wall) to Sivento for testing. Sivento coated one sample with their Dynasytan BH-N water repellent and measured the 24-hour water absorption of the treated sample and one untreated sample. The untreated sample absorption was 0.90%, and the treated sample absorption was 0.24%.

Both treated and untreated samples have low water absorption. The moisture causing the spalls may be caused more by the water trapped by the epoxy coating than by absorption through the surface of the concrete. Further testing would be required to determine the primary source of the moisture and how effective a water repellent will be. However, a breathable water repellent (such as Dynasytan BH-N) will not cause any harm and could reduce the spalling.

Recommendations

We recommend the following repairs:

Aluminum Curtain Wall

1. Clean the aluminum surfaces using mild cleaners, hand scrubbing and water rinse.
2. Seal aluminum surfaces with either AMS #350 or Stuart Dean's Sodric sealers.

The following table compares the proposals submitted thus far by AMS and Stuart Dean. We have worked with both contractors, and we believe either one is capable of performing this work.

Comparison of Aluminum Cleaning Proposals		
Category	AMS	Stuart Dean
Price	\$698,323.84, including staging	\$750,000 \pm 10%, including staging*
Cleaning	Hand scrub, water rinse	Hand scrub, water rinse
Sealing	AMS #350 0.1 mil thickness siloxane	Sodric 1.0 mil thickness acrylic-silicone blend
Maintenance: Washing	once/year with water	once/year with water
Maintenance: Resealing	3 years or more, depending on exposure, likely 5 years	3 years or more, depending on exposure, likely 5 years

Comparison of Aluminum Cleaning Proposals		
Category	AMS	Stuart Dean
Duration	Within 1 year, flexible to meet needs of owner	Within 1 year, flexible to meet needs of owner
Guarantee	3 years	3 years

*Stuart Dean has requested to be allowed to perform do another test panel (time and motion study) similar to that done by AMS, in order to finalize their price

Concrete Walls

1. Clean the concrete using the Rotec steam cleaning method.
2. Remove incipient spalls.
3. Patch spalls with mortar. Embed dolomite aggregate in the patch to match the existing surface.
4. Apply Dynasylan BH-N water repellant.
5. Install sheet metal coping at the top of the concrete walls to reduce water infiltration into the concrete panels.

Our specifications require the contractor to install a sample panel showing all of the repairs, to verify acceptable appearance of, and to set a standard for the rest of the work.

Cost Estimate

We have prepared the following cost estimate for your budgeting purposes:

Item	Cost	Estimate by
Aluminum Curtain Wall		
Cleaning and Sealing (incl. staging)	\$698,324	AMS
Concrete Walls		
Cleaning (incl. staging)	\$245,000	Western Waterproofing
Water repellant	85,000	Western Waterproofing
Coping	4,450	Western Waterproofing
Spall patching	25,000	Western Waterproofing
Total Concrete Walls	\$359,450	

Item	Cost	Estimate by
Engineering Fees		
Construction documents	\$15,000	SGH
Construction administration	40,000	SGH
Total Engineering Fees	\$55,000	
GRAND TOTAL	\$1,112,774	

Once you have received approval to proceed, we will prepare construction documents for the work. We will need input from you concerning your requirements for the owner/contractor agreement, as well as special requirements for working hours, noise, etc. We will submit the construction documents to AMS, Stuart Dean, and Western Waterproofing for bidding. We are available to provide construction observation during the work.

Sincerely yours,



Carolyn L. Searls, Senior Associate, VP

I:\98843\00KAISVR01CLS99.WPD



Photo 1

Kaiser Building, Oakland,
California.



Photo 2

Previously patched concrete spall.



Photo 3

Dirty aluminum panels.

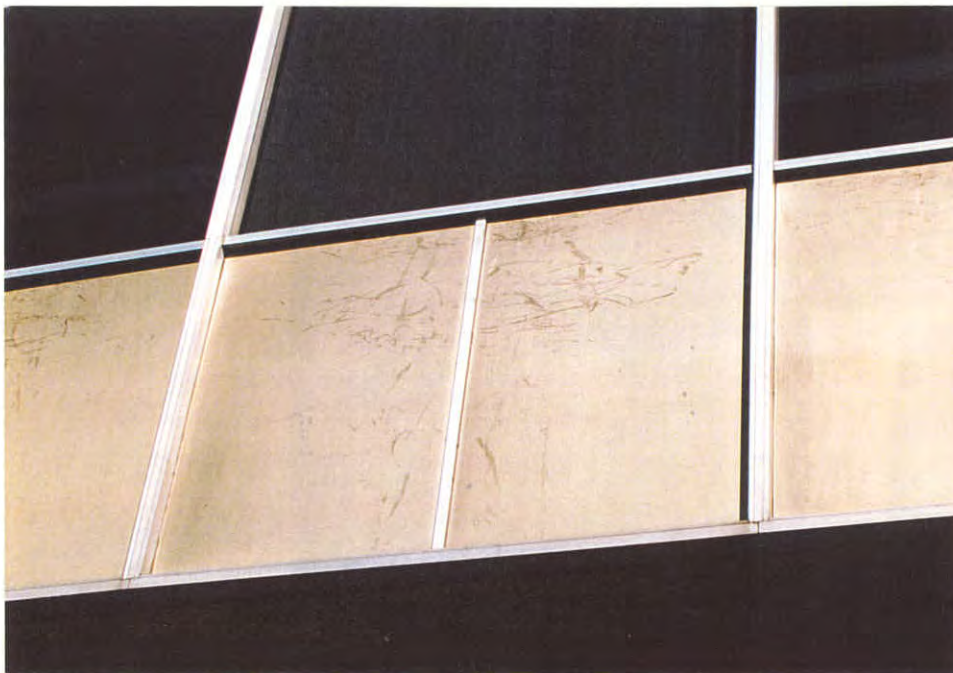


Photo 4

Scratched aluminum on the south side of the podium near ground level.



Photo 5

Typical concrete spall. Note tan-colored aggregate at apex of spall.



Photo 6

We saw many incipient spalls (popouts that had not yet fallen) on the portion of the south wall adjacent to our drop.



Photo 7

Recent concrete spall. Note how dirty the surface of the concrete is compared to the clean spalled area.



Photo 8

The parapet coping does not cover top of precast concrete panels.

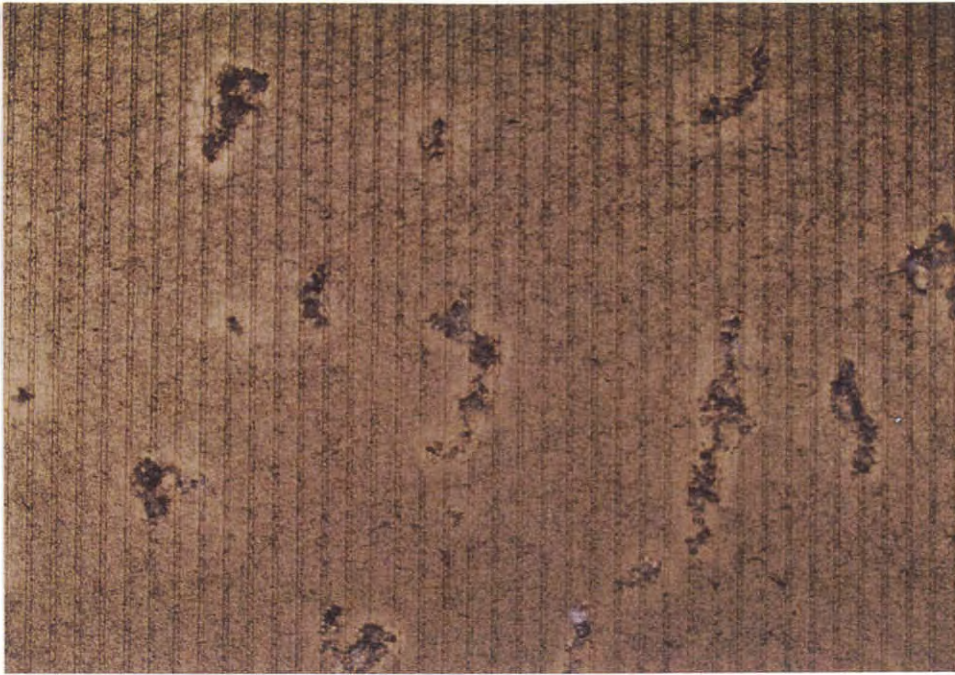


Photo 9

Gold-ribbed panel before cleaning is dirty and pitted. The irregular splotches on the photo are areas of corrosion.

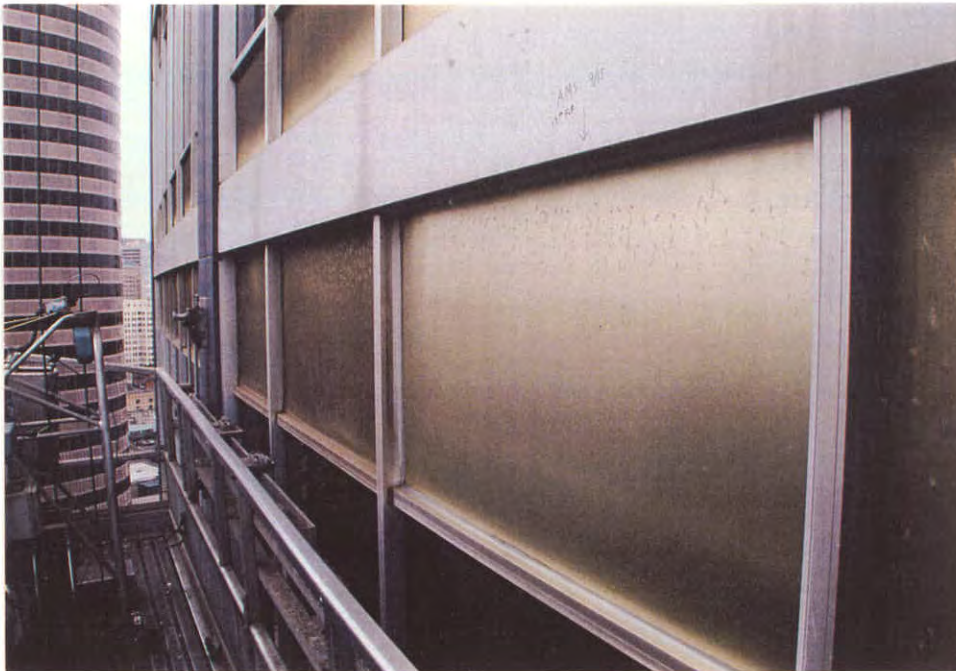


Photo 10

Cleaned gold aluminum panel at 17th Floor.



Photo 11

Cleaned gold aluminum panel at 17th Floor.



Photo 12

Aluminum cleaning mock-ups at the 4th Floor.



Photo 13

Steam cleaning of concrete.

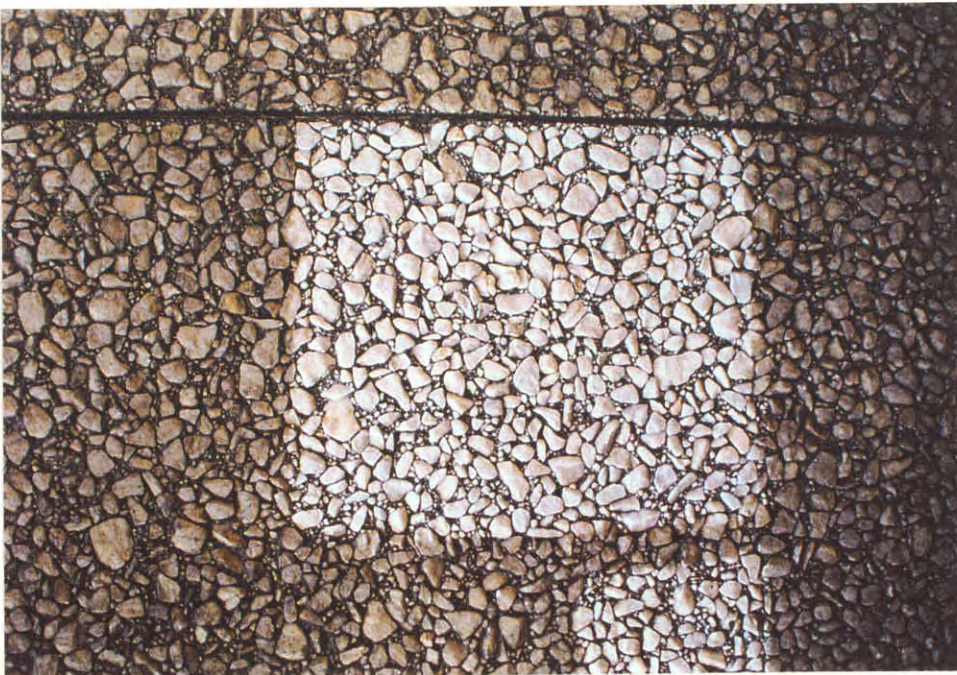


Photo 14

Concrete cleaning test area.

APPENDIX A

MICROSCOPIC EXAMINATION AND ANALYSIS OF HARDENED CONCRETE



Simpson Gumpertz & Heger Inc.
Consulting Engineers

Arlington, MA / San Francisco, CA

M E M O R A N D U M

Date: 2 October 1998

To: Carolyn Searls and File

From: Mauro J. Scali, Staff Consultant/Petrography

Comm. 98843 – Investigation of Precast Concrete Panel Failures – Kaiser Building,
San Francisco, CA

Subject: Microscopic Examination and Analysis of Hardened Concrete

Per your request, we have completed a microscopic examination and analysis of hardened concrete samples from the Kaiser Building, located in San Francisco, California. The purpose of the laboratory testing is to determine the underlying cause of popouts in the exposed surfaces of the precast concrete panels on the exterior of the building.

This memorandum provides a summary of the results of the visual and microscopic examination and x-ray diffraction analysis of the submitted test samples.

Sample Description

The test samples consist of two small, irregular, conically-shaped fractured spalled sections of hardened concrete. The test samples were removed from two different precast panels on the exterior of the building. The test samples were identified as ES -1 and ES -2, with nominal dimensions 6X8 in. and 6-1/2 X 9-1/2 in., respectively.

Sample Preparation

Each sample was cut transversely to expose a cross-section of the hardened concrete. The cut sections were then lapped and ground smooth to create planar, polished surfaces for conducting a microscopic examination of the precast concrete. In addition, a portion of each sample was submitted for preparation of ultra-thin (23 μ m -27 μ m, about 0.0009 in. to 0.001 in. thick) sections that were used to conduct a more detailed examination and analysis of the aggregate and surrounding paste structure.

A portion of Sample ES -1 containing a fragment of a tan color aggregate was submitted to an independent testing laboratory for x-ray diffraction (XRD) analysis. The sample was selected on the basis of the location of the aggregate near the center of the fractured concrete surface.

Microscopic Examination

Using both visual and microscopic techniques, portions of prepared and unprepared surfaces of each sample, including ultra-thin sections, were examined in accordance with selected portions of ASTM C856 "Petrographic Examination of Hardened Concrete."

Polished and fractured sections from each sample were examined with the aid of a stereo microscope at magnifications of 10X to 100X. In addition, a more detailed examination of the prepared thin sections was conducted with the aid of a transmitted-light polarizing microscope, at magnifications of 50X to 800X.

Test Results

Visual and Microscopic Examination

The results of our visual and microscopic examination are summarized below:

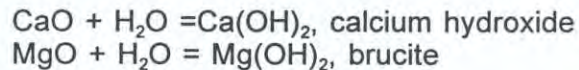
- Both samples exhibit a conical cross-section having a maximum thickness of 1-1/4 in. In both instances, there are multiple pieces of small (1/8 to 1/4 in.), tan to brown color aggregate located at the apex or along the crest of the conical spall fracture (Figures 1 and 2).
- The small tan color particles are soft and easily disrupted when probed with a steel pick.
- The exterior surface of the concrete is dark with light color splotches (Figure 3). The dark color is due to a yellowed, translucent polymer coating on the exterior surface of the concrete. The surface coating exhibits extensive cracking and has pulled away from the surfaces of exposed aggregate particles creating the contrasting light color splotches (Figure 4).
- In general, the surface coating is well bonded to the concrete, except where it has curled and pulled away from the coarse aggregate particles (Figure 5).
- The coarse aggregate consists of 3/4 to 1 in. maximum sized particles of white marble, which are present throughout the full depth of the spalled concrete.
- There is microcracking and evidence of expansion fractures in the tan color aggregate particles (Figure 6).

X-Ray Diffraction (XRD) Analysis

The results of the XRD analysis are summarized below and a copy of the x-ray spectra is included as an attachment to this report. The x-ray diffraction analysis identified the following phases in the tan color particles.

- MgO
- Ca(OH)_2
- Calcite (CaCO_3)
- Brucite [Mg(OH)_2]
- Hematite (Fe_2O_3)
- Aragonite (CaCO_3), small amounts
- Dolomite [$\text{CaMg(CO}_3)_2$], small amounts

Based on the presence of the above compounds and mineral species, the following chemical reactions are believed to have occurred when the tan color particles were exposed to moisture:



Both of these reactions can result in as much as a 200% increase in the volume of the aggregate.

Subsequently, the calcium hydroxide combines with air and water-borne carbon dioxide (CO_2) to form the calcium carbonate that was detected in the tan color particles. The CaO reaction is much more rapid and more likely to have gone to completion as compared to the MgO reaction. Therefore, it is not surprising that CaO (lime) was not detected by XRD analysis of the already expanded tan color aggregate.

Summary and Conclusions

Based on all of the test results, it is concluded that the surface popouts are due to the presence of a contaminant within the concrete, which is expansive in the presence moisture.

The XRD analysis detected calcium carbonate and brucite that were formed from lime (CaO) and magnesium oxide (MgO) in the original aggregate. The tan color aggregate also contains small amounts of dolomite and Aragonite.

The presence of dolomite and Aragonite indicate that the tan color fragments were originally formed from a dolomitic rock. Furthermore, the small quantities of dolomite, the presence of magnesium oxide and the tan color of aggregate fragments indicate that the aggregate particles represent fragments of burnt dolomite.

The XRD analysis reveals the presence of substantial amounts of MgO that remain unreacted in the tan color aggregate. Therefore, there is a real possibility of continued expansion and spalling of the precast concrete, unless the ingress of moisture is halted.

Despite the evidence of extensive cracking, discoloration and partial debonding, the coating on the exterior surface of the concrete has contributed to moisture being trapped behind the surface of the concrete.

The constant availability of moisture ensures that the expansion can and will continue as long as there are sites of unreacted lime (CaO) and magnesium oxide (MgO) in the tan color aggregate. Therefore, the existing surface coating should be removed by mechanical abrasion and replaced with a breathable coating such as a silane or siloxane sealer.



Figure 1.

A view of the underside of Sample ES -1 showing the presence of two tan color aggregate fragments along the apex of the surface spall.

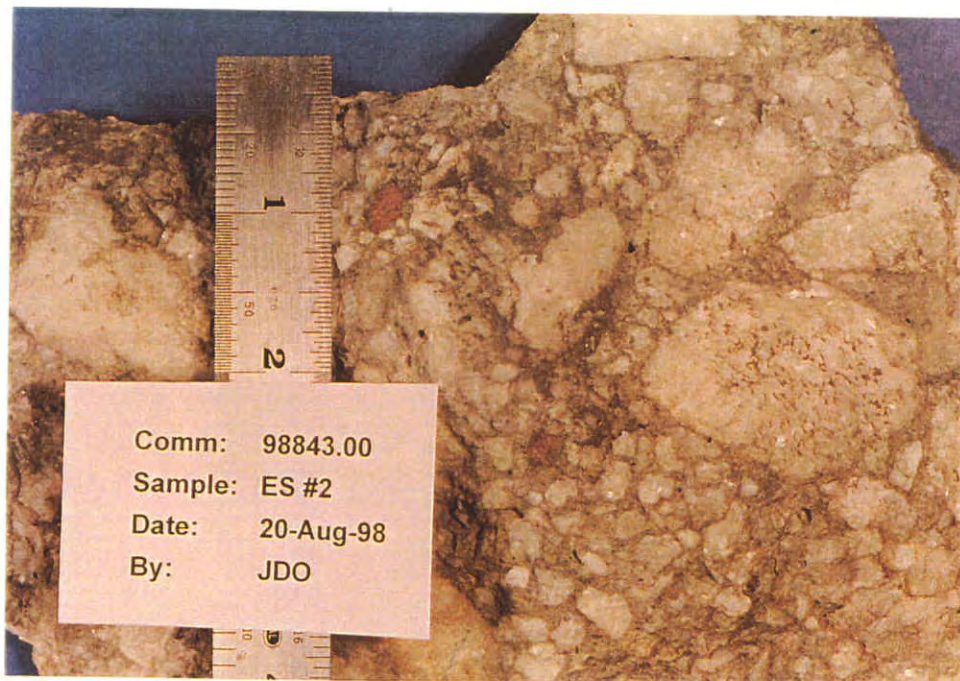


Figure 2.

A view of the underside of Sample ES -2 showing the presence of two tan color aggregate fragments along the apex of the surface spall.



Figure 3.

A view of the exterior surface of the precast concrete at the location for Sample ES - 2. Note the generally dark color of the concrete and the contrasting light color splotches.

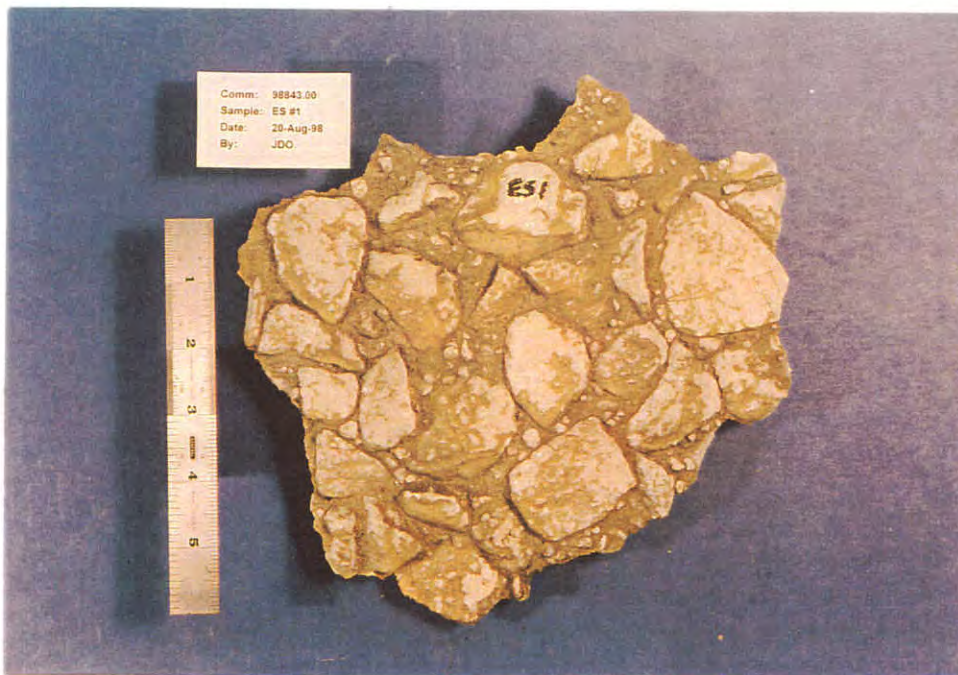


Figure 4.

A close-up view of the surface coating on Sample ES - 1 showing exposed coarse aggregate particles that are only partially covered with the surface coating material.

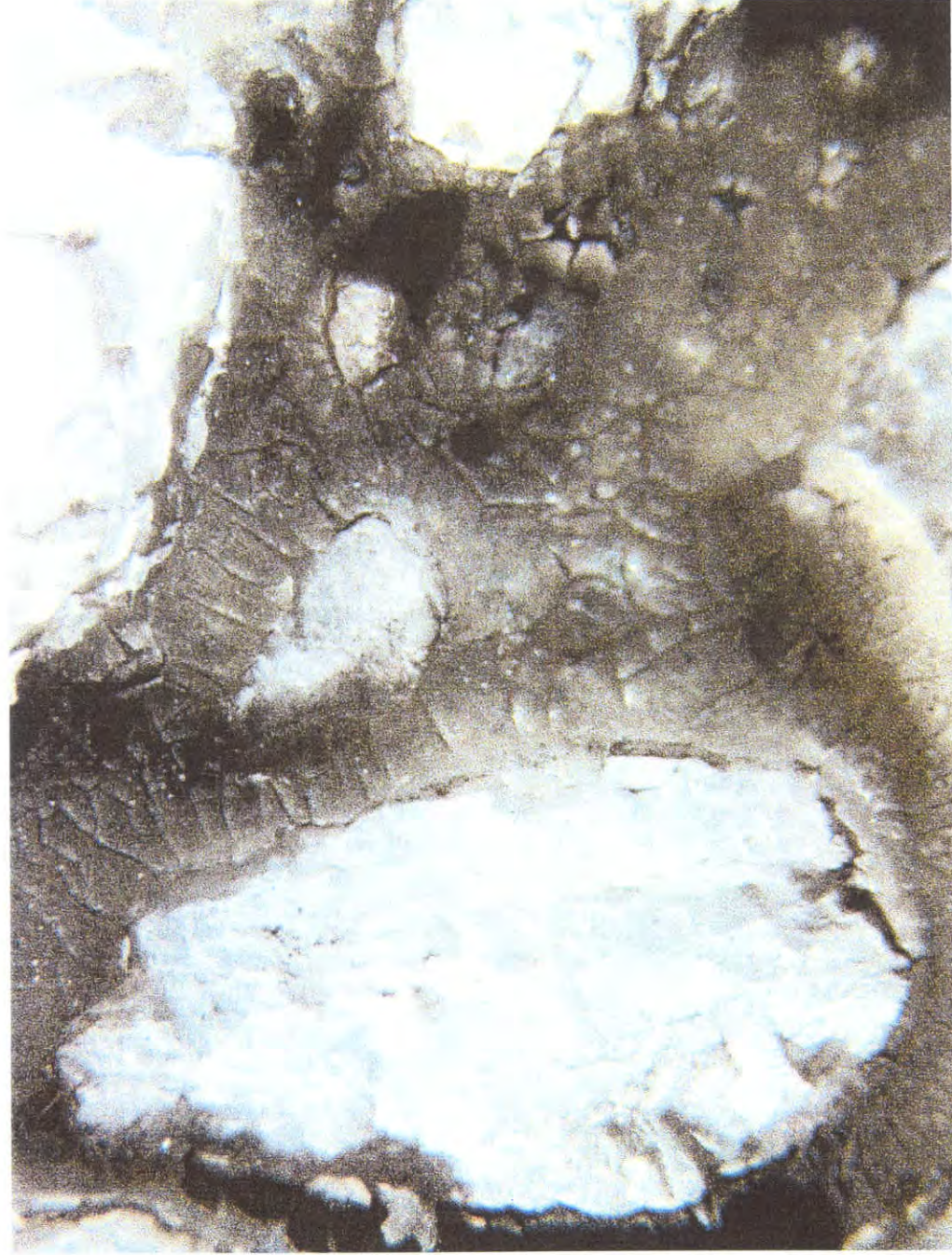


Figure 5 - A magnified (10X) view of the surface of Sample ES - 2 showing discoloration and extensive cracking of the surface coating material. Also note the contrasting color of the exposed white marble aggregate.

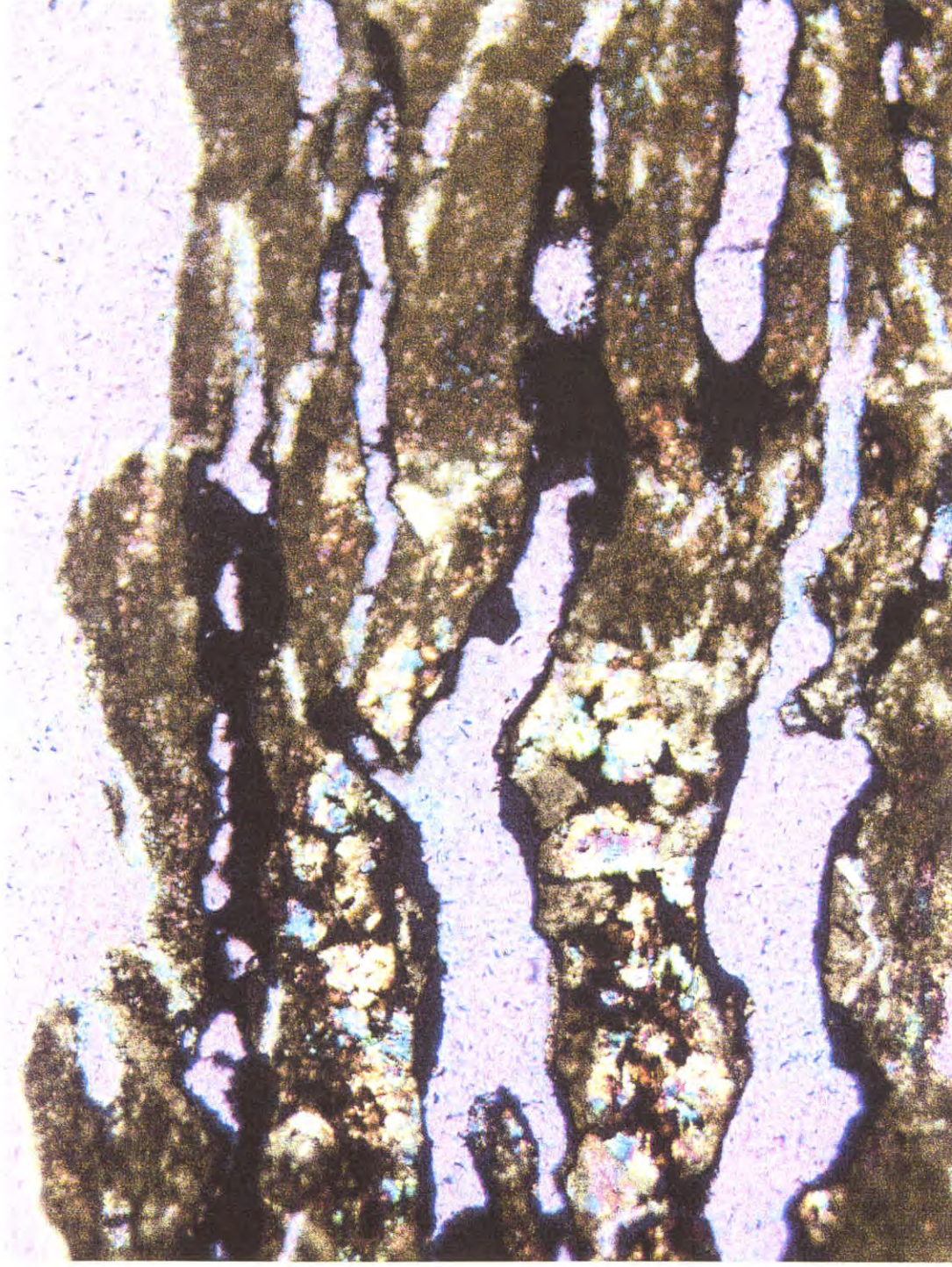


Figure 6 - A magnified (100X) view of a thin section from near the center of the concrete spall in Sample ES - 1. Note the large expansion fractures through the dolomite aggregate (colorful particle located left of center). Also note the extension of the fractures into the surrounding paste structure.

APPENDIX B

WATER REPELLENT EVALUATION

Laboratory Report



CONSTRUCTION PRODUCTS GROUP CHEM-TRETE® Weatherproofing Water Repellent Evaluation

TS-369-088

DATE:

November 16, 1998

PROJECT:

Kaiser Center
300 Lakeside Drive, Suite 130
Oakland, CA 94612

SAMPLES RECEIVED:

(3) pieces of Precast Concrete (spalled from structure)

RECEIVED FROM:

Mr. Joe Link
Specialty Construction Products
P.O. Box 1674
Sebastopol, CA 95473

*Regional Sales Manager: Bob Dooley***PURPOSE:**

To determine the effectiveness of Dynasylan BH-N at reducing water ingress in the supplied specimens for the purpose of warranty qualification.

This information is furnished without warranty, representation, inducement or license of any kind, except that it is accurate to the best of Sivento Inc.'s knowledge or obtained from sources believed by Sivento Inc. to be accurate, and Sivento Inc. does not assume any legal responsibility for use or reliance upon same. Tests should be carried out only by chemists or chemically qualified lab technicians. Before using any product, read its label and Material Safety Data Sheet.

Sivento
A Hüls Group Company

220 Davidson Avenue, Somerset, NJ 08873-6821 (800) 828-0919

Laboratory Report: TS-369-088

Page Two

SAMPLE PREPARATION:

Specimens received were oven dried at 110°C for 24 hours to remove atmospheric moisture. The entire circumference of each sample was waxed to prevent water absorption along sides during testing.

TREATMENT OF SAMPLE:

Specimen number 1 was laboratory treated with flood coat of Dynasylan BH-N. Specimen number 2 remained untreated as a control.

The third specimen was retained.

SIVENTO INC. STANDARD TEST PROCEDURES:

Water Absorption Test: (Modified ASTM C- 642)

The cooled specimen(s) was weighed to the nearest 0.01 grams, then placed treated or exposed surface only, in a tank containing several inches of tap water for a period of 24 hours. The specimen(s) was then removed from the water, towel dried and reweighed. The initial and final weights were used to calculate the 24 Hour Treated Water Absorption values.

Depth of Penetration:

Each sample was split longitudinally using a hammer and chisel. Sample half was placed fractured surface down in a water soluble dye solution. Only the untreated portion of each sample absorbs the solution and becomes stained. The depth of penetration is measured from the surface down to stained region, highest and lowest penetration is recorded.

Laboratory Report: TS-369-088

Page Three

TEST RESULTS:

Water Absorption and Depth of Penetration:

Sample No.	Sample Treatment	24 Hour Water Absorption (%)	Depth of Penetration (inches)
1	Dynasylan BH-N	0.27	Full
2	Control	0.9	—

CONCLUSION:

Test results indicate that Dynasylan BH-N is very effective at reducing water ingress in the supplied specimens. Data shows a very low 0.27 % uptake of water for the treated specimen compared to the relatively low 0.9 % for the control. Dynasylan BH-N penetrated the full depth of specimen to a measurement of approximately one inch.

Observations indicate that a significant amount of epoxy coating remains on the surface of the received samples.



Turner Construction Company
1625 Clay Street
Oakland, California 94612
phone: (510) 267-8100
fax: (510) 267-8118

November 20, 2008

Tomas Schoenberg
The Swig Company, LLC
220 Montgomery Street
San Francisco, CA 94104

Re: Kaiser Center- Mall Buildings Exterior Façade (Dolomite Panels) Feasibility Analysis

Dear Tomas,

Thank you for requesting Turner Construction Company to provide an analysis of the exterior façade of the two existing Mall Buildings at the Kaiser Center complex. Per your request, we have evaluated the feasibility of the intact salvaging (removal) of the Dolomite Precast Panels from the structure of the Mall Buildings, and then the potential preservation and reinstallation of these panels on a new structure at that location.

Scope

The scope of the study included a detailed review of the original 1958 Architectural and Structural Drawings and Specifications for both the Kaiser Center office tower and Mall Buildings prepared by Welton Becket & Associates, as well as a visual inspection of these buildings. Both the tower and Mall Buildings were reviewed due to the variation in panel thickness and attachment details given their different structural frames.

Findings

A review of the original construction documents for the Mall Buildings yielded two Architectural details and one Structural detail as the primary elements influencing our findings (please reference Architectural Detail "A" and Detail "B", and Structural Detail "C" attached to this document). The key element is the 1 inch thick grout layer shown between the 3 inch thick precast panels and the buildings' concrete frame, as referenced on the attached Details "A" and "B". The grout bonds the panel to the concrete as if the panel were cast in place, thus effectively creating a unified section. While the Structural details do not show how the panels are to be attached, Detail "C" does show the same unified section for the panel and grout of 4 inches thick. From our visual inspection we did not see anything to suggest that the panels were installed other than the manner is shown in the drawings. It should be noted that none of these details reference any mechanical attachment for the precast panels that is common in current construction methods (the fastener shown in Detail "A" is for a vertical aluminum mullion interfacing between the panels and is not for the panels' attachment to the building); please reference attached Details SK1A and SK1B as examples of typical precast attachment details.

It is important to note that in our experience renovating another high-rise building in Oakland of similar vintage with a similar precast system, the precast panels were actually used as the form surface for the shearwall concrete, thus casting the panels into the unified concrete frame. Separating the panels from the building's concrete frame required extensive hand demolition of the panels utilizing chipping guns. It is possible that this method of attachment may have been used in certain areas of the Mall Building as well, and thus removal would have the same result as the grouted bonding of the panels stipulated in the original design.



Conclusion

Based upon our review of the design documents and our visual inspection, the attachment of these precast Dolomite panels to the Mall Buildings' concrete frame precludes their mechanical removal other than by destructive methods. Further, even attempting to remove the panels by careful hand demolition would most likely cause them to disintegrate due to the nature of their material composition and age. Therefore, it is our opinion that, irrespective of cost, it would be infeasible for the Dolomite precast exterior façade at the Mall Buildings to be salvaged in a manner that would allow their reuse on any new structure. In addition, while it may be possible to salvage some limited amounts of the Dolomite material from the panels, a reasonable approach to demolition of the structure would not yield any "clean" or consistent material for incorporation into the proposed new building façade.

We also consulted two other construction firms that specialize in precast panel manufacturing and installation, Walters & Wolf and Clark Pacific, who reviewed and commented on the pertinent design documents with respect to the Dolomite panels and their opinions and conclusions align with ours.

We welcome the opportunity to discuss this analysis with you or whomever else you feel is appropriate, and would be glad to answer any further questions you may have.

Sincerely,

A handwritten signature in black ink that reads "Willy Mautner". The signature is stylized, with the first name "Willy" written in a cursive-like script and the last name "Mautner" in a more formal, blocky script.

Willy Mautner, AIA
Chief Estimator

Cc: Deborah Boyer, The Swig Company, LLC
Scott Eastman, Turner Construction Company

APPENDIX C

Significance Diagrams

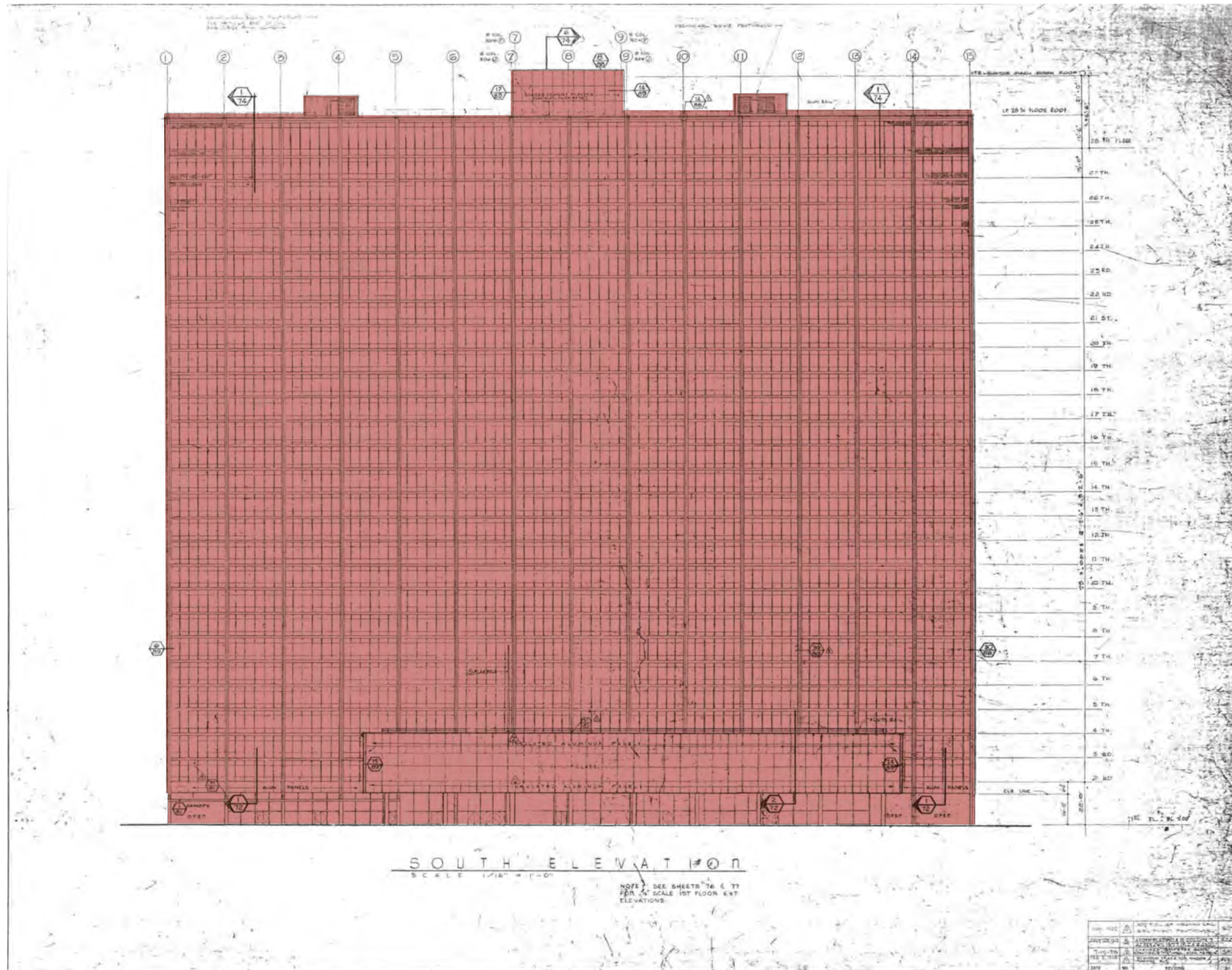


- Significant
- Contributing
- Non-Contributing

Kaiser Center Office Tower

North Elevation

11 September 2008

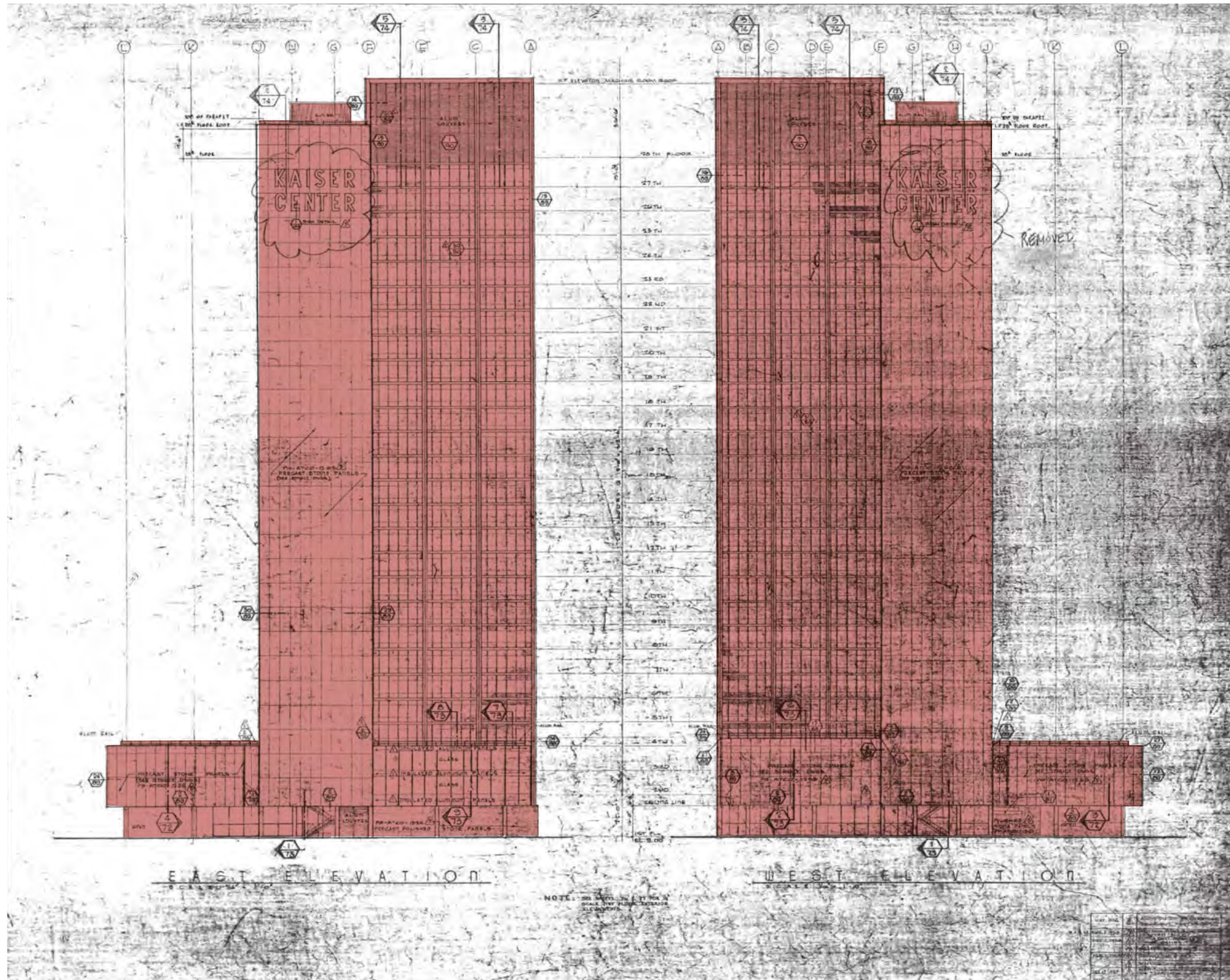


- Significant
- Contributing
- Non-Contributing

**Kaiser Center
Office Tower**

South Elevation

11 September 2008



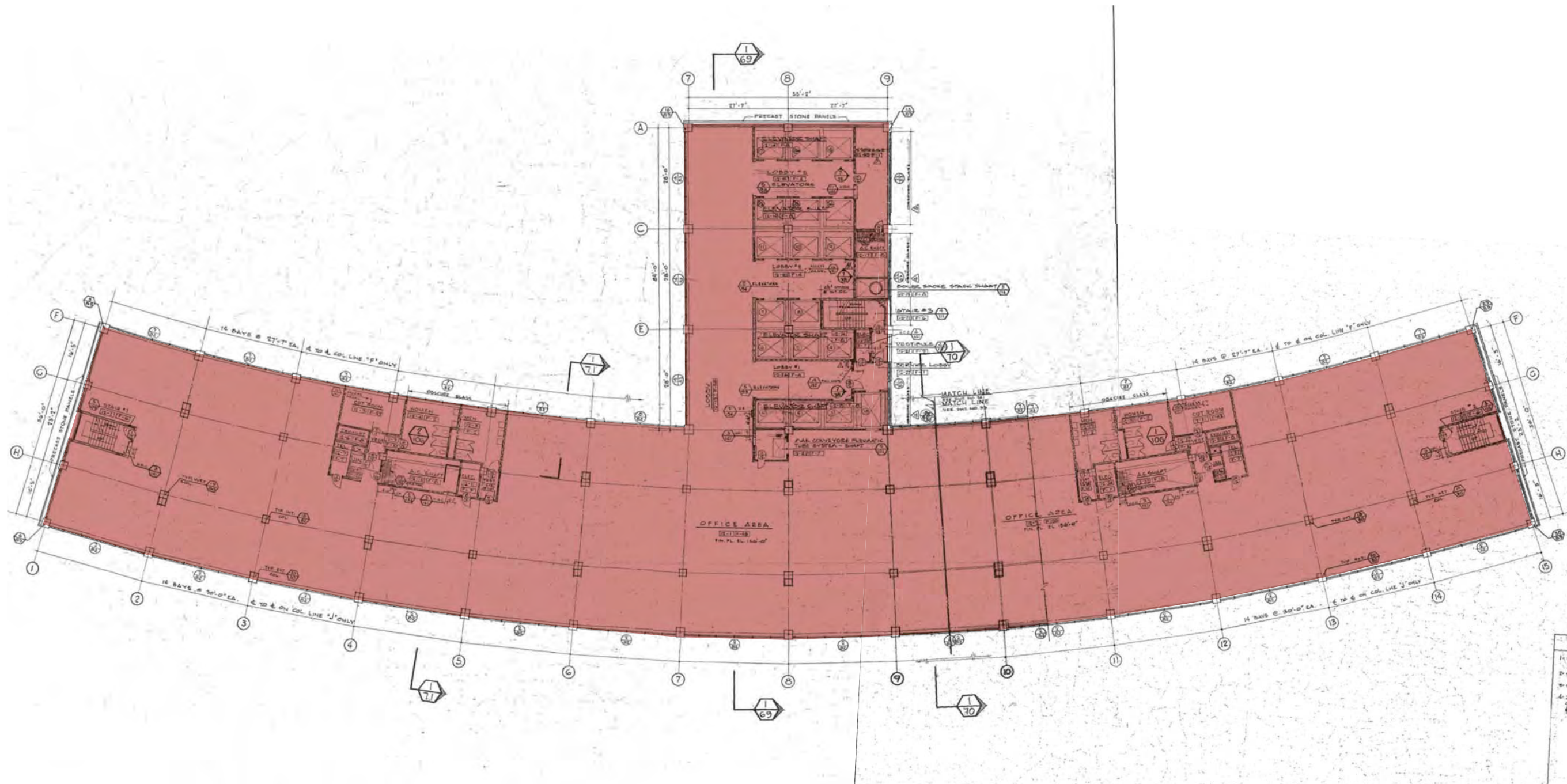


- Significant
- Contributing
- Non-Contributing

Kaiser Center Office Tower

First Floor

11 September 2008

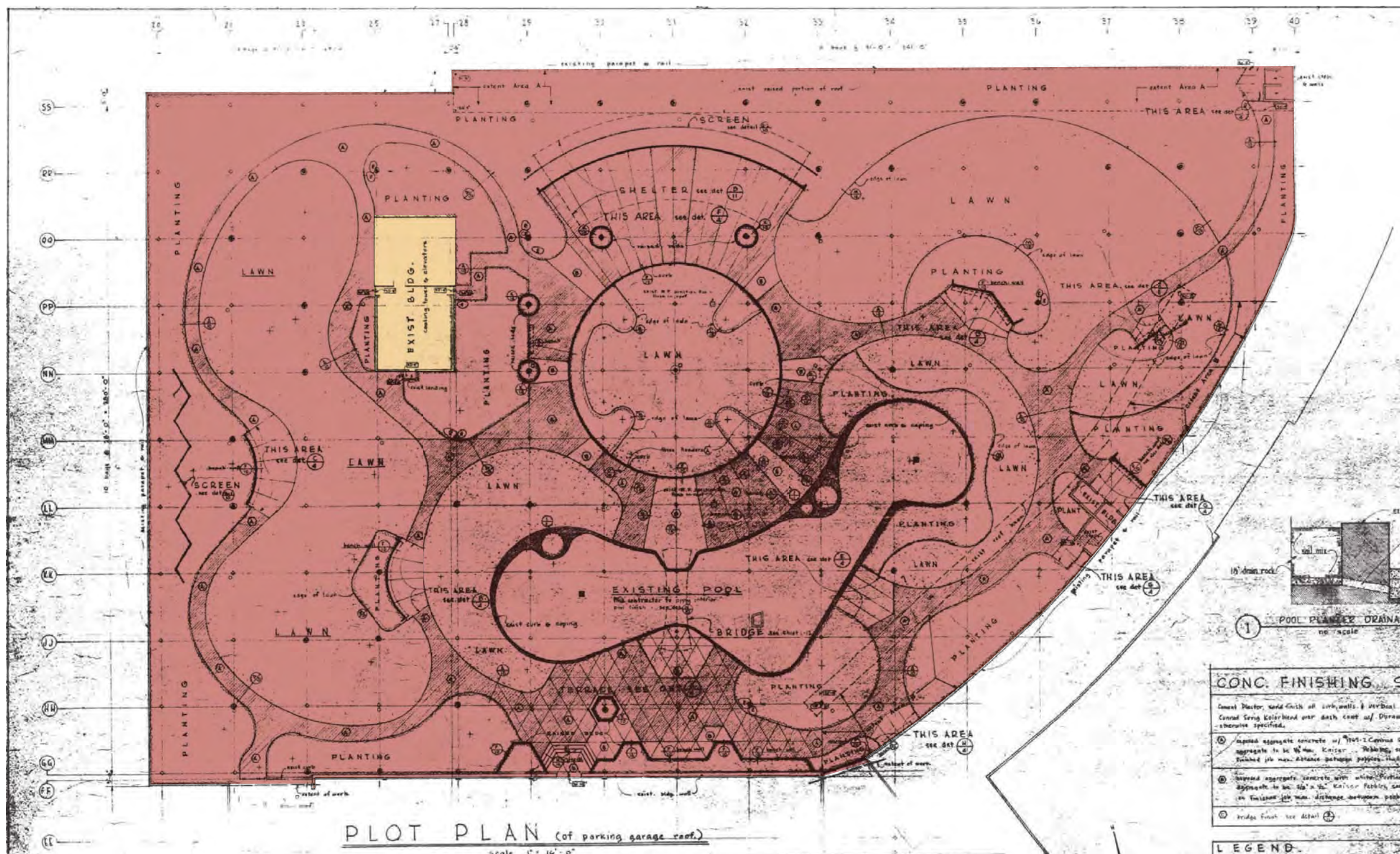


- Significant
- Contributing
- Non-Contributing

Kaiser Center Office Tower

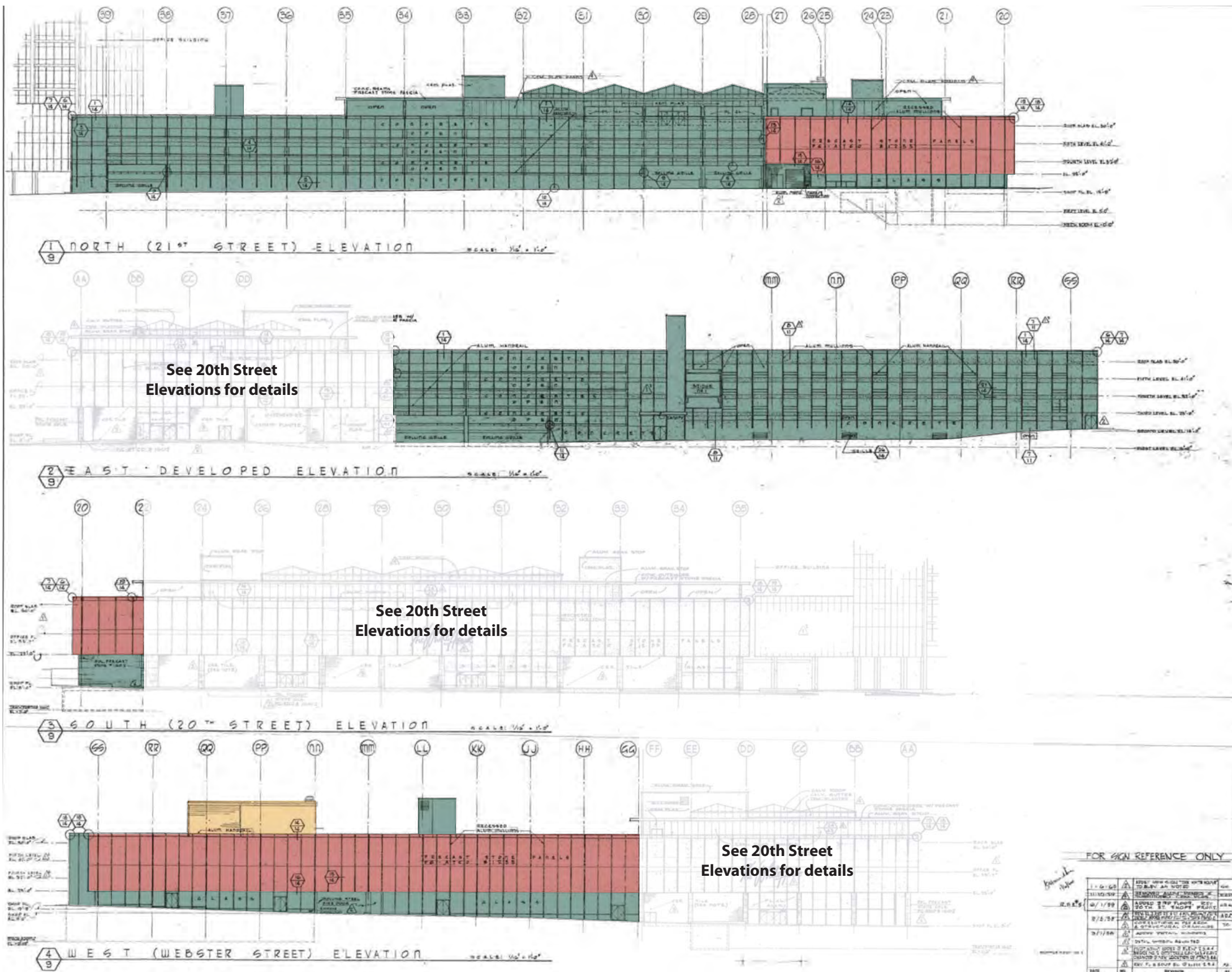
Upper Floors

11 September 2008



Kaiser Center Roof Garden

11 September 2008

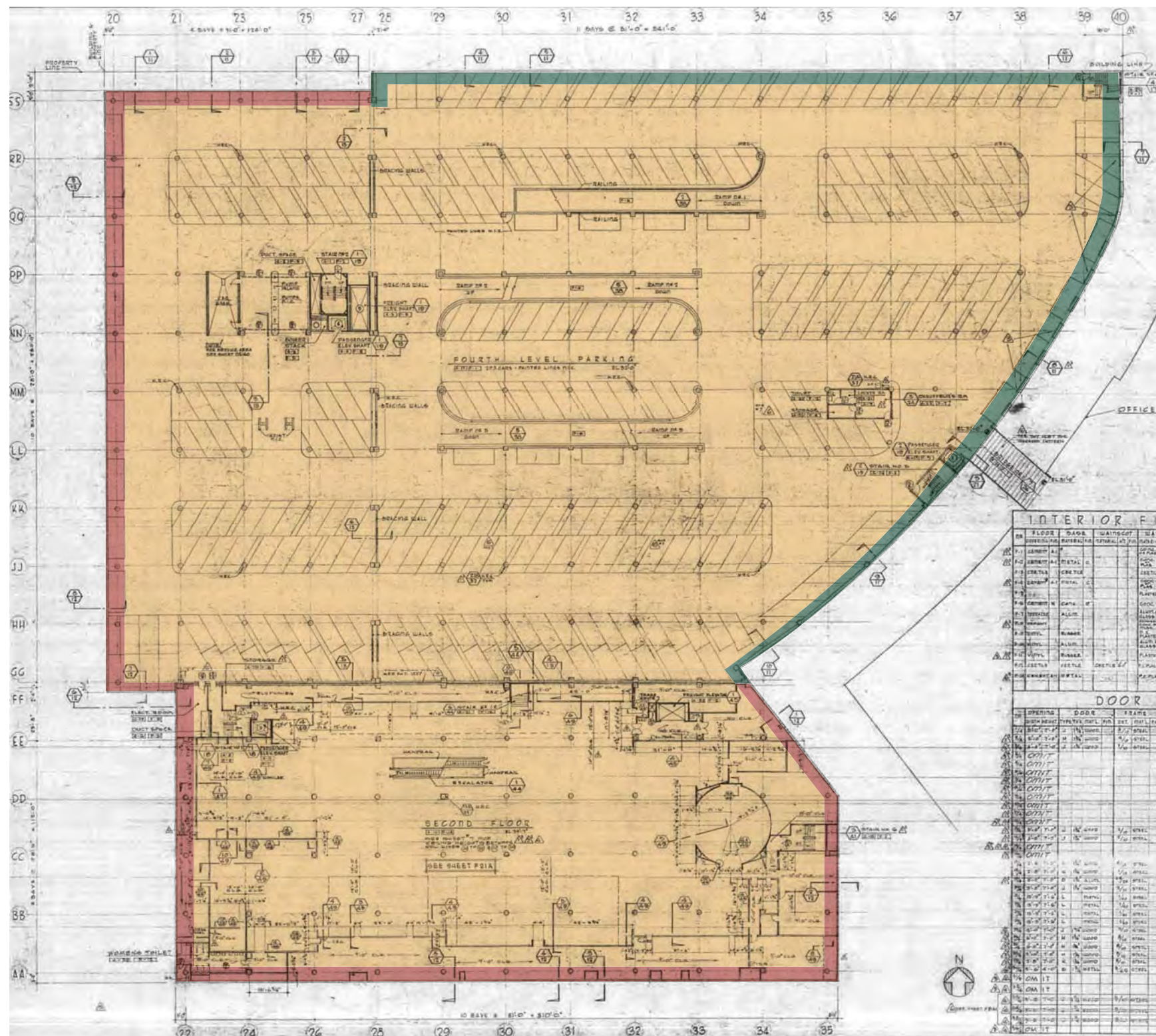


- Significant
- Contributing
- Non-Contributing

**Kaiser Center
Mall Building**

Elevations

11 September 2008

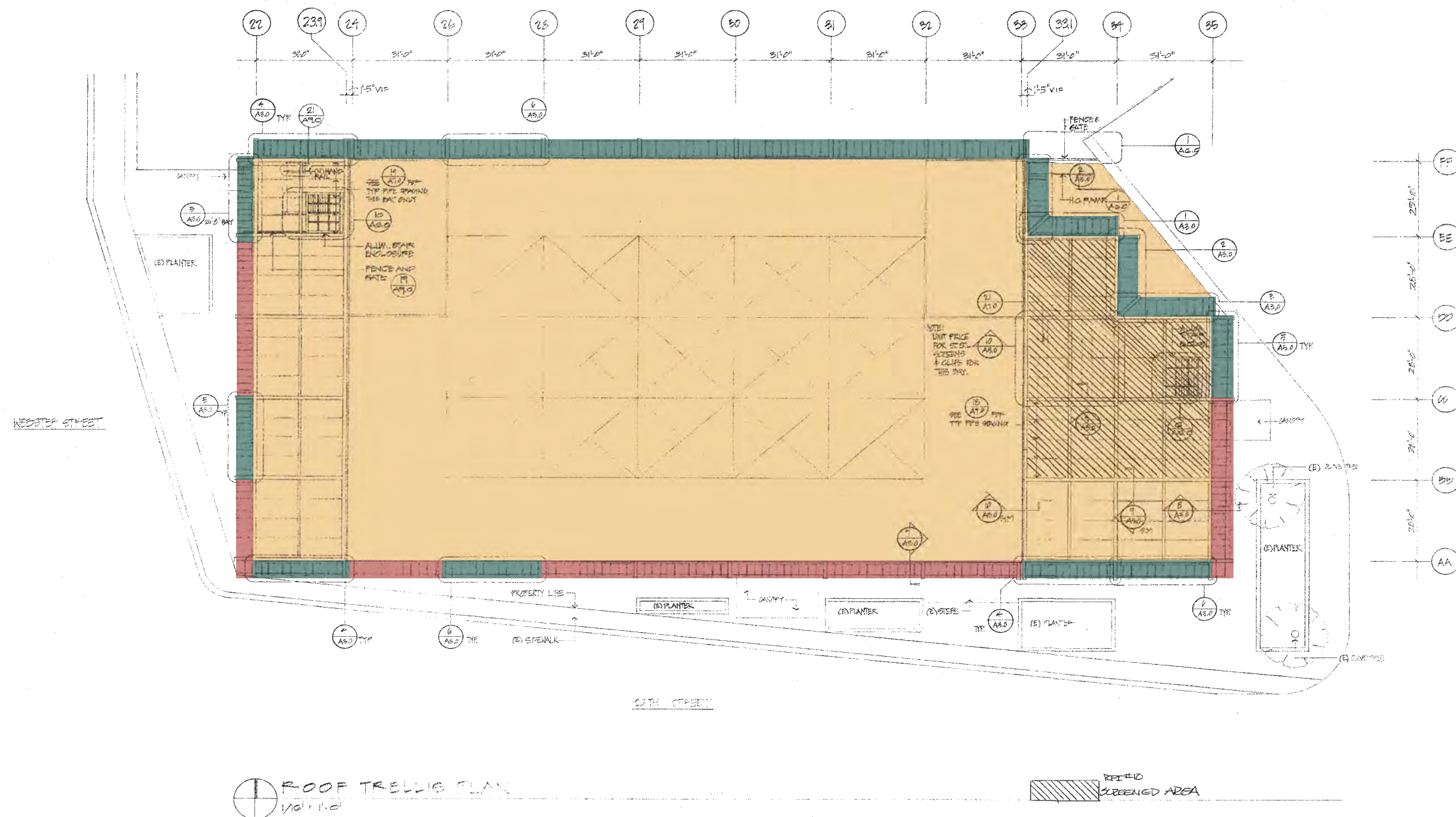


- Significant
- Contributing
- Non-Contributing

Kaiser Center Mall Building

Second Floor Offices / Fourth Floor Parking

11 September 2008



- Significant
- Contributing
- Non-Contributing

Kaiser Center Mall Building

20th Street Building Roof Terrace

11 September 2008

APPENDIX D

DPR 523 A & B Form

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code _____

Other Listings _____
Review Code _____ Reviewer _____ Date _____

Page 1 of 7 Resource name(s) or number (assigned by recorder) Kaiser Center and Roof Garden

P1. Other Identifier:

*P2. Location: ☐ Not for Publication ☒ Unrestricted

*a. County Alameda

*b. USGS 7.5' Quad Oakland, CA.

Date: 1995

*c. Address 300 Lakeside Drive

City Oakland

Zip 94612

*e. Other Locational Data: Assessor's Parcel Number _____ Block: 652 Lot: 1-5

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.)
The Kaiser Center complex is on a large, irregularly shaped block bounded by 20th, Harrison, 21st, and Webster streets. The Kaiser Center complex consists of a twenty-eight-story Office Tower, the three-story and basement 20th Street Mall Building, the two-and-three-story Webster Street Mall Building, a three-and-four-story parking garage, and the Roof Garden on the top level parking garage. The Mall Buildings appear as a strong horizontal base that contrasts the verticality of the tower. The complex was designed by Welton Becket & Associates and completed in 1959. The roof garden was designed by the landscape architecture firm Osmundson & Staley and completed in 1960.

The office tower is made up of two basic components: a T-shaped tower with a straight stem and curved wings; and an asymmetrically located two-story podium supported by square piers at the first floor that extends beyond the plane of the T-shaped tower and follows the curve of the main façade. The main façade of the tower features fourteen bays separated by burnished aluminum piers. Each bay includes six windows surrounded by gold toned and natural aluminum frames. The side facades of the curved plane feature concrete panels with dolomite, a rock-like mineral product, aggregate. Other than the penthouse floor which features a higher ceiling height, all floors and bays on the main façade are identical. The straight vertical portion or stem of the tower features the same fenestration pattern as the main façade at the east and west façade and the same concrete panels with dolomite aggregate at the north and south façades. The north façade features signage reading, "Kaiser." The office tower has undergone few exterior alterations. The only interior alterations include an early-1990s renovation of the lobby and the conversion of the original cafeteria space into tenant space.
(continued)

*P3b. Resource Attributes: (list attributes and codes) HP6 1-3 story commercial building, HP7 3+ story commercial building, HP29 Landscape Architecture

*P4. Resources Present: ☒ Building ☐ Structure ☐ Object ☒ Site ☐ District ☐ Element of District ☐ Other

P5a. Photo



P5b. Photo: (view and date)
Office Tower, View from south; June 16, 2008

*P6. Date Constructed/Age and Sources: ☒ historic
1959 (buildings); 1960 (roof garden)

*P7. Owner and Address:
Swig Company
220 Montgomery, Floor 20
San Francisco, CA 94104

*P8. Recorded by:
Page & Turnbull, Inc.
724 Pine Street
San Francisco, CA 94108

*P9. Date Recorded: July 2008

*P10. Survey Type:
Reconnaissance

*P11. Report Citation: (Cite survey report and other sources, or enter "none")
Page & Turnbull, Historic Resource Evaluation, "Kaiser Center," Sept. 2008.

*Attachments: ☐ None ☐ Location Map ☐ Sketch Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record
☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other (list)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # _____
HRI # _____
Trinomial _____

Page 2 of 7

Resource Name or # (Assigned by recorder) Kaiser Center

*Recorded by Page & Turnbull, Inc.

*Date

☒ Continuation ☐ Update

DPR 523A (1/95)

***Required information**

The parking garage is a three-and-four-story reinforced concrete rectangular plan building with a curved east façade that parallels the tower. The building is utilitarian and the only ornamentation present on the parking lot is a grid of narrow aluminum ribs and aluminum signage reading, "Kaiser Center Garage." The top level of the building is occupied by the Kaiser Center Roof Garden.

The 20th Street Mall building is a three-story and building located at the corner of 20th and Webster streets with a rectangular plan and flat roof. The building features oversize circular piers and glazed aluminum storefronts at the first floor giving the main mass of the building the appearance of floating. The first floor features stucco and white brick veneer cladding. The second floor has no fenestration but feature dolomite concrete panels with aluminum cantilevered canopies and vertical granite panels and aluminum fins above the entrances. The penthouse level occupies approximately three-quarters of the floor plate and is set back from the plane of the lower floors. The penthouse level features stucco cladding and closely arranged aluminum sash windows. The remainder of the penthouse level features an aluminum pergola. As of the date of this evaluation, a portion of this floor is vacant, but has traditionally been occupied by a restaurant that accesses the roof garden.

The Webster Street Mall building is a two-and-three-story building located at the corner of 21st and Webster streets with a rectangular plan and a flat roof covered by the roof garden. The first floor features stucco cladding and fixed full-height aluminum windows. The upper two floors feature slightly protruding dolomite concrete panels with no fenestration. Similar to the 20th Street Mall Building, the main mass of the building appears to float above the first floor.

The Kaiser Center Roof Garden is located on the top level of the parking garage at the northwest corner of the complex. The roof garden is rectangular in plan, except at the eastern edge, where the garden parallels the arc of the tower's main façade. The garden features curvilinear aggregate pathways, a series of irregularly-shaped undulating lawns, a circular lawn located in the center of the garden, low concrete curbing, specimen trees, shrub plantings, concrete benches and related site furnishings, and an 8,800 square foot reflecting pool. The pool features a wood bridge which was added between 1973 and 1975. A visual axis begins at the main entrance to the garden at the 20th Street Mall Building and runs through the reflecting pool and central circular lawn. A concrete HVAC building is located in the northwest corner of the garden. The building is approximately eighteen feet in height, clad in stucco and capped by a flat roof. The HVAC building is screened by specimen trees to alleviate the visual intrusion of this building within the garden.

The buildings and roof garden appear to be in excellent condition.

BUILDING, STRUCTURE, AND OBJECT RECORD

Page 3 of 7

*NRHP Status Code 3B

*Resource Name or # Kaiser Center

B1. Historic name: Kaiser Center

B2. Common name: Kaiser Center

B3. Original Use: Commercial, Garden

B4. Present use: Commercial, Garden

*B5. Architectural Style: Modern

*B6. Construction History: (Construction date, alterations, and date of alterations) The Kaiser Center buildings were constructed in 1959. The Roof Garden was completed in 1960. No major exterior alterations have been made. The Mall Buildings have undergone the most alterations, including changes to the storefronts, and cosmetic changes at the entrances (1960s and 1990s). The interior of the Mall buildings have been substantially altered due to tenant improvements. The cafeteria of the office tower was converted to office space (date unknown), and the lobby of the office tower was renovated in the early-1990s. The wood bridge, a later addition, was installed in the roof garden between 1973 and 1975.

*B7. Moved? ☒ No ☐ Yes ☐ Unknown Date: _____ Original Location: _____

*B8. Related Features:

B9a. Architect: Welton Becket & Associates (buildings); Osmundson & Staley (roof garden)

b. Builder: Robert E. McKee

*B10. Significance: Theme Commercial Development, Modern Architecture and Landscape Architecture Area Oakland
Period of Significance 1959 Property Type Commercial; Landscape Architecture Applicable Criteria 1, 2, 3

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity)

The Kaiser Center Office Tower and Roof Garden is recognized as one of the symbols of Oakland. The 1960 Modern office complex with curved tower anchors the northwest corner of Lake Merritt in the heart of Oakland. Henry J. Kaiser, the magnate of the Kaiser Industries empire commissioned the iconic office complex to serve as the company's headquarters. Kaiser commissioned Welton Becket & Associates, an acclaimed commercial architecture firm, to design the new complex with office tower, retail buildings, parking garage, and roof garden. The complex is also significant for containing the first modern office tower constructed on the shores of Lake Merritt. The Roof Garden, at the top level of the parking garage, was designed by Osmundson & Staley, important landscape architects who created the largest contiguous roof garden in North America at the time of its completion. The roof garden is an important example of Bay Area Modern landscape architecture. Today the Kaiser Center complex stands as a tangible reminder of the importance of Oakland as an industrial and commercial center in the 1950s and 1960s, as an excellent example of the elegance of the Modern style, and the versatility of a master architect, Welton Becket & Associates.
(continued)

B11. Additional Resource Attributes: (List attributes and codes) _____

*B12. References:

See "References Cited" in Page & Turnbull, Historic Resource Evaluation, Kaiser Center, July 2008.

B13. Remarks: None

*B14. Evaluator: Cora Palmer

*Date of Evaluation: September 2008

DPR 523B (1/95)

(This space reserved for official comments.)

Sketch Map



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # _____
HRI # _____
Trinomial _____

Page 4 of 7

Resource Name or # (Assigned by recorder) Kaiser Center

*Recorded by Page & Turnbull, Inc.

*Date ☒ Continuation ☐ Update

***B10. Significance (cont.):**

Criterion 1 (Events)

The Kaiser Center appears to be eligible under Criterion 1 (Events) as a complex that reflects “events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.” In this case, the event is the influence of the Kaiser Industries on the history of California and the West Coast. As the only remaining headquarters building of Kaiser Industries, the multinational corporation that influenced the World War II war effort, infrastructure in California, and throughout the West Coast, and changed the health care industry, the Kaiser Center is a significant landmark testifying to an important industrial institution that helped Oakland remain a significant site of commercial and industrial activities in the post-War era.

The complex is also significant as a reminder of the movement of Oakland's Downtown commercial core toward Grand Avenue and Lake Merritt. The Kaiser Center led the shift of the commercial core from 14th and Broadway in downtown Oakland to Lake Merritt. While earlier residential towers such as the Lake Merritt Hotel (1927) and the Bellevue-Staten Building (1929) had been present on the lake, the Kaiser Center was the first true modern commercial skyscraper complex to be located on Lake Merritt. Other modern office towers followed the shift away from downtown including the Ordway Building (1970), the twenty-seven-story Lake Merritt Plaza (1985) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s are located on prominent intersections in the immediate area.

Criterion 2 (Persons)

The Kaiser Center appears eligible for the California Register under Criterion 2 (Persons) for its association with Henry J. Kaiser. Kaiser is significant as an innovative industrialist with a larger than life personality who built more ships than any other builder during World War II, completed massive construction projects like the Hoover Dam, headed the first company to manufacture steel on the West Coast, and developed a health care organization for workers that became a model for Health Maintenance Organizations (HMOs) across the country. Kaiser was influential in the design of the Kaiser Center; purportedly telling the management team and the architects to “double it” when asked his opinion of the proposed size of the building. Kaiser is also frequently credited for the creation of the roof garden. Additionally, Kaiser held his offices, where he oversaw his multitude of companies and had an apartment at the 27th floor of the building. While many of Kaiser's industrial buildings still exist, the Kaiser Center in Oakland is the only remaining corporate headquarters connected to Kaiser Industries. Kaiser's earlier Oakland headquarters building, at 1924 Broadway, was demolished in the 1990s and therefore the Kaiser Center is an important building that expresses the importance of Oakland as the world headquarters of Kaiser Industries.

Criterion 3 (Architecture)

The Kaiser Center appears eligible for the California Register under Criterion 3 for embodying the distinctive characteristics of the Modern style. The Kaiser Center is a well-preserved example of the style as applied to a corporate headquarters complex. Characteristic features of the complex include its variety of building types: office tower, retail wings, and parking garage all designed in a compatible style; its site in a landscaped plaza with views to Lake Merritt. The complex appears as a strong horizontal base that is contrasted by a vertical office tower. The office tower features structural piers elevating the building's mass above the plaza, a mezzanine podium at the base, a T-shaped plan, a sweeping curved façade, flat roof, polychrome aluminum and glazed wall surfaces, aggregate concrete panels at secondary facades, and standardized bays with little variation. The Mall Buildings are completed in the same style and feature rectangular plans, flat roofs, structural piers elevating the building's mass above the first floor, and dolomite panel cladding. The materials used throughout the complex were selected to showcase the variety of Kaiser manufactured materials including aluminum and dolomite.

The Kaiser Center is also important as a designed office and retail complex, with an office tower, retail, landscaped open space, and parking incorporated on one site. Kaiser's headquarters was not envisioned as solely an office building, but as a group of associated buildings and landscapes that were intended to be used by both Kaiser Industries employees and Oakland community members.

In addition to being an example of a type, the Kaiser Center is also significant as the work of a master, Welton Becket & Associates. Welton Becket & Associates was an important modernist architecture firm working throughout the United States. The firm specialized in corporate headquarters, hotels, and cultural centers and was the largest architecture firm in the United States in the 1950s. The Kaiser Center is an excellent example of Welton Becket's work for corporate clients, who relied upon the firm to embody the corporation's philosophy in physical form. Welton Becket's design for the Kaiser Center showcases not only the materials produced by Kaiser Industries but also the characteristics Kaiser Industries were known for: innovation, in the use of a curved façade; and concern for employee well-being embodied in the inclusion of a roof garden.

The roof garden is significant for its design and as the largest contiguous roof garden in North America at the time of its construction. The garden features many of the hallmarks of modern landscape design including undulating topography, curvilinear pathways, geometrically shaped lawns, simple materials such as concrete pathways, planters, and benches; (continued)

CONTINUATION SHEET

Primary # _____

HRI # _____

Trinomial _____

Page 5 of 7

Resource Name or # (Assigned by recorder) Kaiser Center

*Recorded by Page & Turnbull, Inc.

*Date ☒ Continuation ☐ Update

***B10. Significance (cont.):**

trimmed hedges, shrubs, specimen trees, and an asymmetrical pool. The design by Osmundson & Staley is indicative of the Bay Area Modern landscape architecture popularized by designers such as Thomas Church, Robert Royston, and Lawrence Halprin. The Kaiser Center roof garden by Osmundson & Staley exemplifies the mid-century California Style first popularized by Church and his contemporaries in the 1940s. The California Style emphasized the importance of indoor/outdoor living and relied heavily on a modern landscape architectural vocabulary to achieve this effect. The decision to include a roof garden as part of the Kaiser Center complex marked an important recognition of the potential of the roof garden to create a more healthful and attractive office environment within the city.

Criterion 4 (Information Potential)

This property was not fully assessed for its potential to yield information important in prehistory or history, per California Register Criterion 4 (Information Potential).

The Kaiser Center complex retains its integrity, and the only significant alterations to public spaces include the renovation of the lobby and replacement of the cafeteria by tenant space. The exterior of the complex has seen few alterations, other than storefront alterations, signage changes, and the installation of ornament at the Mall Building entrances. The roof garden also retains integrity and though many of the plantings have been replaced over time, the new plantings are consistent with the original design. Overall, the complex retains sufficient integrity to convey its historical significance.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # _____
HRI # _____
Trinomial _____

Page 6 of 7

Resource Name or # (Assigned by recorder) Kaiser Center

*Recorded by Page & Turnbull, Inc.

*Date ☒ Continuation ☐ Update



Parking Garage, north façade. Source: Page & Turnbull, June 2008.



20th Street Mall, southeast corner. Source: Page & Turnbull, June 2008

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # _____
HRI # _____
Trinomial _____

Page 7 of 7

Resource Name or # (Assigned by recorder) Kaiser Center

*Recorded by Page & Turnbull, Inc.

*Date ☒ Continuation ☐ Update



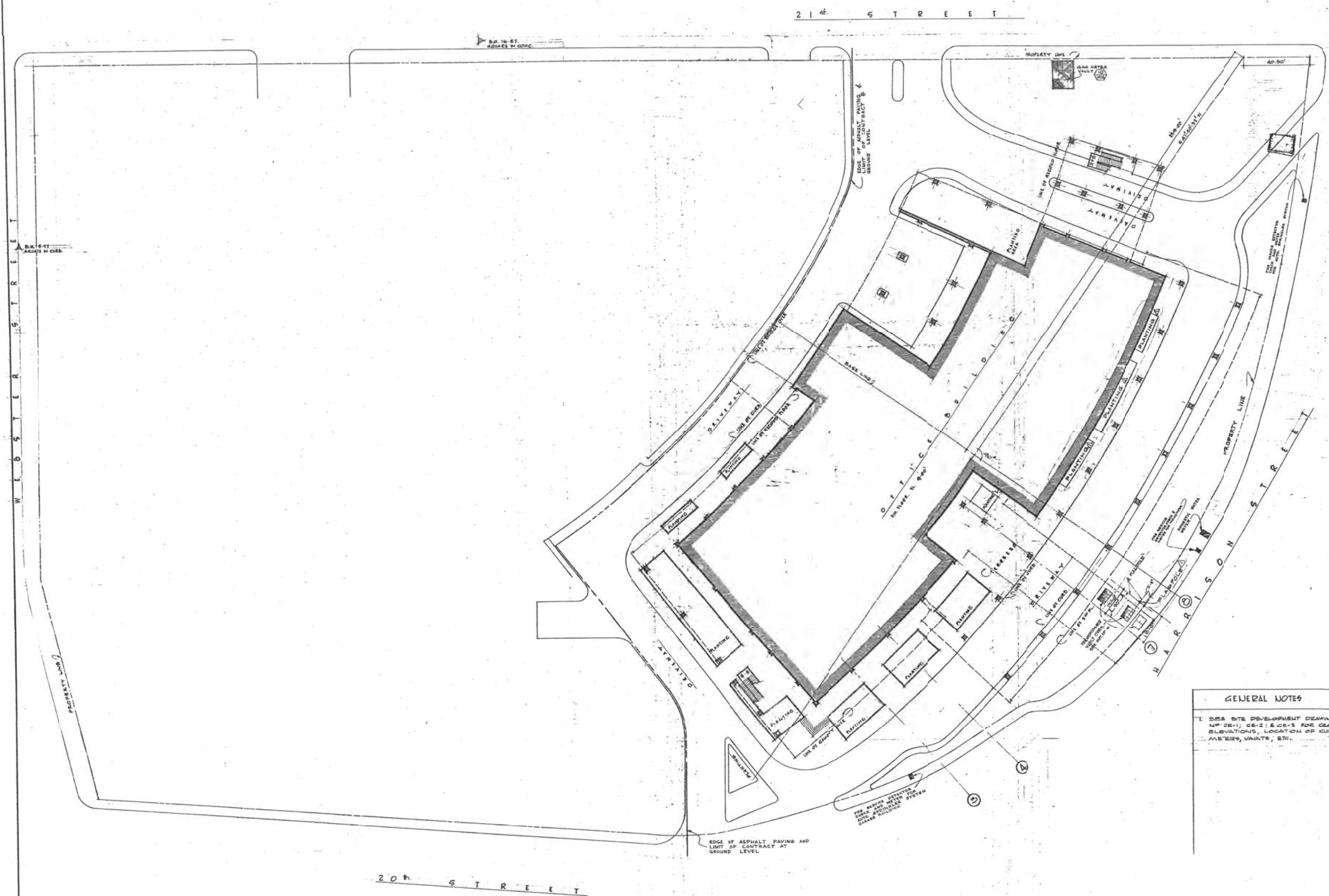
Webster Street Mall, northwest corner. Source: Page & Turnbull, June 2008.



Roof Garden, view from Office Tower. Source: Page & Turnbull, June 2008

APPENDIX E

Historic Drawings



GENERAL NOTES

1. SEE SITE DEVELOPMENT DRAWINGS NO. DE-1, DE-2, & DE-3 FOR GRADE, ELEVATIONS, LOCATION OF CURBS, MANHOLES, VAULTS, ETC.

MURRAY ERIC ASSOCIATES
STRUCTURAL ENGINEERS - LOS ANGELES, CALIF.
DUDLEY DEANE & ASSOCIATES
MECHANICAL & ELECTRICAL ENGINEERS - SAN FRANCISCO, CALIF.

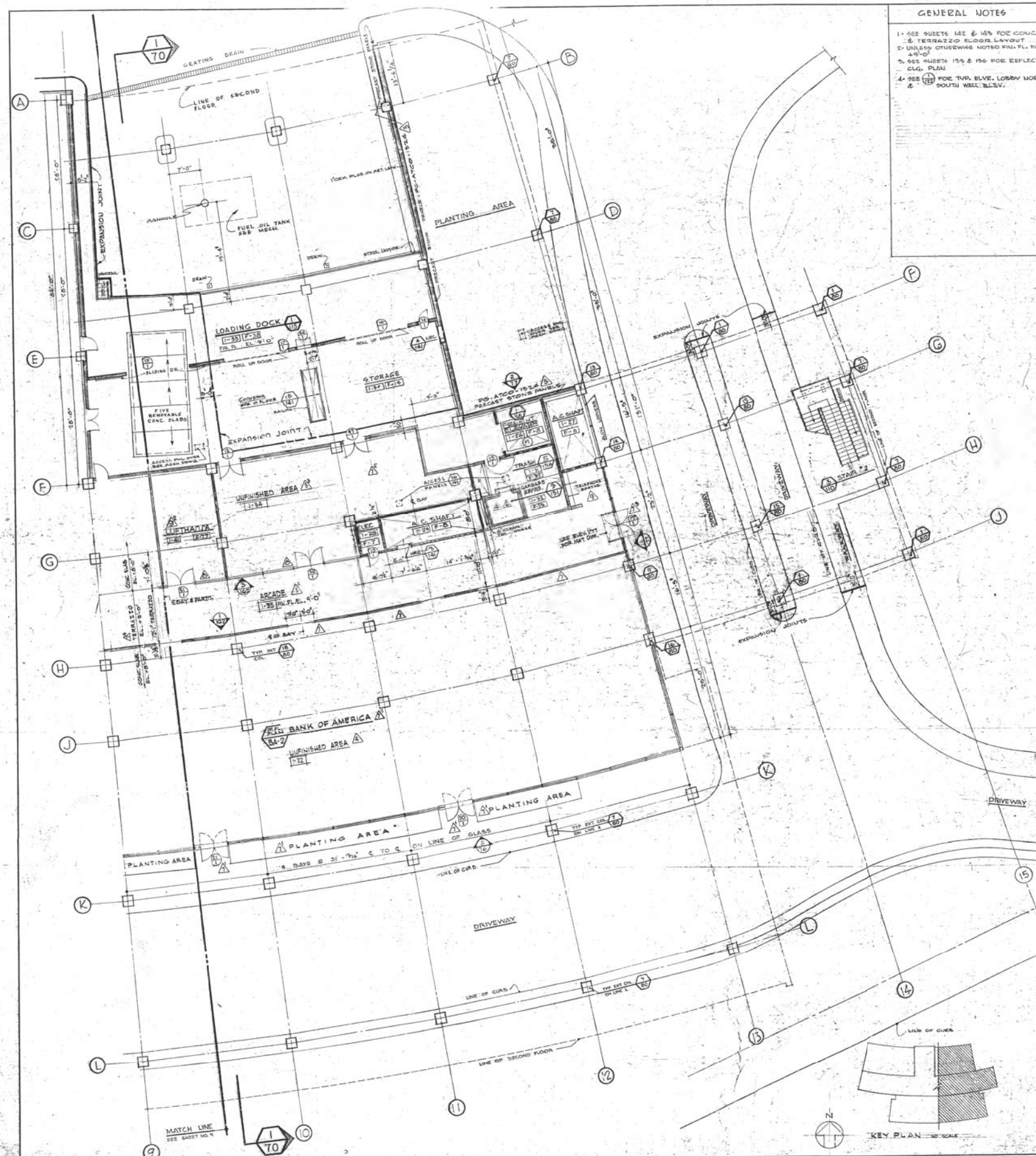
KAISER CENTER

OAKLAND, CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
PLOT PLAN
SCALE 1" = 20'-0"

DATE	NOVEMBER 15, 1957
TRACED	JOB NO. 1437
CHECKED	SHEET NO. 2-1



GENERAL NOTES

1. SEE SHEETS 142 & 143 FOR CON-
-CRETE TERRAZZO FLOOR LAYOUT
2. UNLESS OTHERWISE NOTED FIN. FL.
-TO 0'
3. SEE SHEETS 135 & 136 FOR REPLE-
-MENT CLG. PLAN
4. SEE (1) FOR TYP. BLVE. LOBBY IN
-SOUTH WALL BLVE.

INTERIOR FINISH SCHEDULE

ACTED	FIN. NO.	FLOOR		BASE		WAINSCOT		WALL		CEILING		TRIM		REMARKS	
		COVERING	FIN.	MATERIAL	FIN.	MATERIAL	FIN.	HT. FIN.	MATERIAL	FIN.	MATERIAL	FIN.	MATERIAL	FIN.	
	F-1	VINYL TILES		RUBBER		NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	B	ACETAL C		
	F-5	EXPANDED PLASTER		RUBBER		NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	B	ACETAL C		POOR SHEET ON TOP FOR VENTILATION IN CLG. HT. OF SPACE. (10-1)
	F-6	CEMENT	D	ACETAL	O	NONE			PUTTYCOAT PLASTER	B	EXPANDED STRUCTURE	O	ACETAL O		
	F-6	NONE		NONE		NONE			HARDWALL PLASTER		NONE		NONE		
	F-7	CEMENT	A	METAL	C	NONE			HARDWALL PLASTER		EXPANDED STRUCTURE		METAL C		
	F-12	VINYL TILES		RUBBER		NONE			KEENE'S GYPSUM	A	KEENE'S GYPSUM	O	ACETAL C		
	F-15	TERRAZZO		TERRAZZO		NONE			ALUMINUM EXPANDED		AC. PLASTIC	B	N		SEE DETAILS
	F-23	QUARRY TILES		QUARRY TILES		NONE			MIRAL GYPSUM		MIRAL GYPSUM	A	ACETAL C		SEE REFRIGERATOR DETAILS FOR CEILING ON DATE
	F-28	CEMENT	D	ACETAL	C	NONE			PUTTYCOAT PLASTER	B	EXPANDED STRUCTURE	O	ACETAL C		SEE REFRIGERATOR DETAILS FOR CEILING ON DATE
	F-14	CEMENT	A	ACETAL	C	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	B	METAL C		SEE DETAILS FOR CLG. HT.
	F-24	CEMENT	F	NONE		METAL	O		KEENE'S GYPSUM	A	KEENE'S GYPSUM	O	METAL C		
	F-30	EXPANDED PLASTER		NONE		NONE			EXPANDED STRUCTURE		EXPANDED STRUCTURE		NONE		
	F-34	CEMENT	F	WOOD		METAL	B		WINE & WINE PLASTER	O	WINE & WINE PLASTER	O	METAL C		
	F-40	TERRAZZO		TERRAZZO		NONE			FLINT & GLASS PLASTER	A	ACUSTIC PLASTIC	O	METAL C		
	F-41	QUARRY TILES		QUARRY TILES		NONE			FLINT & GLASS PLASTER	A	ACUSTIC PLASTIC	O	METAL C		
	F-47	VINYL TILES		RUBBER		NONE			PUTTYCOAT PLASTER	B	EXPANDED STRUCTURE	O	METAL C		A HIGH DATE

DOOR SCHEDULE - CONTINUED

NO.	DOOR	OPENING	DOOR		FRAME		THRESHOLD		LOUVER	HARDWARE	FLTR	REMARKS					
			WIDE	HT.	THICK	MATERIAL	NO.	DETAIL	NO.	DETAIL	MATERIAL						
41	W	W	2' 0"	7' 0"	1 1/2"	WOOD	011	STL	-	-	-	31	-	-	-	-	THRESH. CLOSERS-21, 31 & 41 ON FLOOR.
42	W	W	2' 0"	7' 0"	1 1/2"	ALUM.	312A	STL	-	514A	METAL	-	17	-	-	-	
43	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
44	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
45	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
46	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
47	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
48	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
49	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
50	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
51	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
52	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
53	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
54	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
55	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
56	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
57	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
58	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
59	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
60	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
61	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
62	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
63	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
64	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
65	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
66	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
67	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
68	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
69	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
70	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
71	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
72	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
73	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
74	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
75	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
76	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
77	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
78	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
79	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
80	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
81	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
82	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
83	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
84	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
85	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
86	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
87	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
88	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
89	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
90	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
91	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
92	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
93	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
94	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
95	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
96	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
97	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
98	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
99	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS
100	W	W	2' 0"	7' 0"	1 1/2"	THIN PL.	-	ALUM.	414	-	-	22	-	-	-	-	SEE DETAIL- FR. PL. CLOSERS

DOOR SCHEDULE

[illegible]

FOR CONTINUATION OF DOOR SCHEDULE SEE ABOVE

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MURRAY ERICK ASSOCIATES
STRUCTURAL ENGINEERS — LOS ANGELES, CALIF.

DUDLEY DEANE & ASSOCIATES
MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.

K A I S E R C E N T E R
O A K L A N D , C A L I F O R N I A

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

5 OFFICE BUILDING
1ST FLOOR PLAN
SCALE 1/8" = 1'-0"

G	DRAWN	DATE	NOVEMBER 15, 1957
	TRACED	JOB NO.	1437
	CHECKED	SHEET NO.	10-9

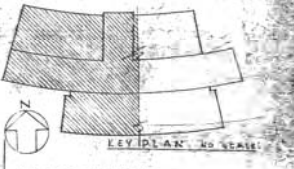


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REVISION	DATE	BY
1	MAR 9 1957	WELTON BECKETT
2	JUL 17 1957	WELTON BECKETT
3	SEP 15 1957	WELTON BECKETT
4	SEP 15 1957	WELTON BECKETT
5	SEP 15 1957	WELTON BECKETT
6	SEP 15 1957	WELTON BECKETT
7	SEP 15 1957	WELTON BECKETT
8	SEP 15 1957	WELTON BECKETT
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10	SEP 15 1957	WELTON BECKETT
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42	SEP 15 1957	WELTON BECKETT
43	SEP 15 1957	WELTON BECKETT
44	SEP 15 1957	WELTON BECKETT
45	SEP 15 1957	WELTON BECKETT
46	SEP 15 1957	WELTON BECKETT
47	SEP 15 1957	WELTON BECKETT
48	SEP 15 1957	WELTON BECKETT
49	SEP 15 1957	WELTON BECKETT
50	SEP 15 1957	WELTON BECKETT
51	SEP 15 1957	WELTON BECKETT
52	SEP 15 1957	WELTON BECKETT
53	SEP 15 1957	WELTON BECKETT
54	SEP 15 1957	WELTON BECKETT
55	SEP 15 1957	WELTON BECKETT
56	SEP 15 1957	WELTON BECKETT
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58	SEP 15 1957	WELTON BECKETT
59	SEP 15 1957	WELTON BECKETT
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63	SEP 15 1957	WELTON BECKETT
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65	SEP 15 1957	WELTON BECKETT
66	SEP 15 1957	WELTON BECKETT
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80	SEP 15 1957	WELTON BECKETT
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82	SEP 15 1957	WELTON BECKETT
83	SEP 15 1957	WELTON BECKETT
84	SEP 15 1957	WELTON BECKETT
85	SEP 15 1957	WELTON BECKETT
86	SEP 15 1957	WELTON BECKETT
87	SEP 15 1957	WELTON BECKETT
88	SEP 15 1957	WELTON BECKETT
89	SEP 15 1957	WELTON BECKETT
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94	SEP 15 1957	WELTON BECKETT
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98	SEP 15 1957	WELTON BECKETT
99	SEP 15 1957	WELTON BECKETT
100	SEP 15 1957	WELTON BECKETT



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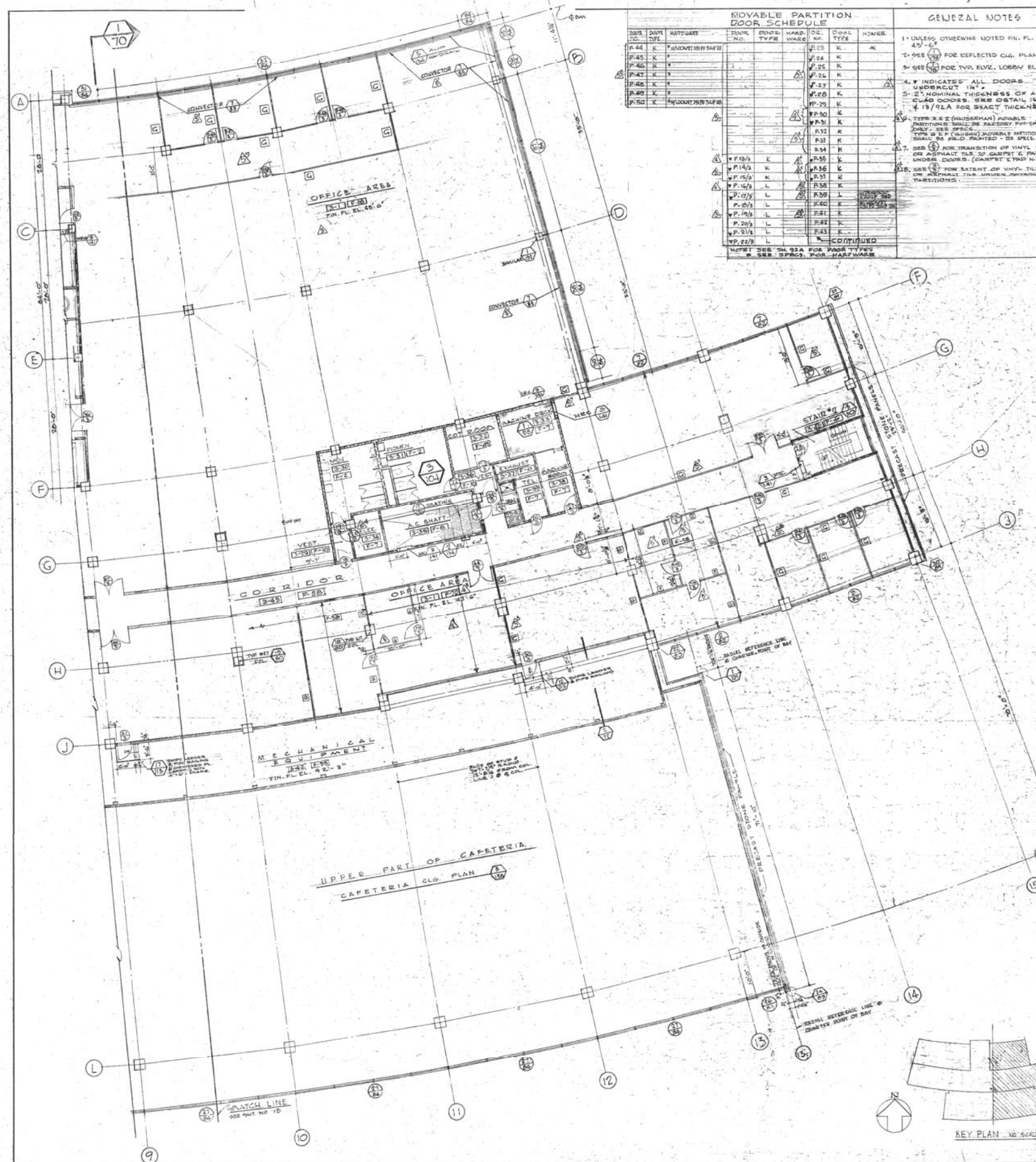
Kaiser Center

OAKLAND, CALIFORNIA

WELTON BECKETT AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
3RD FLOOR PLAN
SCALE: 1/8" = 1'-0"

DATE	NOVEMBER 15, 1957
TRACED	JOB NO. 1437
CHECKED	SHEET NO.
	13-4



MOVABLE PARTITION DOOR SCHEDULE									
DOOR NO.	DOOR TYPE	HART/WARE	FINISH NO.	EDGE TYPE	HARD- WARE	Q.C.	DOOR TYPE	DOOR TYPE	HOURS
P-44	K	*H LOCKET 50 P.D. 1415				P-23	K		
P-45	K					P-24	K		
P-46	K					P-25	K		
P-47	K					P-26	K		
P-48	K					P-27	K		
P-49	K					P-28	K		
P-50	K	*H LOCKET 50 P.D. 1415				P-29	K		
						P-30	K		
						P-31	K		
						P-32	K		
						P-33	K		
						P-34	H		
						P-35	L		
						P-36	K		
						P-37	K		
						P-38	K		
						P-39	L		
						P-40	K		
						P-41	K		
						P-42	K		
						P-43	K		
						P-44	K		

NOTE: SEE CH. 34 FOR DOOR TYPES

CONTINUED

GENERAL NOTES

1.5% OTHERWISE NOTED IN PL. EL. 1/4
 1/4" - 6"
 SEE 1/4" FOR REFLECTED CL. PLAN
 SEE 1/4" FOR TYP. ELV. LOGRA ELEV.
 * INDICATES ALL DOORS
 UNDER 14"
 2" NOMINAL THICKNESS OF ALL
 CLAD DOORS. SEE DETAIL 14/19
 1/19/92A FOR SNAXT THICKNESS
 TYPE X X (HUSSEMAN) MOVABLE
 PARTITIONS - SHALL BE FACTORY FINISH
 ONLY. SEE SPEC.
 TYPE S F (WILSON) MOVABLE PARTITIONS
 SHALL BE FIELD PAINTED - SEE SPEC.
 SEE 1/4" FOR TRANSITION OF VINYL TILE
 OR ASPHALT TILE TO CARPET & PASS
 UNDER DOORS. SEE DETAIL 1/19/92C
 SEE 1/4" FOR RATE-UP OF VINYL TILE
 OR ASPHALT TILE ARMING MOVING
 PARTITIONS.

INTERIOR FINISH SCHEDULE														
FIN. NO.	FLOOR		BASE		WAINSCOT		WALL		CEILING		TRIM		REMARKS	
	COVERING	FIN.	MATERIAL	FIN.	MATERIAL	WT.	FIN.	MATERIAL	FIN.	MATERIAL	FIN.	MATERIAL		FIN.
F.1	VINYL TILE	-	RUBBER	-	NONE	-	-	PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8.2	B	METAL C	
F.2	CERAMIC TILE	-	CERAMIC TILE	-	NONE	-	-	CERAMIC TILE	B	ACUSTIC TILE	8.2	B	METAL C	
F.3	VINYL TILE	-	ALUM.	-	NONE	-	-	ALUMINUM	B	ALUMINUM	8.2	B	METAL C	
F.4	ASPHALT TILE	-	RUBBER	-	NONE	-	-	PUTTYCOAT PLASTER	A	PUTTYCOAT PLASTER	8.2	A	METAL C	
F.6	CEMENT	D	METAL	O	NONE	-	-	PUTTYCOAT PLASTER	C	EXPOSED STRUCTURE	O	METAL O	C	
F.8	NONE	-	NONE	-	NONE	-	-	HARDWALL PLASTER	-	NONE	-	NONE	-	QUANTITY SEE (F-3) (F-10)
F.10	VINYL TILE	-	RUBBER	-	NONE	-	-	PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8.2	B	METAL C	
F.12	VINYL TILE	-	RUBBER	-	NONE	-	-	CEMENT PLASTER	B	CEMENT PLASTER	8.2	A	METAL C	
F.7	CEMENT	A	METAL	C	NONE	-	-	HARDWALL PLASTER	-	EXPOSED STRUCTURE	-	METAL	C	C
F.43	VINYL TILE	-	RUBBER	-	NONE	-	-	PUTTYCOAT PLASTER	B	ACUSTIC TILE	8.2	B	METAL C	
F-35	BUTYRONUM	-	BUTYRONUM	-	NONE	-	-	WEDGELL PLASTER	A	EXPOSED STRUCTURE	N	METAL	C	C
F-8	VINYL TILE	-	ALUM.	-	NONE	-	-	PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8.2	B	METAL C	ALUM. TRIM C. EG. SEE (F-70)
F-70	CEMENT (EXPOSED)	-	ALUM.	-	NONE	-	-	PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8.2	B	METAL C	ALUM. TRIM C. EG. SEE (F-70)

[illegible]

DOOR SCHEDULE									
COORD	UP/DOWN	FLOOR	DOOR	FRAME	THRESHOLD	GLASS	HARDWARE	REMARKS	
NO.	DIR.	ST.	NO.	MATERIAL	FINISH	MATERIAL	FINISH		
110	UP	1ST	110	ALUM.	STL			EXP. CLOSER	
111	UP	1ST	111	ALUM.	STL			EXP. CLOSER	
112	UP	1ST	112	ALUM.	STL			EXP. CLOSER	
113	UP	1ST	113	ALUM.	STL			EXP. CLOSER	
114	UP	1ST	114	ALUM.	STL			EXP. CLOSER	
115	UP	1ST	115	ALUM.	STL			EXP. CLOSER	
116	UP	1ST	116	ALUM.	STL			EXP. CLOSER	
117	UP	1ST	117	ALUM.	STL			EXP. CLOSER	
118	UP	1ST	118	ALUM.	STL			EXP. CLOSER	
119	UP	1ST	119	ALUM.	STL			EXP. CLOSER	
120	UP	1ST	120	ALUM.	STL			EXP. CLOSER	
121	UP	1ST	121	ALUM.	STL			EXP. CLOSER	
122	UP	1ST	122	ALUM.	STL			EXP. CLOSER	
123	UP	1ST	123	ALUM.	STL			EXP. CLOSER	
124	UP	1ST	124	ALUM.	STL			EXP. CLOSER	
125	UP	1ST	125	ALUM.	STL			EXP. CLOSER	
126	UP	1ST	126	ALUM.	STL			EXP. CLOSER	
127	UP	1ST	127	ALUM.	STL			EXP. CLOSER	
128	UP	1ST	128	ALUM.	STL			EXP. CLOSER	
129	UP	1ST	129	ALUM.	STL			EXP. CLOSER	
130	UP	1ST	130	ALUM.	STL			EXP. CLOSER	
131	UP	1ST	131	ALUM.	STL			EXP. CLOSER	
132	UP	1ST	132	ALUM.	STL			EXP. CLOSER	
133	UP	1ST	133	ALUM.	STL			EXP. CLOSER	
134	UP	1ST	134	ALUM.	STL			EXP. CLOSER	
135	UP	1ST	135	ALUM.	STL			EXP. CLOSER	
136	UP	1ST	136	ALUM.	STL			EXP. CLOSER	
137	UP	1ST	137	ALUM.	STL			EXP. CLOSER	
138	UP	1ST	138	ALUM.	STL			EXP. CLOSER	
139	UP	1ST	139	ALUM.	STL			EXP. CLOSER	
140	UP	1ST	140	ALUM.	STL			EXP. CLOSER	
141	UP	1ST	141	ALUM.	STL			EXP. CLOSER	
142	UP	1ST	142	ALUM.	STL			EXP. CLOSER	
143	UP	1ST	143	ALUM.	STL			EXP. CLOSER	
144	UP	1ST	144	ALUM.	STL			EXP. CLOSER	
145	UP	1ST	145	ALUM.	STL			EXP. CLOSER	
146	UP	1ST	146	ALUM.	STL			EXP. CLOSER	
147	UP	1ST	147	ALUM.	STL			EXP. CLOSER	
148	UP	1ST	148	ALUM.	STL			EXP. CLOSER	
149	UP	1ST	149	ALUM.	STL			EXP. CLOSER	
150	UP	1ST	150	ALUM.	STL			EXP. CLOSER	
151	UP	1ST	151	ALUM.	STL			EXP. CLOSER	
152	UP	1ST	152	ALUM.	STL			EXP. CLOSER	
153	UP	1ST	153	ALUM.	STL			EXP. CLOSER	
154	UP	1ST	154	ALUM.	STL			EXP. CLOSER	
155	UP	1ST	155	ALUM.	STL			EXP. CLOSER	
156	UP	1ST	156	ALUM.	STL			EXP. CLOSER	
157	UP	1ST	157	ALUM.	STL			EXP. CLOSER	
158	UP	1ST	158	ALUM.	STL			EXP. CLOSER	
159	UP	1ST	159	ALUM.	STL			EXP. CLOSER	
160	UP	1ST	160	ALUM.	STL			EXP. CLOSER	

[illegible]

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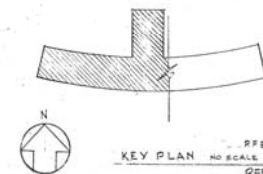
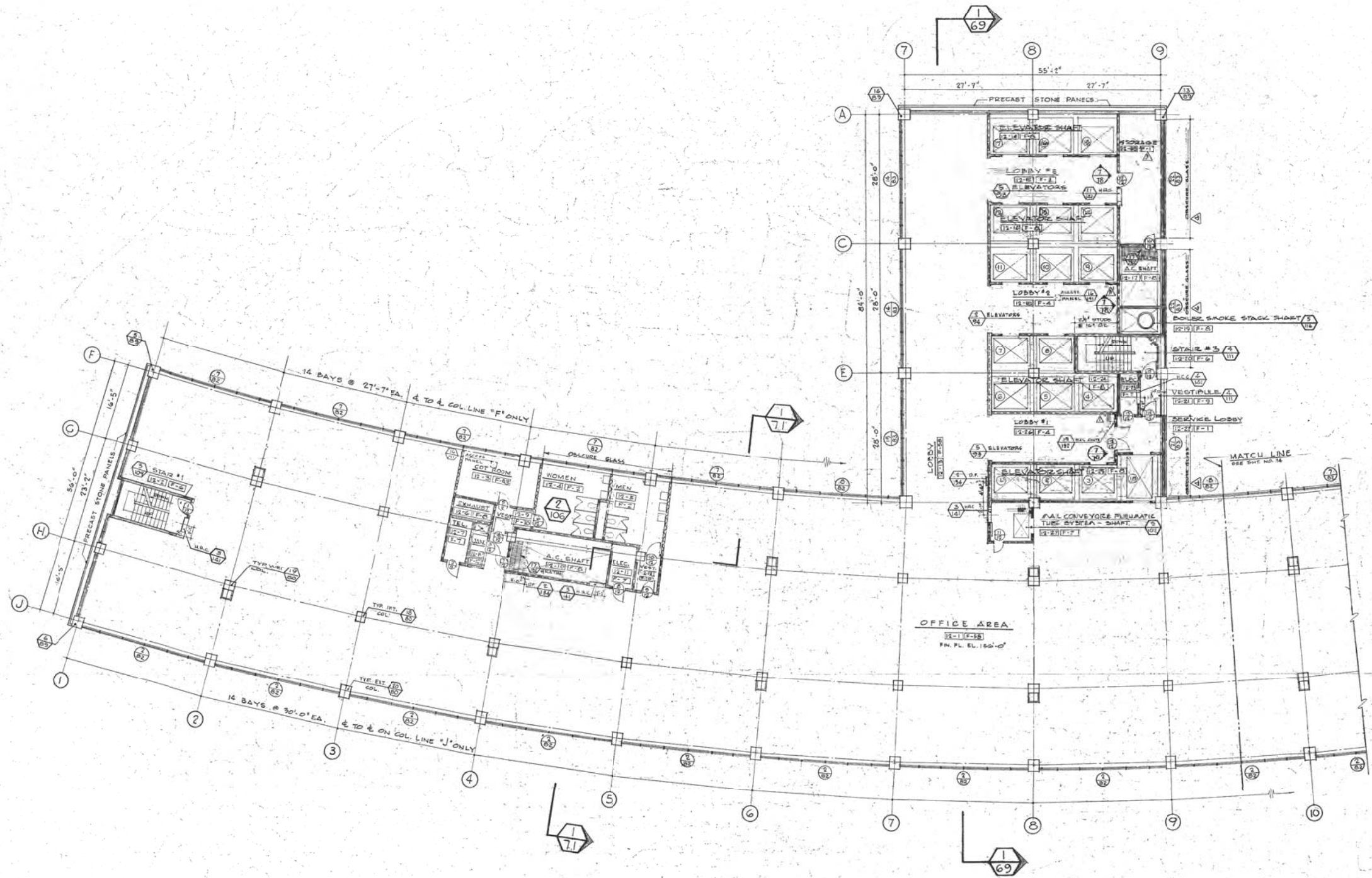
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WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
3 RD FLOOR PLAN
SCALE: 1/8" = 1'-0"
PART TWO

TRACED.	JOB NO. 1437
CHECKED	SHEET NO.
	14-5



JULY 25, 50	REVISION 1	ADJ.
JULY 1, 1959	REVISION 2	ADJ.
MAY 4, 1957	REVISION 3	ADJ.
MAY 26, 50	REVISION 4	ADJ.
DATE	NO.	REVISION
DRAWN	DATE	NOVEMBER 15, 1957
TRACED	JOB NO.	1437
CHECKED	SHEET NO.	31-4
		PART ONE

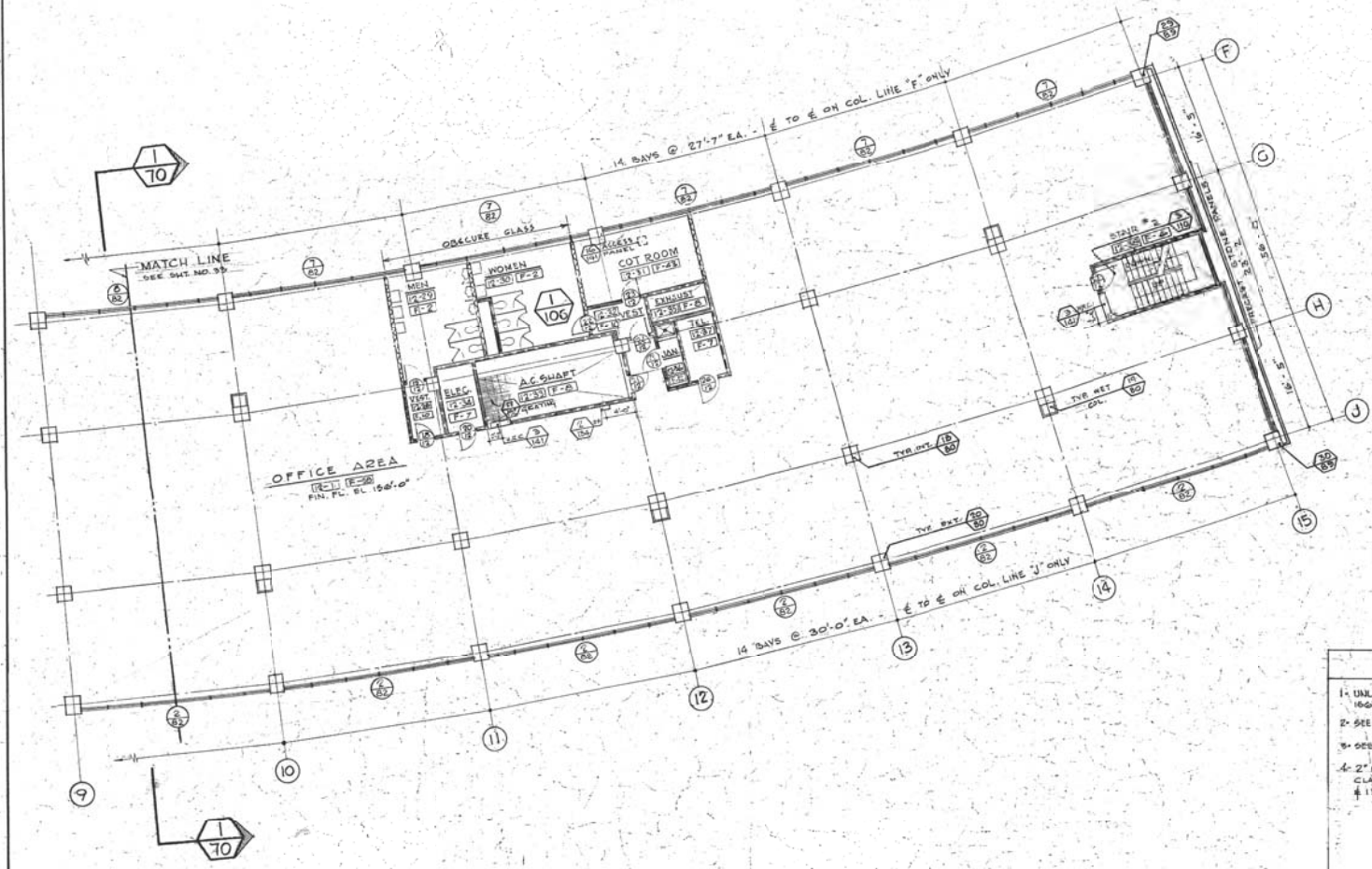
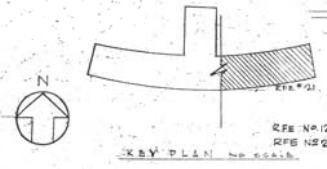
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DUDLEY DEANE & ASSOCIATES
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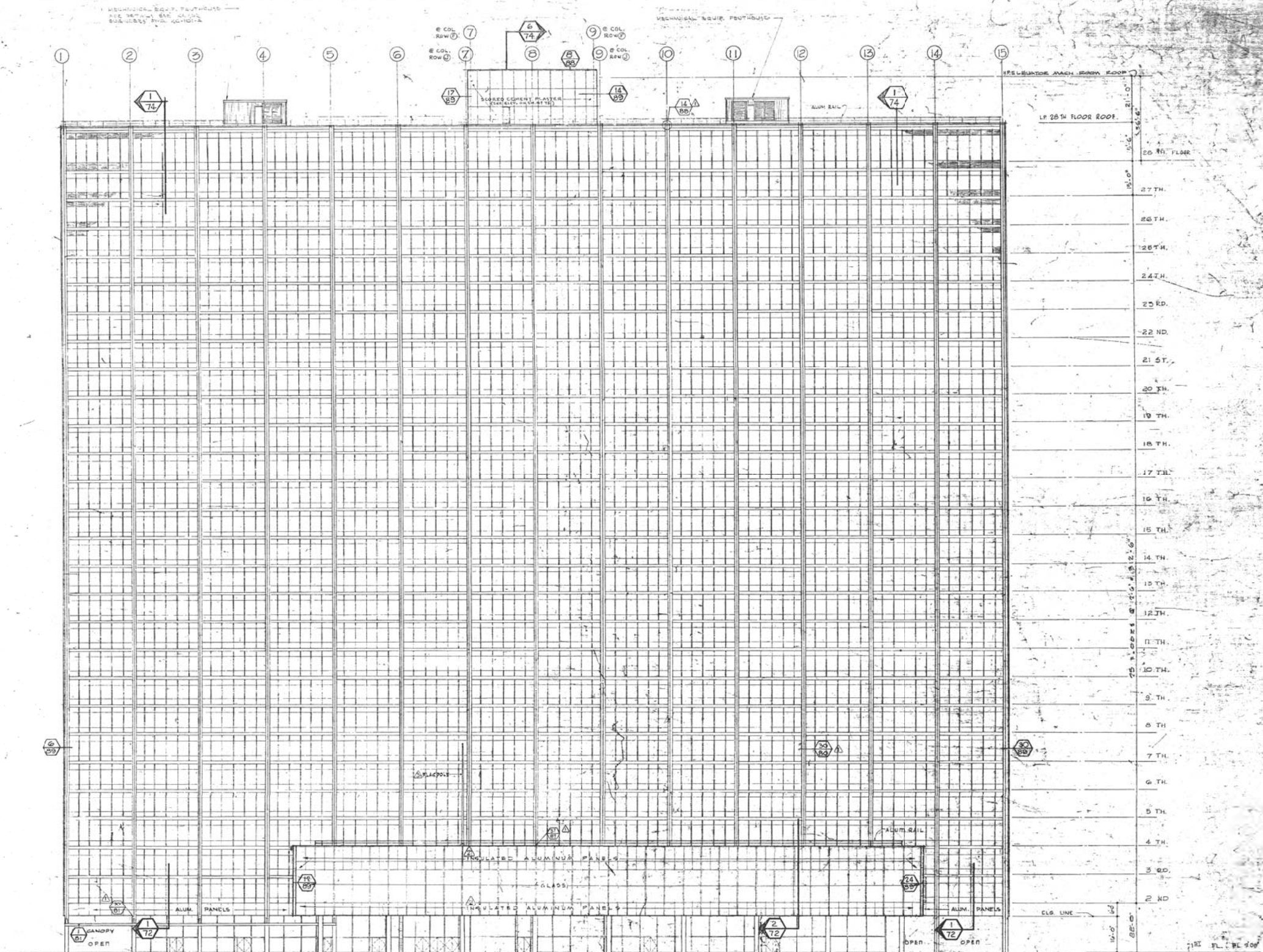
K A I S E R C E N T E R O A K L A N D , C A L I F O R N I A

WELTON BECKET AND ASSOCIATES
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LOS ANGELES, CALIFORNIA

OFFICE BUILDING
12 TH FLOOR PLAN
SCALE: 1/8" = 1'-0"

FLOOR BASE VAINSCOT WALL CEILING TRIM										REMARKS
FIN NO	COVERING	FIN MATERIAL	FIN MATERIAL	FIN MATERIAL	FIN MATERIAL	FIN MATERIAL	FIN MATERIAL	FIN MATERIAL	FIN MATERIAL	
F-1	VINYL TILE	RUBBER	-	WONS	FUTTYCOAT PLASTER	B	PATUTCOAT PLASTER	B	ASTAL C	*TYPE 'H' WALL & DOG FIN @ SPAC (12-36)
F-2	CERAMIC TILE	CERAMIC	-	WONS	CERAMIC TILE	B	AC. PLASTIC	B	ASTAL C	
F-3	VINYL TILE	RUBBER	-	WONS	FUTTYCOAT PLASTER	B	PATUTCOAT PLASTER	B	ASTAL C	
F-4	VINYL TILE	ALUM	-	WONS	ALUMINUM	B	AC. PLASTIC	B	ASTAL C	SAB (12-36)
F-5	CEMENT M	METAL	C	WONS	FUTTYCOAT PLASTER	0	EXPOSED STRUCT.	0	METAL	
F-6	CEMENT M	METAL	C	WONS	WOODWALL PLASTIC	0	EXPOSED STRUCT.	0	METAL	
F-7	NONE	NONE	-	WONS	WOODWALL PLASTIC	0	NONE	0	NONE	IDENTAL AT 12-36 12-12 12-36
F-8	CEMENT M	CEMENT M	-	WONS	CEMENT PLASTER	B	CEMENT PLASTER	B	ASTAL C	
F-9	VINYL TILE	RUBBER	-	WONS	FUTTYCOAT PLASTER	B	PATUTCOAT PLASTER	B	ASTAL C	
F-10	VINYL TILE	RUBBER	-	WONS	KEEPS & FINISH	B	KEEPS & FINISH	B	ASTAL C	
F-11	VINYL TILE	RUBBER	-	WONS	FUTTYCOAT PLASTER	B	AC. PLASTIC	B	ASTAL C	
F-12	VINYL TILE	ALUM	-	WONS	FUTTYCOAT PLASTER	B	METAL	B	ASTAL C	ALUM. TRIM @ DOG SET (12-36)

[illegible][illegible]



SOUTH ELEVATION

NOTE: SEE SHEETS 76 & 77 FOR SCALE 1ST FLOOR EXT. ELEVATIONS.

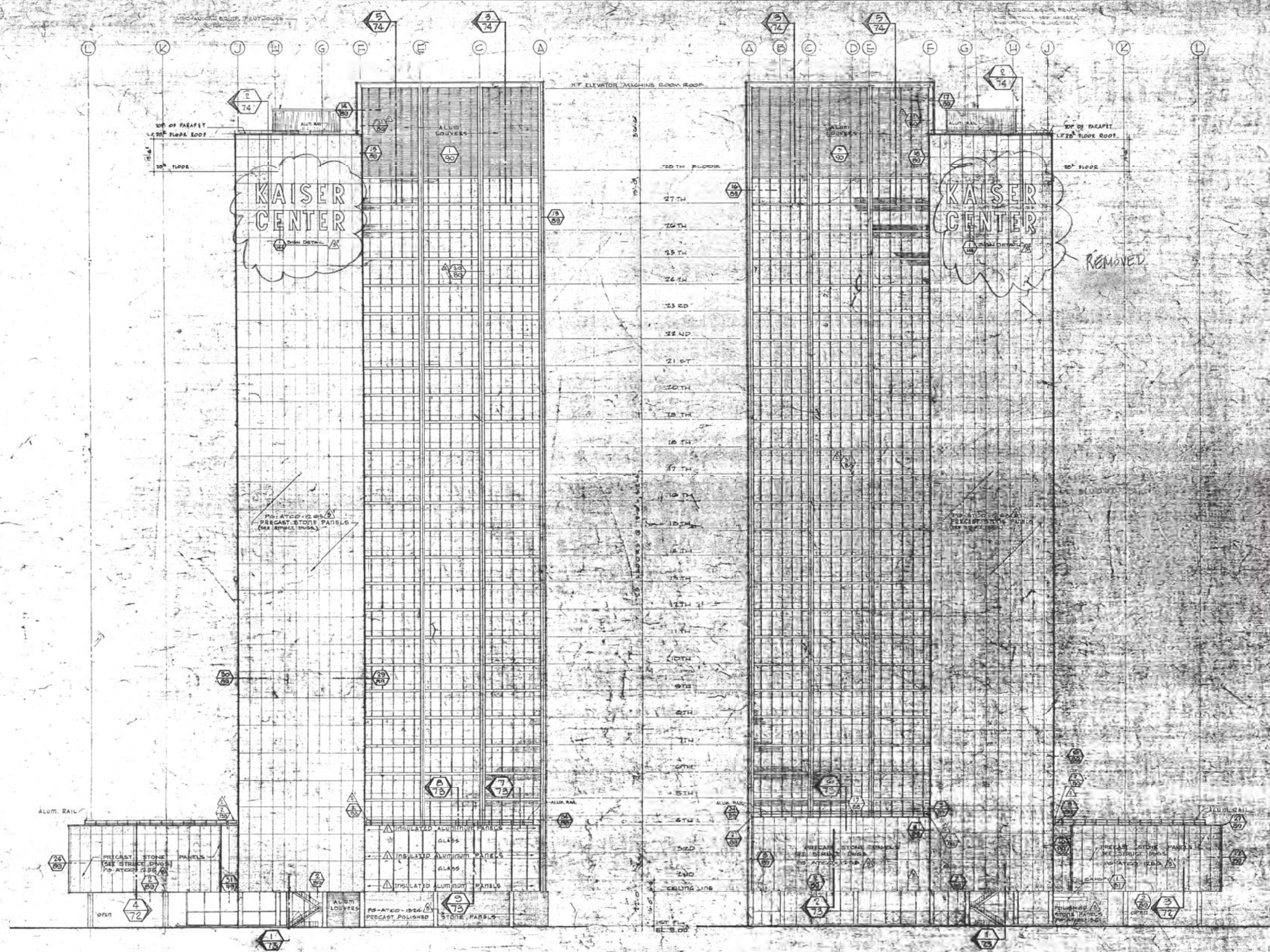
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MECHANICAL/ELECTRICAL ENGINEERS - SAN FRANCISCO, CALIF.

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LOS ANGELES, CALIFORNIA

OFFICE BUILDING
SOUTH ELEVATION
SCALE: 1/16" = 1'-0"

NOV. 1967	ADD TOWER MECHANICAL EQUIPMENT PENTHOUSE	222
JULY 28, 68	ADDED REVISIONS TO SHEET 76	222
7-15-68	CHANGED REVISIONS TO SHEET 76	222
FEB. 5, 1968	CHANGED REVISIONS TO SHEET 76	222
DATE	NO.	REVISION
DRAWN	DATE NOVEMBER 15, 1967	
TRACED	JOB NO. 1437	
CHECKED	SHEET NO.	
		66-4



EAST ELEVATION

WEST ELEVATION

NOTE: SEE SECTION 11 FOR SCALE OF FLOOR EXTERIOR ELEVATIONS.

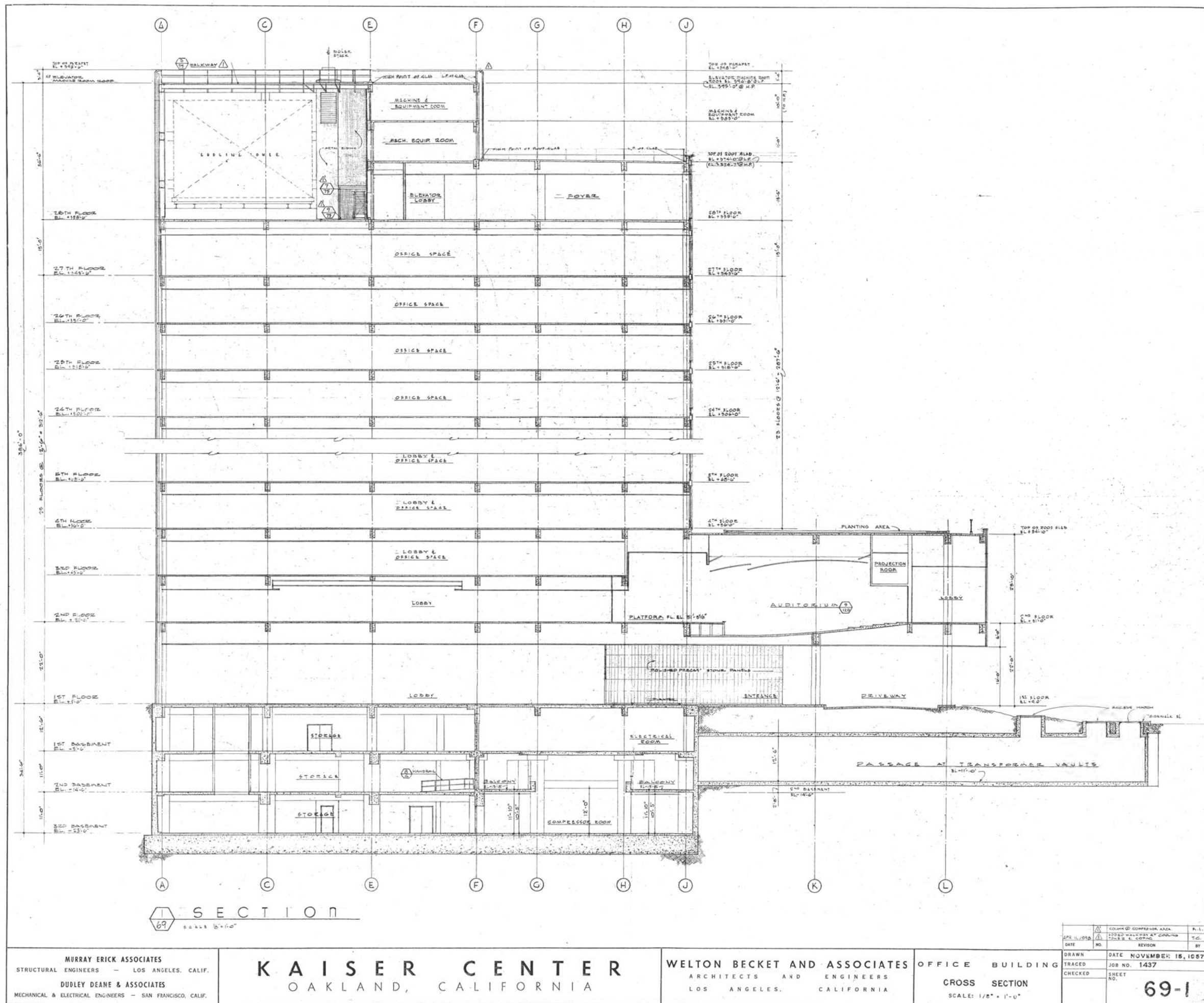
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DUDLEY DEANE & ASSOCIATES
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OAKLAND, CALIFORNIA

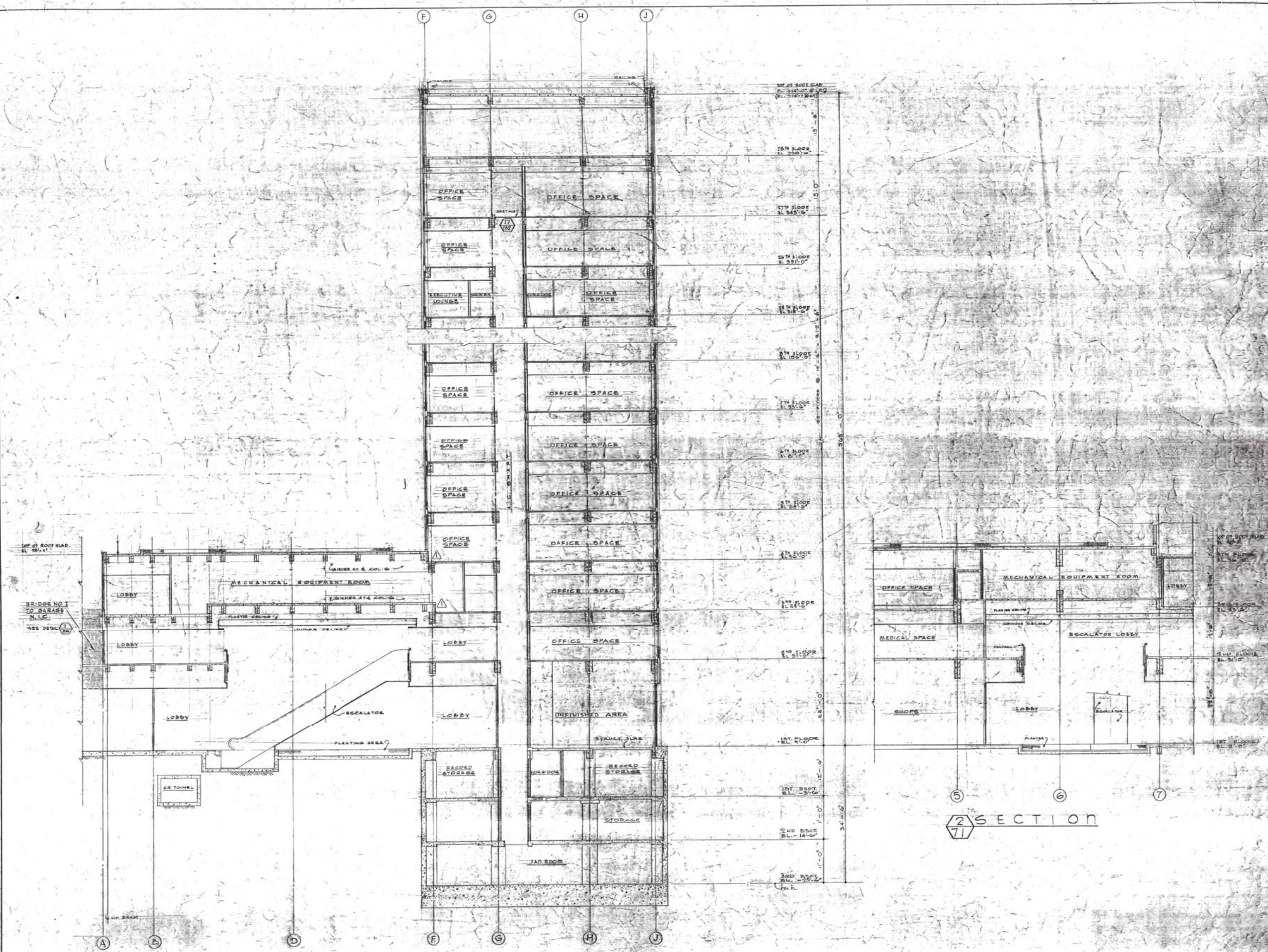
WELTON BECKET AND ASSOCIATES OFFICE BUILDING
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA
EAST & WEST ELEVATIONS
SCALE 1/8" = 1'-0"

REV.	NO.	DESCRIPTION
1	1	ADDITIONAL NOTES
2	2	REVISIONS
3	3	REVISIONS
4	4	REVISIONS
5	5	REVISIONS
6	6	REVISIONS
7	7	REVISIONS
8	8	REVISIONS
9	9	REVISIONS
10	10	REVISIONS
11	11	REVISIONS
12	12	REVISIONS
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27	27	REVISIONS
28	28	REVISIONS
29	29	REVISIONS
30	30	REVISIONS





	DATE	NO.	REVISION	BY
G	DRAWN		DATE	NOVEMBER 15, 1957
	TRACED		JOB NO.	1437
	CHECKED		SHEET NO.	70



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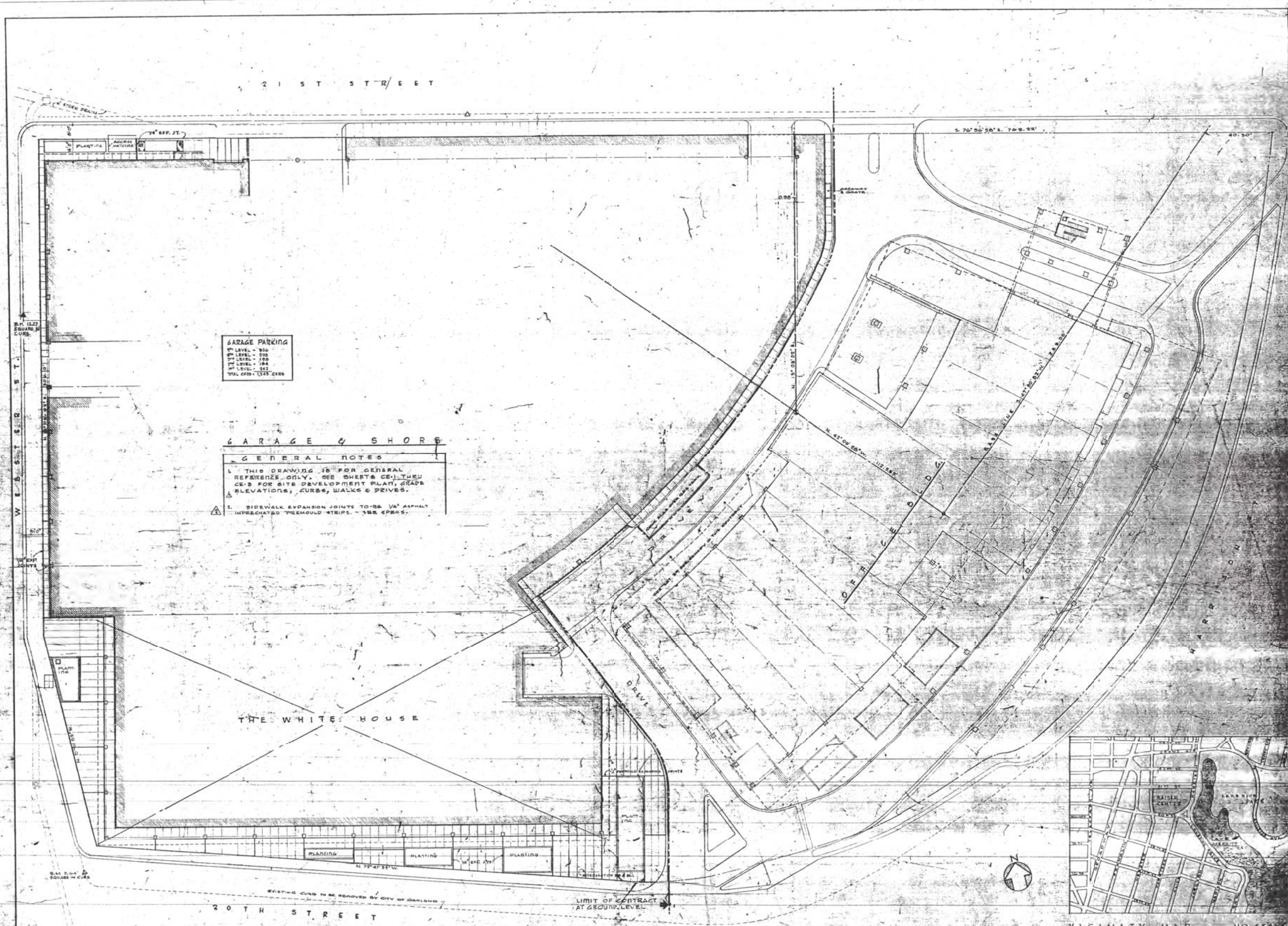
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OAKLAND, CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
CROSS SECTION
SCALE: 1/8" = 1'-0"

DATE	NOVEMBER 15, 1957
JOE NO.	1437
SHEET NO.	71-1



MURRAY ERICK ASSOCIATES
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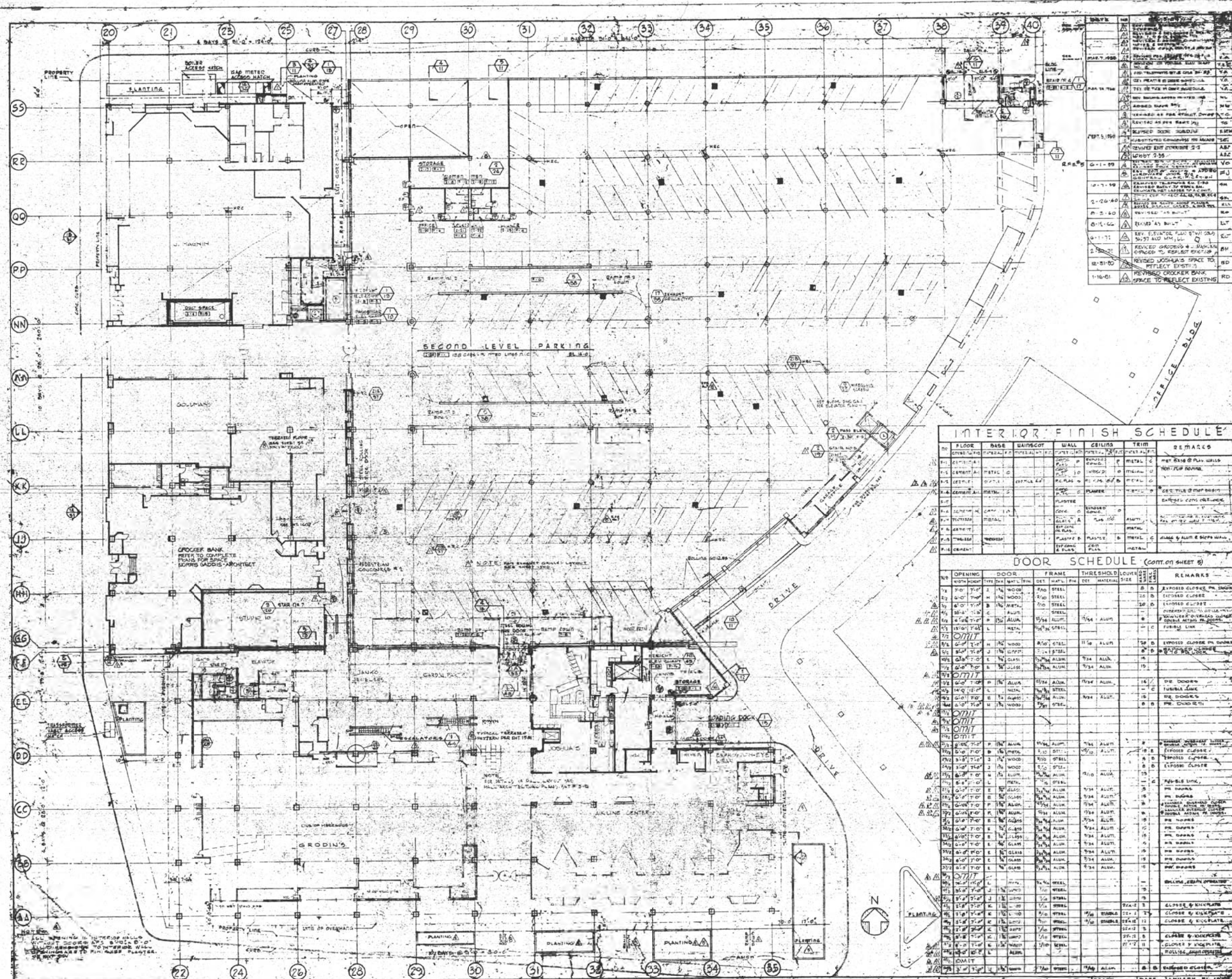
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OAKLAND, CALIFORNIA

WELTON BECKETT AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

PARKING GARAGE & SHOPS
SITE PLAN
SCALE: 1/4" = 10'

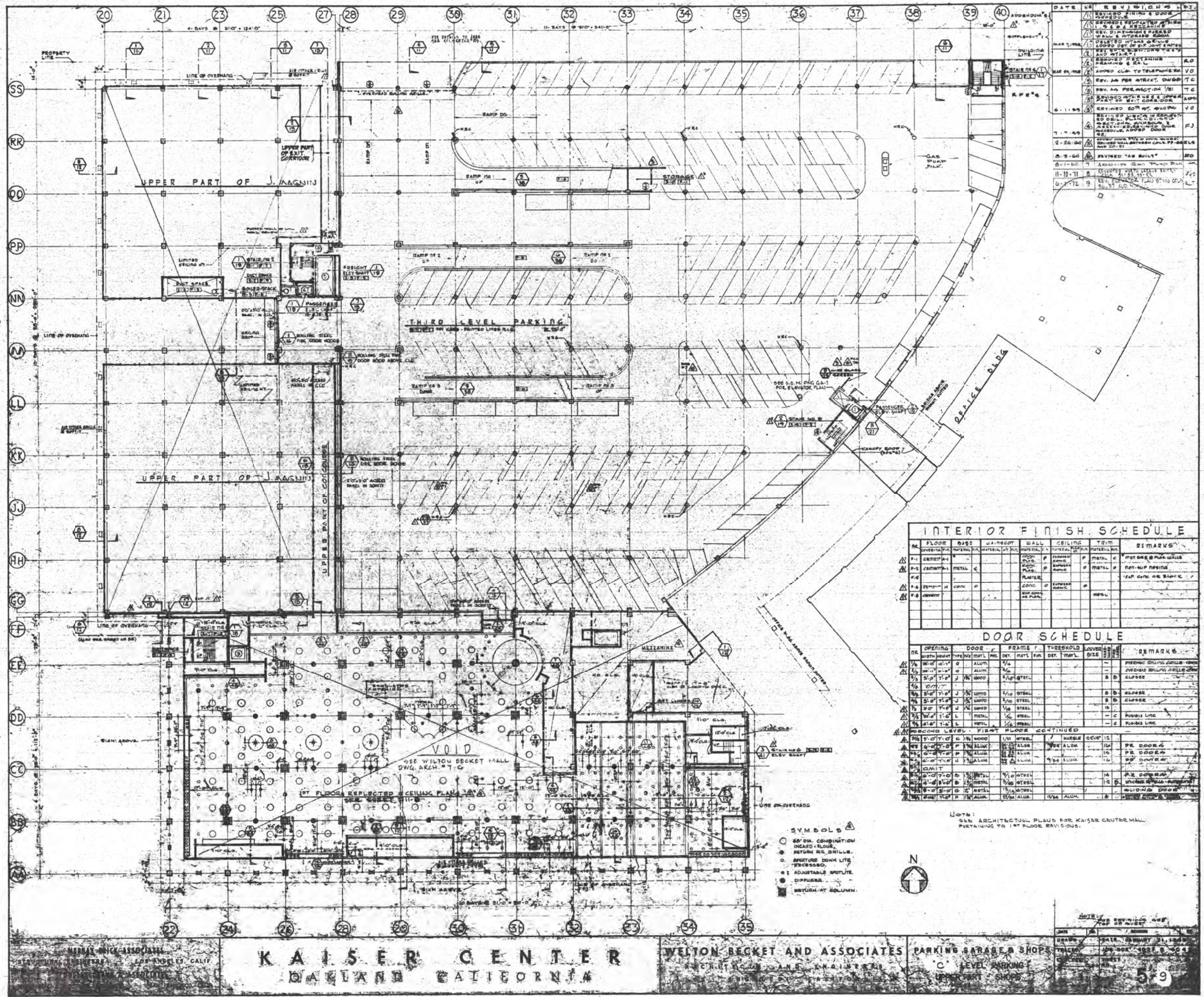
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DATE	8-1-56	REVISION	2
DATE	1-31-58	REVISION	3
DATE	4-1-58	REVISION	4
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DATE	4-1-58	REVISION	6
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DATE	4-1-58	REVISION	10
DATE	4-1-58	REVISION	11
DATE	4-1-58	REVISION	12
DATE	4-1-58	REVISION	13
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DATE	4-1-58	REVISION	61
DATE	4-1-58	REVISION	62
DATE	4-1-58	REVISION	63
DATE	4-1-58	REVISION	64
DATE	4-1-58	REVISION	65
DATE	4-1-58	REVISION	66
DATE	4-1-58	REVISION	67
DATE	4-1-58	REVISION	68
DATE	4-1-58	REVISION	69
DATE	4-1-58	REVISION	70
DATE	4-1-58	REVISION	71
DATE	4-1-58	REVISION	72
DATE	4-1-58	REVISION	73
DATE	4-1-58	REVISION	74
DATE	4-1-58	REVISION	75
DATE	4-1-58	REVISION	76
DATE	4-1-58	REVISION	77
DATE	4-1-58	REVISION	78
DATE	4-1-58	REVISION	79
DATE	4-1-58	REVISION	80
DATE	4-1-58	REVISION	81
DATE	4-1-58	REVISION	82
DATE	4-1-58	REVISION	83
DATE	4-1-58	REVISION	84
DATE	4-1-58	REVISION	85
DATE	4-1-58	REVISION	86
DATE	4-1-58	REVISION	87
DATE	4-1-58	REVISION	88
DATE	4-1-58	REVISION	89
DATE	4-1-58	REVISION	90
DATE	4-1-58	REVISION	91
DATE	4-1-58	REVISION	92
DATE	4-1-58	REVISION	93
DATE	4-1-58	REVISION	94
DATE	4-1-58	REVISION	95
DATE	4-1-58	REVISION	96
DATE	4-1-58	REVISION	97
DATE	4-1-58	REVISION	98
DATE	4-1-58	REVISION	99
DATE	4-1-58	REVISION	100



NO.	DATE	REVISION
1	1-16-51	REVISED EXISTING
2	1-16-51	REVISED EXISTING
3	1-16-51	REVISED EXISTING
4	1-16-51	REVISED EXISTING
5	1-16-51	REVISED EXISTING
6	1-16-51	REVISED EXISTING
7	1-16-51	REVISED EXISTING
8	1-16-51	REVISED EXISTING
9	1-16-51	REVISED EXISTING
10	1-16-51	REVISED EXISTING
11	1-16-51	REVISED EXISTING
12	1-16-51	REVISED EXISTING
13	1-16-51	REVISED EXISTING
14	1-16-51	REVISED EXISTING
15	1-16-51	REVISED EXISTING
16	1-16-51	REVISED EXISTING
17	1-16-51	REVISED EXISTING
18	1-16-51	REVISED EXISTING
19	1-16-51	REVISED EXISTING
20	1-16-51	REVISED EXISTING
21	1-16-51	REVISED EXISTING
22	1-16-51	REVISED EXISTING
23	1-16-51	REVISED EXISTING
24	1-16-51	REVISED EXISTING
25	1-16-51	REVISED EXISTING
26	1-16-51	REVISED EXISTING
27	1-16-51	REVISED EXISTING
28	1-16-51	REVISED EXISTING
29	1-16-51	REVISED EXISTING
30	1-16-51	REVISED EXISTING
31	1-16-51	REVISED EXISTING
32	1-16-51	REVISED EXISTING
33	1-16-51	REVISED EXISTING
34	1-16-51	REVISED EXISTING
35	1-16-51	REVISED EXISTING
36	1-16-51	REVISED EXISTING
37	1-16-51	REVISED EXISTING
38	1-16-51	REVISED EXISTING
39	1-16-51	REVISED EXISTING
40	1-16-51	REVISED EXISTING

INTERIOR FINISH SCHEDULE									
NO.	FLOOR	BASE	WAINSCOT	WALL	CEILING	TRIM	REMARKS		
1	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	MET BASE & PLIN WALLS		
2	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	NON-FIRE DOORS		
3	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
4	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
5	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
6	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
7	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
8	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
9	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
10	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
11	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
12	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
13	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
14	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
15	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
16	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
17	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
18	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
19	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
20	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
21	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
22	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
23	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
24	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
25	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
26	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
27	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
28	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
29	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
30	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
31	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
32	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
33	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
34	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
35	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
36	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
37	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
38	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
39	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		
40	1st	CEMENT	CEMENT	CEMENT	CEMENT	CEMENT	METAL WALLS		

DOOR SCHEDULE (CONT. ON SHEET 5)									
NO.	OPENING	DOOR	FRAME	THRESHOLD	LOUVER	REMARKS			
1	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE ON DOORS			
2	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
3	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
4	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
5	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
6	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
7	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
8	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
9	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
10	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
11	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
12	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
13	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
14	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
15	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
16	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
17	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
18	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
19	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
20	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
21	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
22	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
23	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
24	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
25	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
26	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
27	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
28	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
29	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
30	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
31	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
32	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
33	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
34	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
35	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
36	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
37	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
38	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
39	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			
40	6'-0" x 7'-0"	1/2" WOOD	1/2" WOOD	1/2" WOOD	1/2" WOOD	EXPOSED CLOSURE			



DATE	NO.	REVISION	BY
1-1-59	1	REVISED FINISH & DOOR	W.B.
1-1-59	2	REVISED FINISH & DOOR	W.B.
1-1-59	3	REVISED FINISH & DOOR	W.B.
1-1-59	4	REVISED FINISH & DOOR	W.B.
1-1-59	5	REVISED FINISH & DOOR	W.B.
1-1-59	6	REVISED FINISH & DOOR	W.B.
1-1-59	7	REVISED FINISH & DOOR	W.B.
1-1-59	8	REVISED FINISH & DOOR	W.B.
1-1-59	9	REVISED FINISH & DOOR	W.B.
1-1-59	10	REVISED FINISH & DOOR	W.B.
1-1-59	11	REVISED FINISH & DOOR	W.B.
1-1-59	12	REVISED FINISH & DOOR	W.B.
1-1-59	13	REVISED FINISH & DOOR	W.B.
1-1-59	14	REVISED FINISH & DOOR	W.B.
1-1-59	15	REVISED FINISH & DOOR	W.B.
1-1-59	16	REVISED FINISH & DOOR	W.B.
1-1-59	17	REVISED FINISH & DOOR	W.B.
1-1-59	18	REVISED FINISH & DOOR	W.B.
1-1-59	19	REVISED FINISH & DOOR	W.B.
1-1-59	20	REVISED FINISH & DOOR	W.B.

INTERIOR FINISH SCHEDULE									
NO.	FLOOR	BASE	WALL	CEILING	TRIM	DOOR	WINDOW	STAIR	REMARKS
1	1st	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
2	2nd	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
3	3rd	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
4	4th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
5	5th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
6	6th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
7	7th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
8	8th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
9	9th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
10	10th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD

DOOR SCHEDULE									
NO.	OPENING	DOOR	FRAME	THRESHOLD	LOUVER	REMARKS			
	HIGHT X WIDT	TYPE	MAT'L	FIN.	DET. MAT'L	DET. MAT'L			
1/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
2/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
3/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
4/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
5/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
6/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
7/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
8/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
9/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
10/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
11/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
12/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
13/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
14/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
15/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
16/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
17/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
18/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
19/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
20/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
21/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
22/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
23/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
24/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
25/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
26/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
27/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
28/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
29/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
30/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
31/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
32/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
33/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
34/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
35/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
36/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
37/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
38/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
39/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
40/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
41/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
42/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
43/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
44/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
45/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
46/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
47/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
48/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
49/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
50/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
51/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
52/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
53/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
54/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
55/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
56/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
57/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
58/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
59/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
60/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
61/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
62/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
63/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
64/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
65/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
66/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
67/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
68/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
69/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
70/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
71/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
72/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
73/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
74/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
75/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
76/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
77/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
78/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
79/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
80/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
81/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
82/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
83/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
84/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
85/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
86/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
87/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
88/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
89/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
90/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
91/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
92/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
93/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
94/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
95/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
96/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
97/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
98/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
99/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			
100/2	5'-0" X 7'-0"	Q	ALUM.	4/8		—			

FLOOR CONTINUED									
NO.	FLOOR	BASE	WALL	CEILING	TRIM	DOOR	WINDOW	STAIR	REMARKS
11	11th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
12	12th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
13	13th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
14	14th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
15	15th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
16	16th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
17	17th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
18	18th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
19	19th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD
20	20th	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

SYMBOLS									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

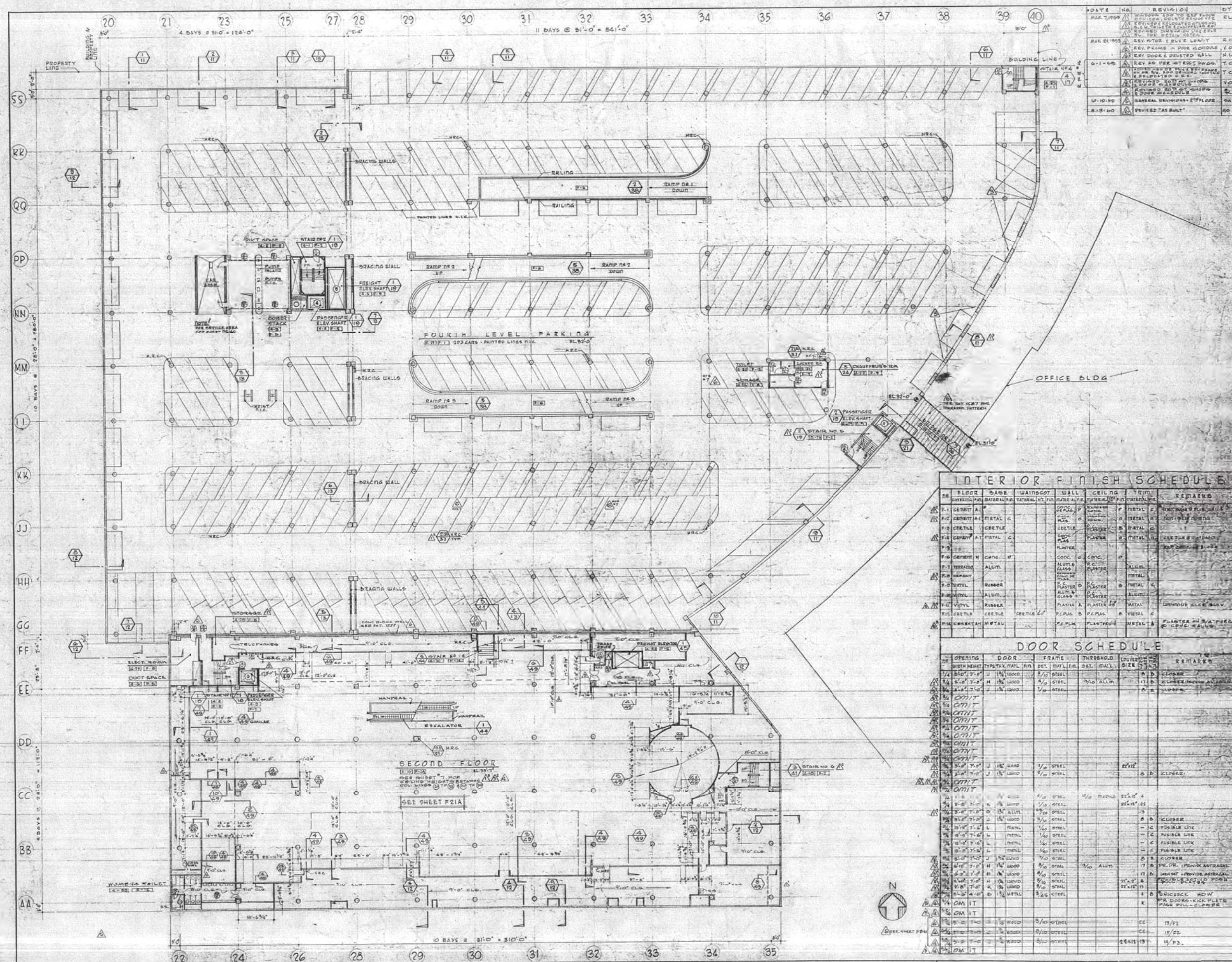
Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS

Notes:
SEE ARCHITECTURAL PLANS FOR KAISER CENTER MALL
PARKING GARAGE & SHOPS
UPPER PART SHOPS



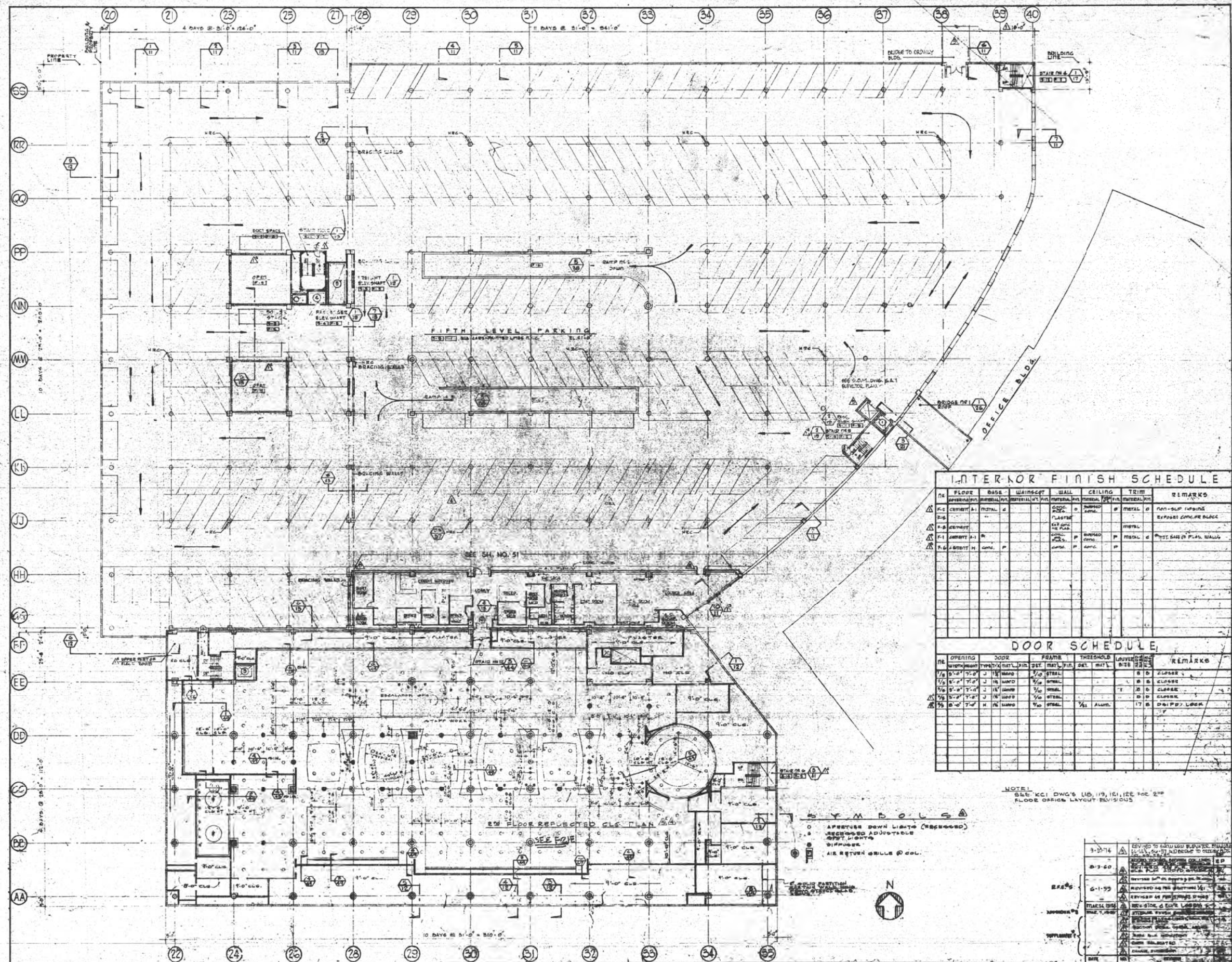
DATE	NO.	REVISION	BY
MAR 3, 1958	1	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	2	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	3	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	4	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	5	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	6	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	7	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	8	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	9	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	10	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	11	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	12	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	13	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	14	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	15	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	16	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	17	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	18	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	19	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	20	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	21	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	22	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	23	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	24	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	25	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	26	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	27	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	28	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	29	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	30	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	31	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	32	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	33	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	34	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	35	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	36	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	37	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	38	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	39	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL
MAR 3, 1958	40	REVISED TO REFLECT REVISIONS TO SHOPPING CENTER AND OFFICE BUILDING	EL

INTERIOR FINISH SCHEDULE

NO.	FLOOR	WALL	CEILING	TRIM	REMARKS
1	1ST	CONCRETE	CONCRETE	CONCRETE	
2	2ND	CONCRETE	CONCRETE	CONCRETE	
3	3RD	CONCRETE	CONCRETE	CONCRETE	
4	4TH	CONCRETE	CONCRETE	CONCRETE	
5	5TH	CONCRETE	CONCRETE	CONCRETE	
6	6TH	CONCRETE	CONCRETE	CONCRETE	
7	7TH	CONCRETE	CONCRETE	CONCRETE	
8	8TH	CONCRETE	CONCRETE	CONCRETE	
9	9TH	CONCRETE	CONCRETE	CONCRETE	
10	10TH	CONCRETE	CONCRETE	CONCRETE	
11	11TH	CONCRETE	CONCRETE	CONCRETE	
12	12TH	CONCRETE	CONCRETE	CONCRETE	
13	13TH	CONCRETE	CONCRETE	CONCRETE	
14	14TH	CONCRETE	CONCRETE	CONCRETE	
15	15TH	CONCRETE	CONCRETE	CONCRETE	
16	16TH	CONCRETE	CONCRETE	CONCRETE	
17	17TH	CONCRETE	CONCRETE	CONCRETE	
18	18TH	CONCRETE	CONCRETE	CONCRETE	
19	19TH	CONCRETE	CONCRETE	CONCRETE	
20	20TH	CONCRETE	CONCRETE	CONCRETE	

DOOR SCHEDULE

NO.	DOOR	FRAME	THRESHOLD	REMARKS
1	1ST	CONCRETE	CONCRETE	
2	2ND	CONCRETE	CONCRETE	
3	3RD	CONCRETE	CONCRETE	
4	4TH	CONCRETE	CONCRETE	
5	5TH	CONCRETE	CONCRETE	
6	6TH	CONCRETE	CONCRETE	
7	7TH	CONCRETE	CONCRETE	
8	8TH	CONCRETE	CONCRETE	
9	9TH	CONCRETE	CONCRETE	
10	10TH	CONCRETE	CONCRETE	
11	11TH	CONCRETE	CONCRETE	
12	12TH	CONCRETE	CONCRETE	
13	13TH	CONCRETE	CONCRETE	
14	14TH	CONCRETE	CONCRETE	
15	15TH	CONCRETE	CONCRETE	
16	16TH	CONCRETE	CONCRETE	
17	17TH	CONCRETE	CONCRETE	
18	18TH	CONCRETE	CONCRETE	
19	19TH	CONCRETE	CONCRETE	
20	20TH	CONCRETE	CONCRETE	



INTERIOR FINISH SCHEDULE									
NO.	FLOOR	BASE	WAINSCOT	WALL	CEILING	TRIM	REMARKS		
1	1st	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	NON-SLIP TUBING		
2	2nd	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
3	3rd	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
4	4th	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
5	5th	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
6	6th	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
7	7th	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
8	8th	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
9	9th	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		
10	10th	CONCRETE	METAL	CONCRETE	CONCRETE	METAL	EXPOSED CONCRETE BLOCK		

DOOR SCHEDULE									
NO.	OPENING	DOOR	FRAME	THRESHOLD	LOUVER	GLASS	REMARKS		
1	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
2	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
3	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
4	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
5	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
6	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
7	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
8	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
9	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		
10	1'-0" x 7'-0"	1/2" WOOD	1/2" STEEL	1/2" STEEL	1/2" STEEL	1/2" STEEL	CLASSED		

NOTE:
SEE KCI DWG'S 110, 111, 112, 113 FOR 2ND FLOOR OFFICE LAYOUT REVISIONS

SYMBOLS
 ○ APERTURE DOWN LIGHTS (RECESSED)
 ○ RECESSED ADJUSTABLE DOWN LIGHTS
 ○ AIR RETURN GRILLE @ COL.

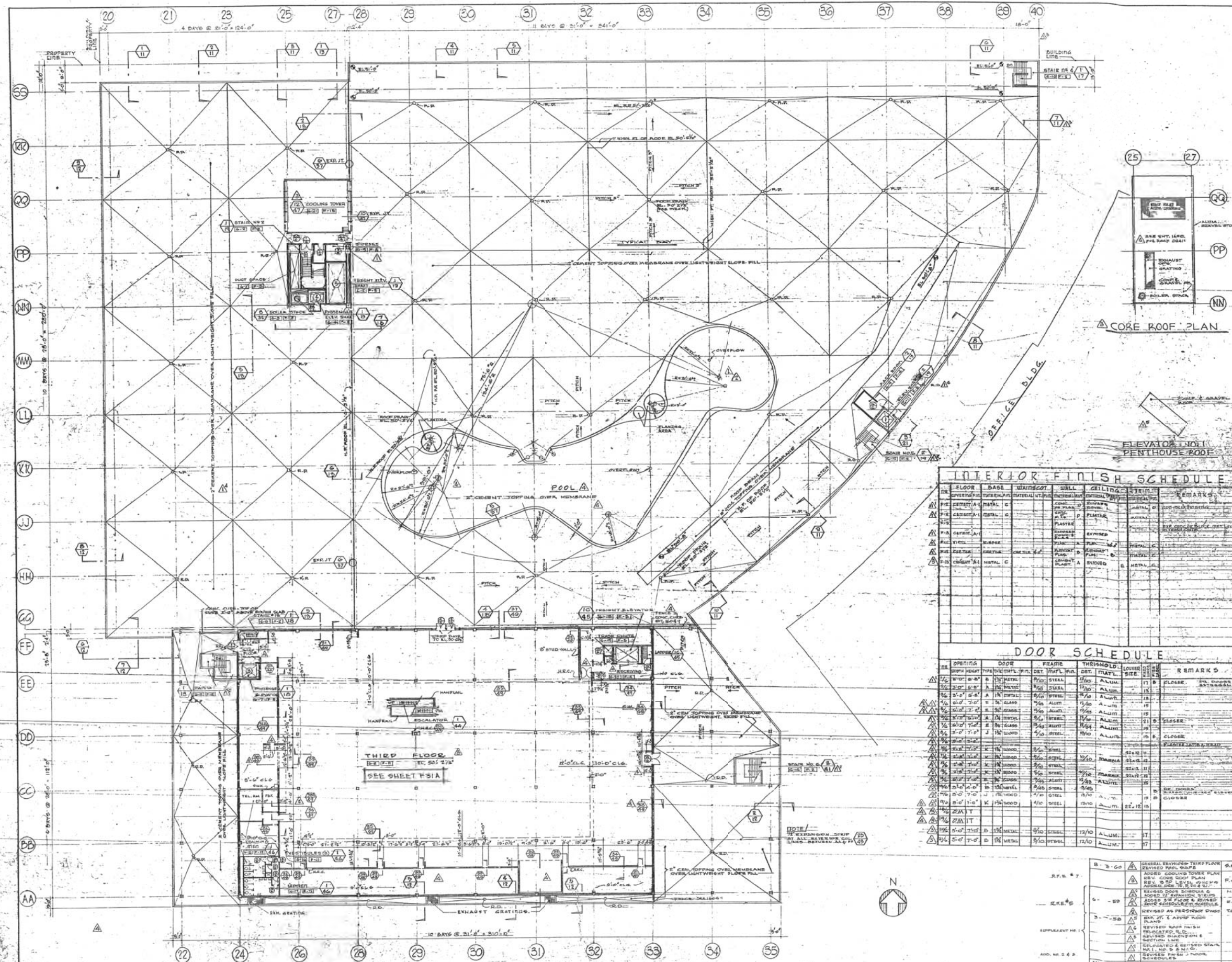
MURRAY ERICK ASSOCIATES
 STRUCTURAL ENGINEERS
 LOS ANGELES, CALIF.
 DUPLEY DRANE & ASSOCIATES
 MECHANICAL & ELECTRICAL ENGINEERS
 SAN FRANCISCO, CALIF.

K A I S E R C E N T E R
 OAKLAND, CALIFORNIA

WELTON BECKETT AND ASSOCIATES
 ARCHITECTS AND ENGINEERS
 1011 ANDERSON BLVD.
 SAN FRANCISCO, CALIF.

PARKING GARAGE & SHOPS
 5TH LEVEL PARKING
 UPPER PART - BOTH STORIES

DATE	NO.	REVISION
3-27-74	1	REVISED TO SHOW 100% FINISHES
5-1-74	2	REVISED TO SHOW 100% FINISHES
6-1-74	3	REVISED TO SHOW 100% FINISHES
7-1-74	4	REVISED TO SHOW 100% FINISHES
8-1-74	5	REVISED TO SHOW 100% FINISHES
9-1-74	6	REVISED TO SHOW 100% FINISHES
10-1-74	7	REVISED TO SHOW 100% FINISHES
11-1-74	8	REVISED TO SHOW 100% FINISHES
12-1-74	9	REVISED TO SHOW 100% FINISHES
1-1-75	10	REVISED TO SHOW 100% FINISHES
2-1-75	11	REVISED TO SHOW 100% FINISHES
3-1-75	12	REVISED TO SHOW 100% FINISHES
4-1-75	13	REVISED TO SHOW 100% FINISHES
5-1-75	14	REVISED TO SHOW 100% FINISHES
6-1-75	15	REVISED TO SHOW 100% FINISHES
7-1-75	16	REVISED TO SHOW 100% FINISHES
8-1-75	17	REVISED TO SHOW 100% FINISHES
9-1-75	18	REVISED TO SHOW 100% FINISHES
10-1-75	19	REVISED TO SHOW 100% FINISHES
11-1-75	20	REVISED TO SHOW 100% FINISHES
12-1-75	21	REVISED TO SHOW 100% FINISHES
1-1-76	22	REVISED TO SHOW 100% FINISHES
2-1-76	23	REVISED TO SHOW 100% FINISHES
3-1-76	24	REVISED TO SHOW 100% FINISHES
4-1-76	25	REVISED TO SHOW 100% FINISHES
5-1-76	26	REVISED TO SHOW 100% FINISHES
6-1-76	27	REVISED TO SHOW 100% FINISHES
7-1-76	28	REVISED TO SHOW 100% FINISHES
8-1-76	29	REVISED TO SHOW 100% FINISHES
9-1-76	30	REVISED TO SHOW 100% FINISHES
10-1-76	31	REVISED TO SHOW 100% FINISHES
11-1-76	32	REVISED TO SHOW 100% FINISHES
12-1-76	33	REVISED TO SHOW 100% FINISHES
1-1-77	34	REVISED TO SHOW 100% FINISHES
2-1-77	35	REVISED TO SHOW 100% FINISHES
3-1-77	36	REVISED TO SHOW 100% FINISHES
4-1-77	37	REVISED TO SHOW 100% FINISHES
5-1-77	38	REVISED TO SHOW 100% FINISHES
6-1-77	39	REVISED TO SHOW 100% FINISHES
7-1-77	40	REVISED TO SHOW 100% FINISHES
8-1-77	41	REVISED TO SHOW 100% FINISHES
9-1-77	42	REVISED TO SHOW 100% FINISHES
10-1-77	43	REVISED TO SHOW 100% FINISHES
11-1-77	44	REVISED TO SHOW 100% FINISHES
12-1-77	45	REVISED TO SHOW 100% FINISHES
1-1-78	46	REVISED TO SHOW 100% FINISHES
2-1-78	47	REVISED TO SHOW 100% FINISHES
3-1-78	48	REVISED TO SHOW 100% FINISHES
4-1-78	49	REVISED TO SHOW 100% FINISHES
5-1-78	50	REVISED TO SHOW 100% FINISHES
6-1-78	51	REVISED TO SHOW 100% FINISHES
7-1-78	52	REVISED TO SHOW 100% FINISHES
8-1-78	53	REVISED TO SHOW 100% FINISHES
9-1-78	54	REVISED TO SHOW 100% FINISHES
10-1-78	55	REVISED TO SHOW 100% FINISHES
11-1-78	56	REVISED TO SHOW 100% FINISHES
12-1-78	57	REVISED TO SHOW 100% FINISHES
1-1-79	58	REVISED TO SHOW 100% FINISHES
2-1-79	59	REVISED TO SHOW 100% FINISHES
3-1-79	60	REVISED TO SHOW 100% FINISHES
4-1-79	61	REVISED TO SHOW 100% FINISHES
5-1-79	62	REVISED TO SHOW 100% FINISHES
6-1-79	63	REVISED TO SHOW 100% FINISHES
7-1-79	64	REVISED TO SHOW 100% FINISHES
8-1-79	65	REVISED TO SHOW 100% FINISHES
9-1-79	66	REVISED TO SHOW 100% FINISHES
10-1-79	67	REVISED TO SHOW 100% FINISHES
11-1-79	68	REVISED TO SHOW 100% FINISHES
12-1-79	69	REVISED TO SHOW 100% FINISHES
1-1-80	70	REVISED TO SHOW 100% FINISHES
2-1-80	71	REVISED TO SHOW 100% FINISHES
3-1-80	72	REVISED TO SHOW 100% FINISHES
4-1-80	73	REVISED TO SHOW 100% FINISHES
5-1-80	74	REVISED TO SHOW 100% FINISHES
6-1-80	75	REVISED TO SHOW 100% FINISHES
7-1-80	76	REVISED TO SHOW 100% FINISHES
8-1-80	77	REVISED TO SHOW 100% FINISHES
9-1-80	78	REVISED TO SHOW 100% FINISHES
10-1-80	79	REVISED TO SHOW 100% FINISHES
11-1-80	80	REVISED TO SHOW 100% FINISHES
12-1-80	81	REVISED TO SHOW 100% FINISHES
1-1-81	82	REVISED TO SHOW 100% FINISHES
2-1-81	83	REVISED TO SHOW 100% FINISHES
3-1-81	84	REVISED TO SHOW 100% FINISHES
4-1-81	85	REVISED TO SHOW 100% FINISHES
5-1-81	86	REVISED TO SHOW 100% FINISHES
6-1-81	87	REVISED TO SHOW 100% FINISHES
7-1-81	88	REVISED TO SHOW 100% FINISHES
8-1-81	89	REVISED TO SHOW 100% FINISHES
9-1-81	90	REVISED TO SHOW 100% FINISHES
10-1-81	91	REVISED TO SHOW 100% FINISHES
11-1-81	92	REVISED TO SHOW 100% FINISHES
12-1-81	93	REVISED TO SHOW 100% FINISHES
1-1-82	94	REVISED TO SHOW 100% FINISHES
2-1-82	95	REVISED TO SHOW 100% FINISHES
3-1-82	96	REVISED TO SHOW 100% FINISHES
4-1-82	97	REVISED TO SHOW 100% FINISHES
5-1-82	98	REVISED TO SHOW 100% FINISHES
6-1-82	99	REVISED TO SHOW 100% FINISHES
7-1-82	100	REVISED TO SHOW 100% FINISHES



INTERIOR FINISH SCHEDULE									
FLOOR	BASE	WAINSCOT	WALL	CEILING	STAIR	REMARKS			
1	WOOD	WOOD	WOOD	WOOD	WOOD				
2	WOOD	WOOD	WOOD	WOOD	WOOD				
3	WOOD	WOOD	WOOD	WOOD	WOOD				
4	WOOD	WOOD	WOOD	WOOD	WOOD				
5	WOOD	WOOD	WOOD	WOOD	WOOD				
6	WOOD	WOOD	WOOD	WOOD	WOOD				
7	WOOD	WOOD	WOOD	WOOD	WOOD				
8	WOOD	WOOD	WOOD	WOOD	WOOD				
9	WOOD	WOOD	WOOD	WOOD	WOOD				
10	WOOD	WOOD	WOOD	WOOD	WOOD				

DOOR SCHEDULE									
NO.	OPENING	DOOR	FRAME	THRESHOLD	LOWER	REMARKS			
1	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
2	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
3	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
4	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
5	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
6	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
7	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
8	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
9	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				
10	10'-0" x 7'-0"	WOOD	WOOD	WOOD	WOOD				

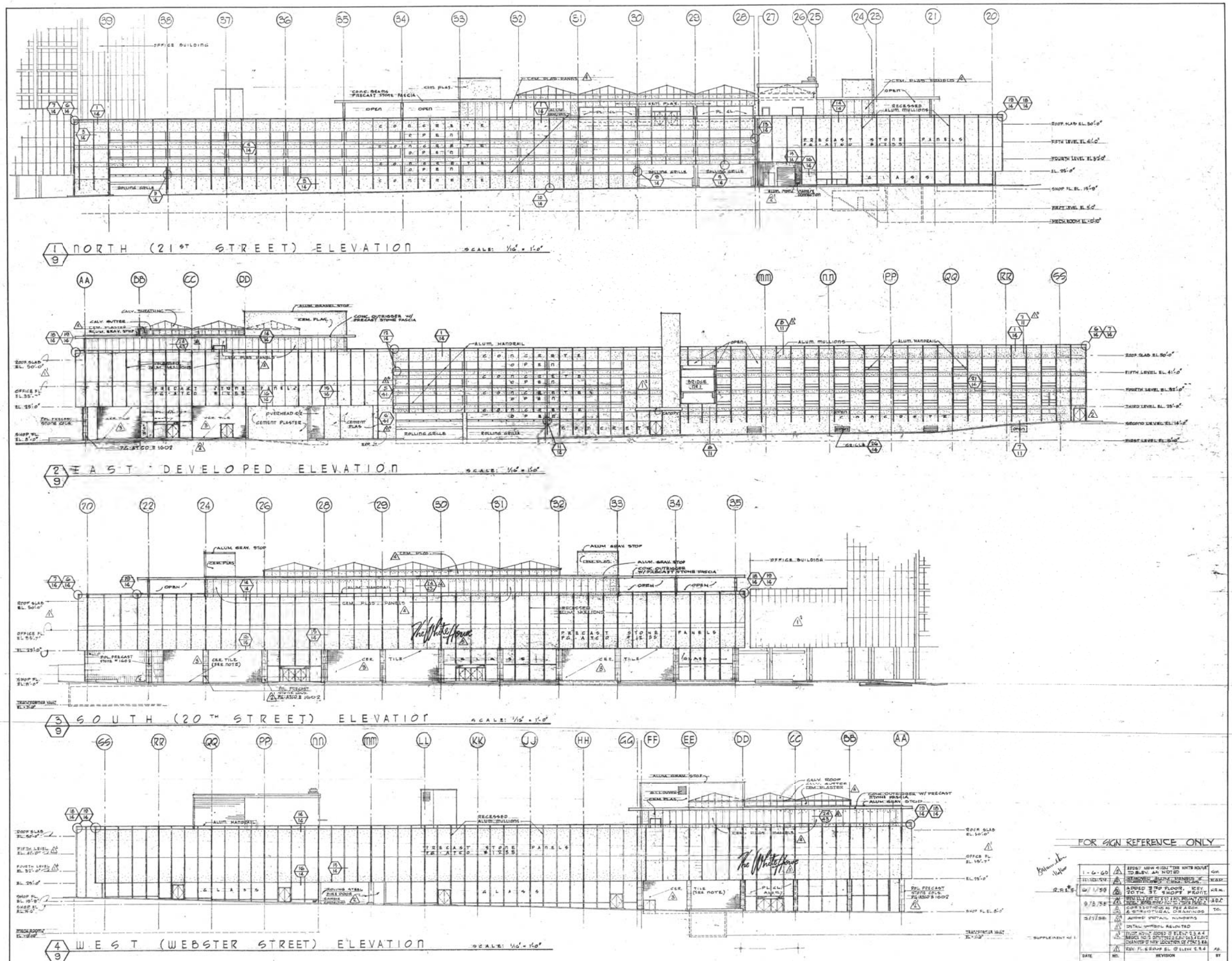
MURRAY ERICK ASSOCIATES
STRUCTURAL ENGINEERS - LOS ANGELES, CALIF.
DUDLEY DEANE & ASSOCIATES
MECHANICAL & ELECTRICAL ENGINEERS - SAN FRANCISCO, CALIF.

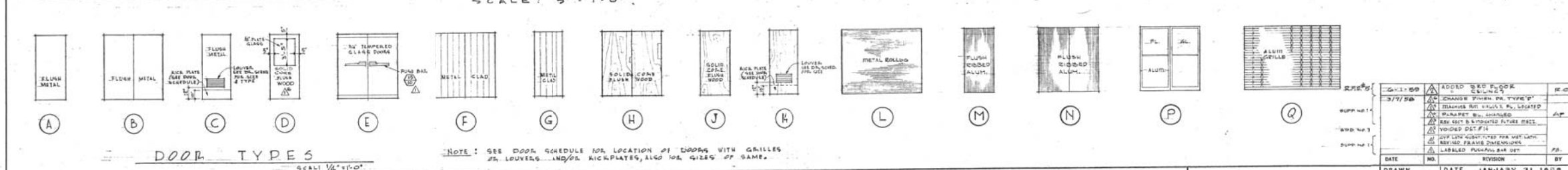
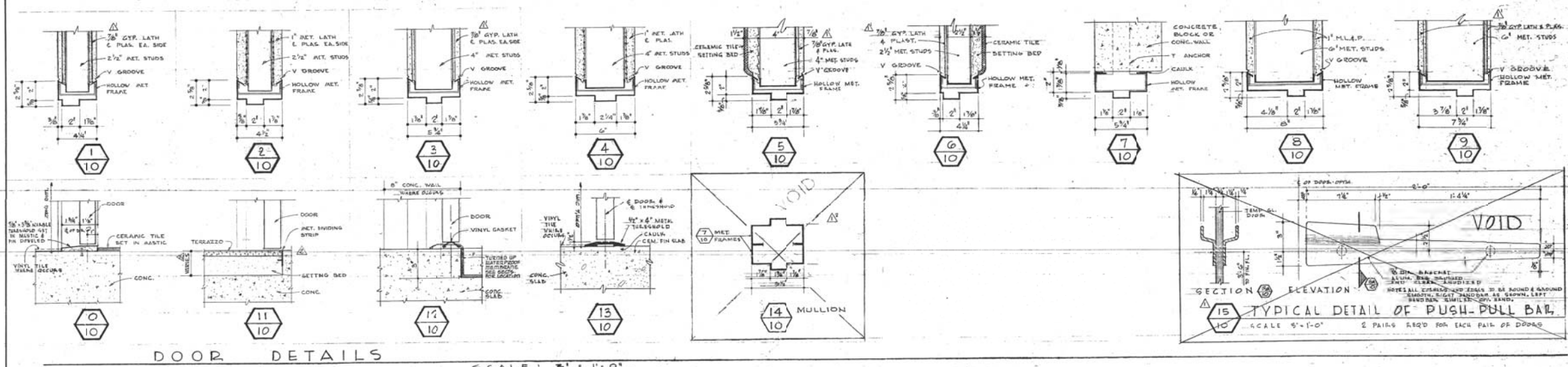
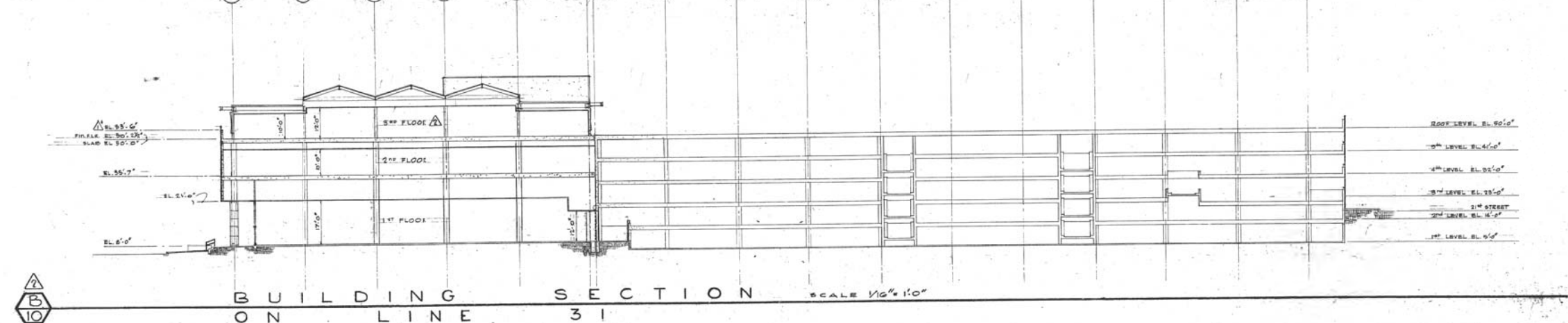
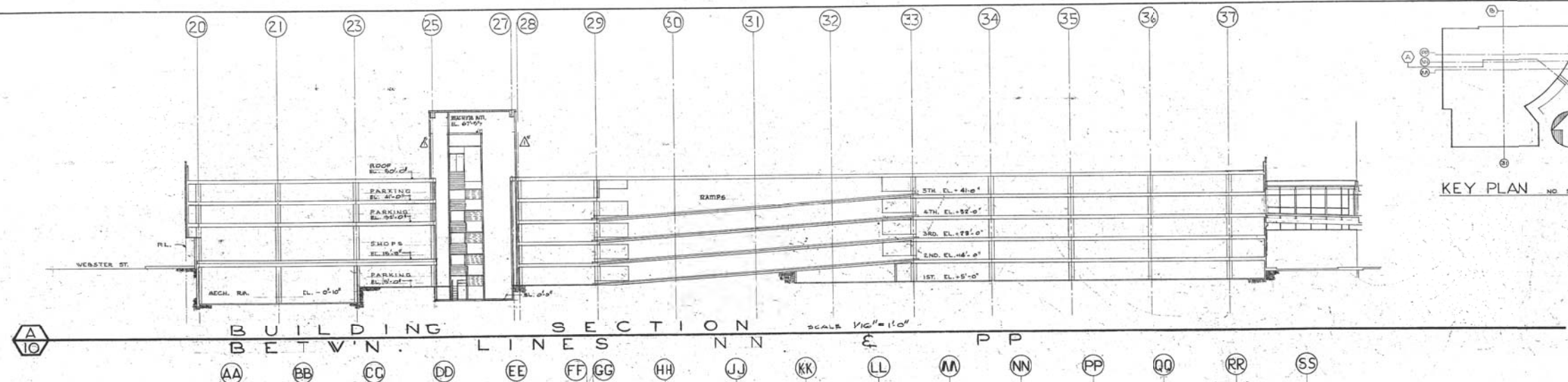
Kaiser Center OAKLAND, CALIFORNIA

WELTON BECKETT AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

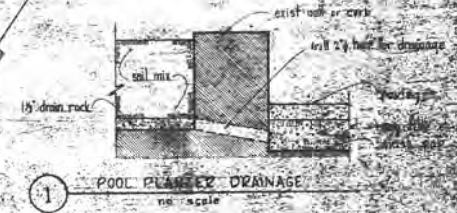
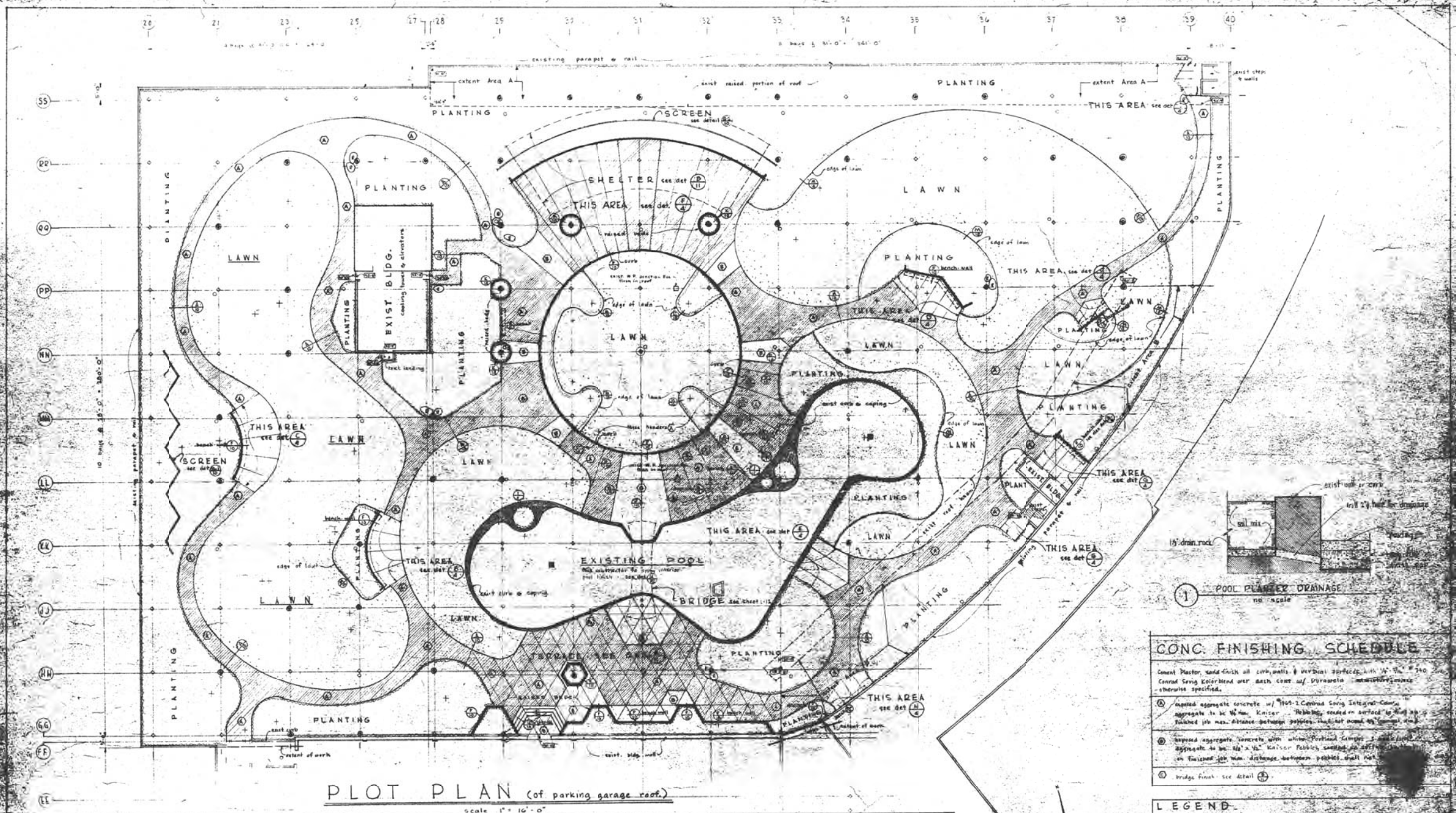
PARKING GARAGE & SHOPS
6TH. LEVEL ROOF PLAN.
SCALE: 1/16" = 1'-0"

DATE	NO.	REVISION	BY
JANUARY 31, 1958	4031	6	4049





<p>MURRAY ERICK ASSOCIATES STRUCTURAL ENGINEERS — LOS ANGELES, CALIF.</p> <p>DUDLEY DEANE & ASSOCIATES MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.</p>	<p>K A I S E R C E N T E R O A K L A N D , C A L I F O R N I A</p>	<p>WELTON BECKET AND ASSOCIATES ARCHITECTS AND ENGINEERS LOS ANGELES, CALIFORNIA</p>	<p>PARKING GARAGE & SHOPS BUILDING SECTIONS DOOR TYPES & SCHEDULE SCALE 1/16" = 1'-0"</p>	<table><tr><td>DRAWN</td><td>DATE JANUARY 31, 1950</td></tr><tr><td>TRACED</td><td>JOB NO. 4037 & 4049</td></tr><tr><td>CHECKED</td><td>SHEET NO.</td></tr><tr><td></td><td>10-2</td></tr></table>	DRAWN	DATE JANUARY 31, 1950	TRACED	JOB NO. 4037 & 4049	CHECKED	SHEET NO.		10-2
DRAWN	DATE JANUARY 31, 1950											
TRACED	JOB NO. 4037 & 4049											
CHECKED	SHEET NO.											
	10-2											



CONC. FINISHING SCHEDULE

- 1. Cement plaster, sand-finish all vertical surfaces with 1/2" - 3/4" sand. Cement sand-finish over mesh concrete of 1/2" diameter. Minimum thickness 1/2" unless specified.
- 2. Applied aggregate concrete w/ 1/2" - 3/4" Cement Sand-finish. Cement sand-finish over mesh concrete of 1/2" diameter. Minimum thickness 1/2" unless specified.
- 3. Applied aggregate concrete with white Portland cement. Cement sand-finish over mesh concrete of 1/2" diameter. Minimum thickness 1/2" unless specified.
- 4. Bridge finish - see detail 10.

LEGEND

- specimen tree location
- roof support
- roof drain
- planting
- detail number
- sheet number
- path - see 10
- also 10 - see the schedule this sheet

GENERAL NOTES

All concrete shall be lightweight concrete. See specifications.

See finishing schedule on this sheet for color & texture.

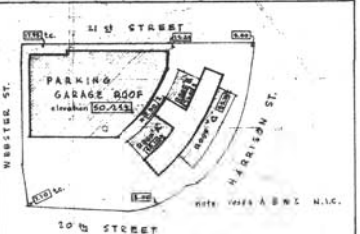
Typical existing elevations are as follows: 50' - 52' @ roof drains, 50' - 52' @ column locations where roof drain does not occur exceptions as noted on plan.

Contractor to pour 3 square samples each of concrete (A, B, C, D) (see 10, 11, 12) on site, to be approved by Landscape Architect as standard of quality for all subsequent work. All work not equal to samples in quality shall be removed and replaced @ no extra cost to the owner. Samples shall be removed from site by contractor when all pours have been completed and approved by the L.A.

Max. allowable roof loads are as follows: 125 lbs. per sq. ft. for 18,000 lbs. total weight of roof & columns with the following exceptions: Area A - 90 lbs. per sq. ft., Area B - 125 lbs. per sq. ft. no concentrated loads allowed. Contractor shall observe these limitations in carrying out his work.

SCHEDULE OF DRAWINGS

- L-1 key map, conc. finishing schedule, general notes, plot plan-parking garage roof
- L-2 grading plan - parking garage roof (1/2" supplementary grading plan)
- L-3 staking plan
- L-4 areas shown @ 1/2" scale - details
- L-5 planting plan - parking garage roof
- L-6 irrigation plan
- L-7
- L-8
- L-9
- L-10 details
- S-1 bridge details
- E-1 electrical plan
- E-2 electrical details
- ME-1 reflection pool



NOTE:

Note relative elevations of roofs & ground level as given in site plan above.

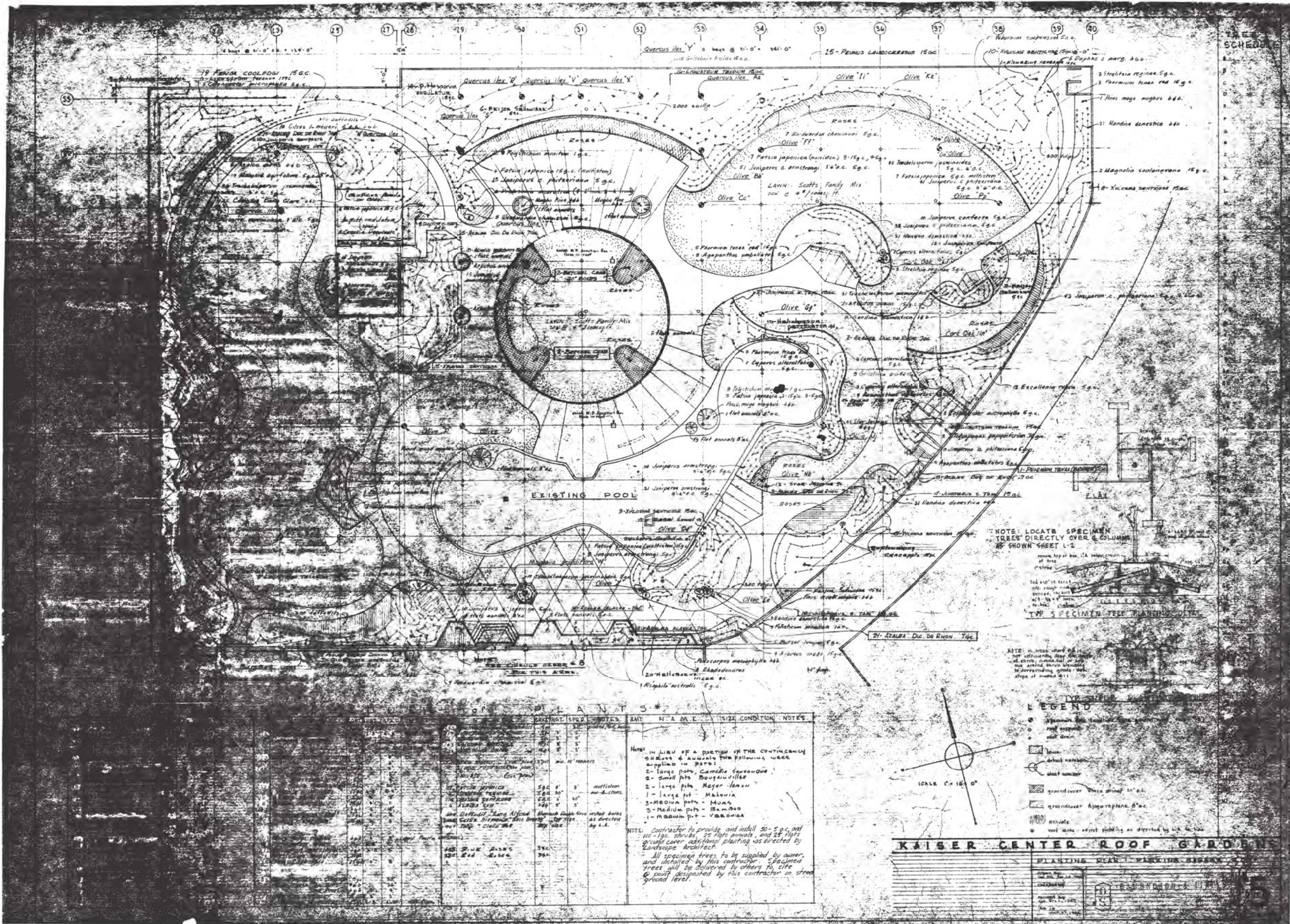
KAISER CENTER ROOF GARDEN

PLOT PLAN - PARKING GARAGE ROOF

Prepared by: [Signature]

Checked by: [Signature]

Approved by: [Signature]



19 PINUS COULADGI 15 G.C.
Quercus ilex 'V' quercus ilex 'X'
Quercus ilex 'V' quercus ilex 'X'

Quercus ilex 'V' quercus ilex 'X'
Quercus ilex 'V' quercus ilex 'X'

15 PINUS LAUBGERANUS 15 G.C.
Quercus ilex 'V' quercus ilex 'X'

10 MYRTUS BENTHAMII 15 G.C.
Quercus ilex 'V' quercus ilex 'X'

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40.

EXISTING POOL

NOTE: LOCATE SPECIMEN
TREES DIRECTLY OVER COLUMNS
AS SHOWN SHEET L-2

NOTE: IN AREA WHERE
NOT SPECIFICALLY SHOWN
LOCATE SPECIMEN TREES
DIRECTLY OVER COLUMNS
AS SHOWN SHEET L-2

LEGEND

- 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40.

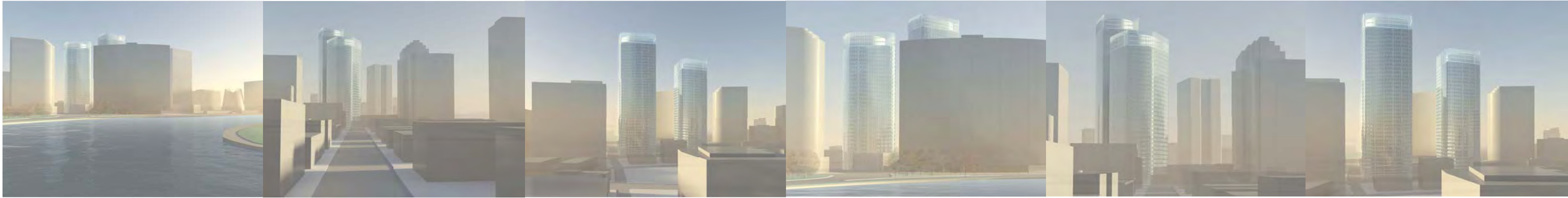
KAISER CENTER ROOF GARDEN

PLANTING PLAN - PARKING AREA

| PLANT | QTY | SIZE | CONDITION | NOTES |
|--|-----|------|-----------|-------|
| 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. | | | | |

APPENDIX F

Proposed Project Drawings



KAISER CENTER

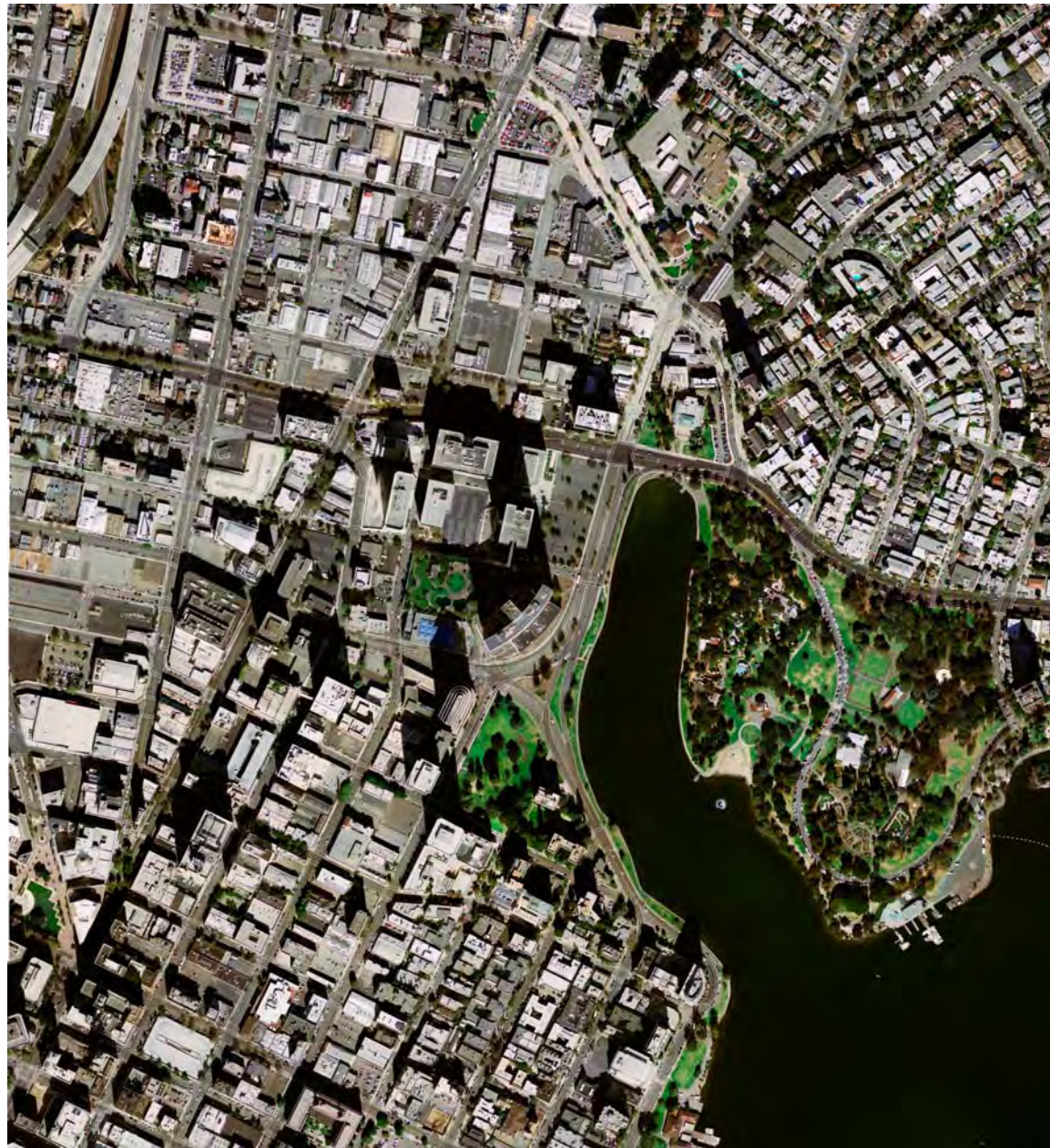
DEVELOPMENT REVIEW
MARCH 14 2008

KAISER CENTER

INDEX

| | |
|---------|------------------------------|
| ASK 046 | PROJECT AREA CONTEXT |
| ASK 047 | PROJECT AND LOT INFORMATION |
| ASK 048 | EAST/WEST BUILDING SECTION |
| ASK 049 | NORTH/SOUTH BUILDING SECTION |
| ASK 050 | SITE PLAN |
| ASK 051 | BASEMENT LEVEL PLAN |
| ASK 052 | FIRST LEVEL PLAN |
| ASK 053 | SECOND LEVEL PLAN |
| ASK 054 | THIRD LEVEL PLAN |
| ASK 055 | FOURTH LEVEL PLAN |
| ASK 056 | FIFTH LEVEL PLAN |
| ASK 057 | SIXTH LEVEL PLAN |
| ASK 058 | SITE CONTEXT PHOTOS |
| ASK 059 | PARKING AND AREA SUMMARIES |
| ASK 060 | EXISTING TREE DESCRIPTION |
| ASK 061 | RENDERINGS |

The following drawings are conceptual and for illustrative purposes only and remain subject to change.



PROJECT CONTEXT



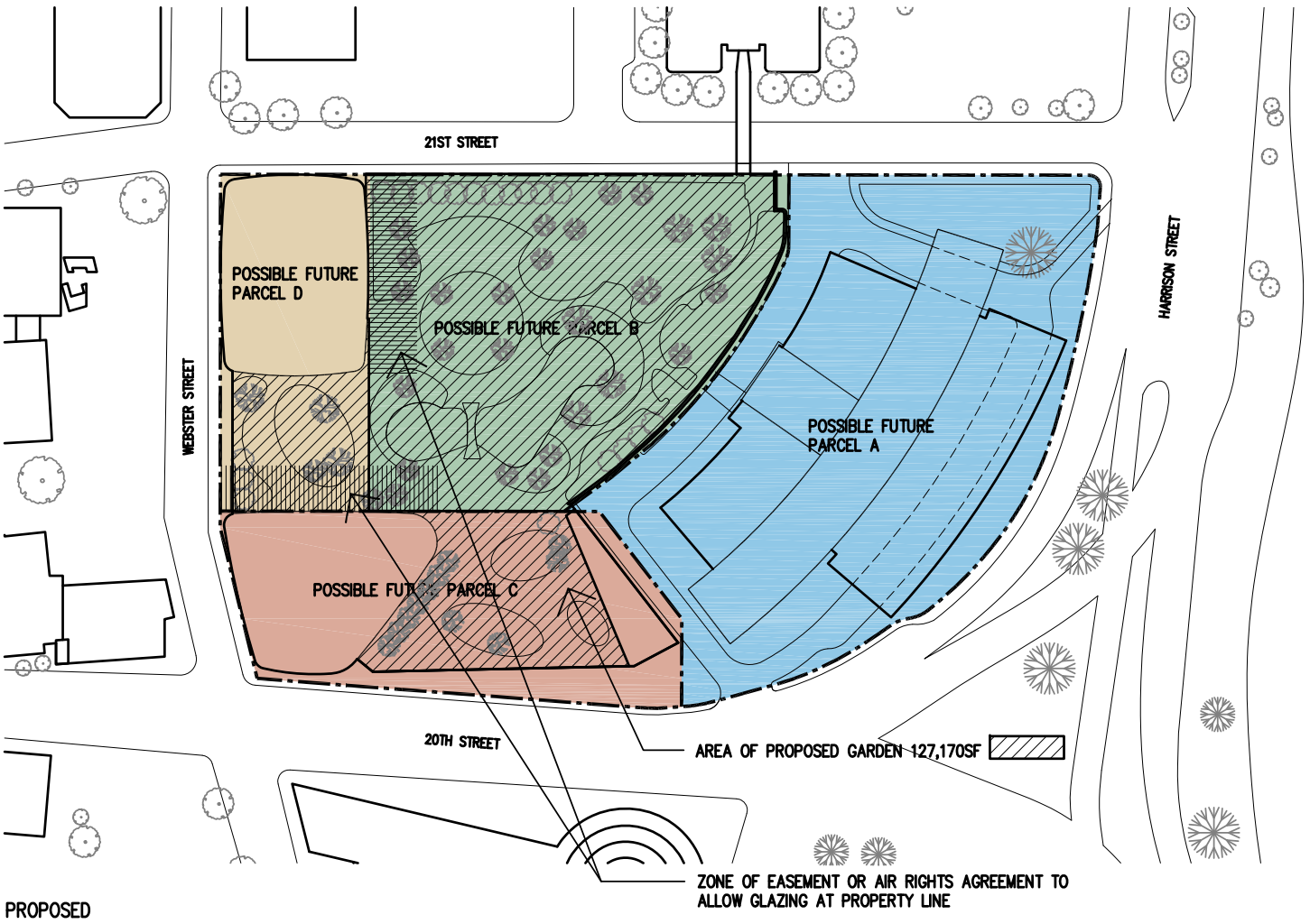
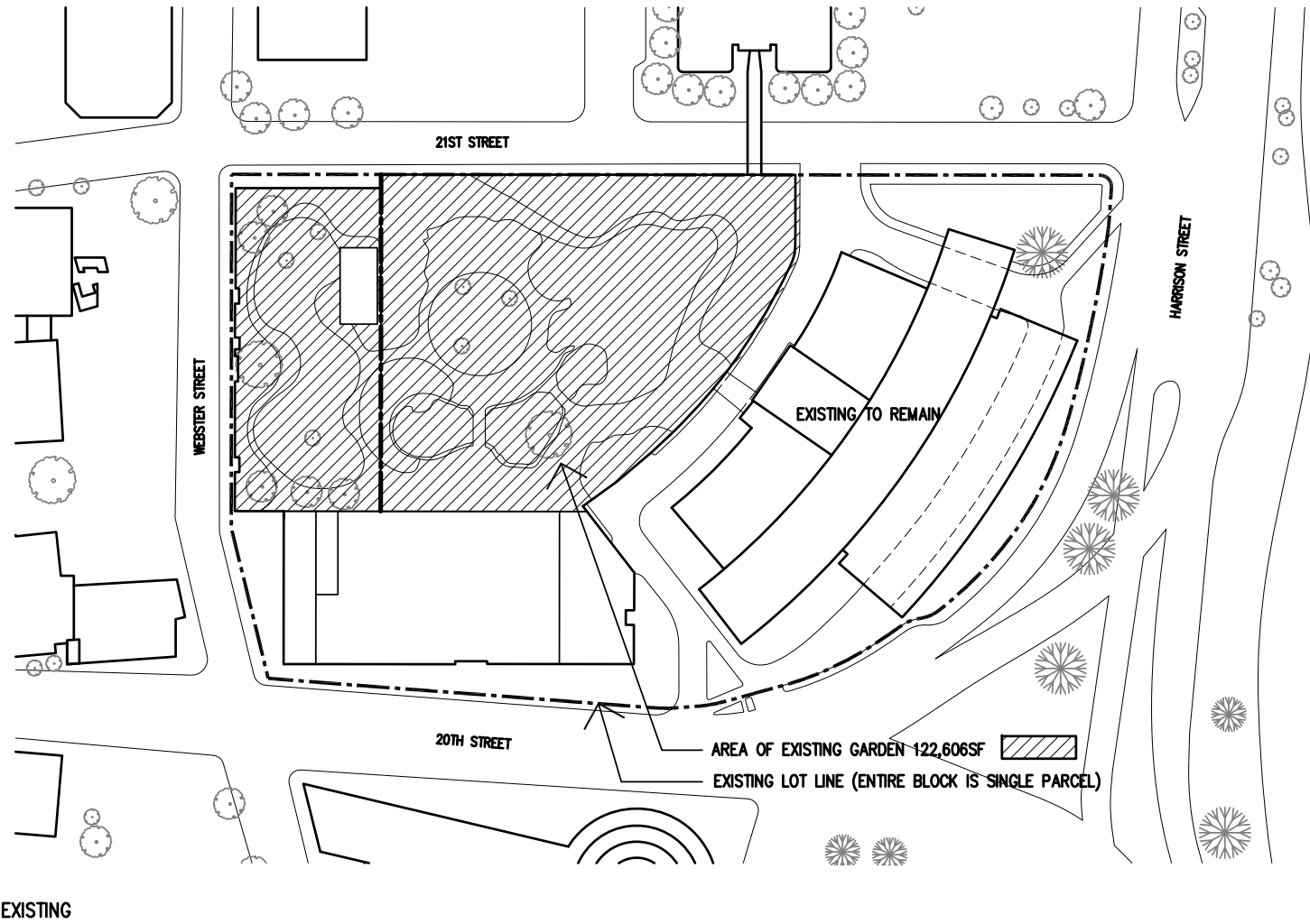
EXISTING KAISER CENTER

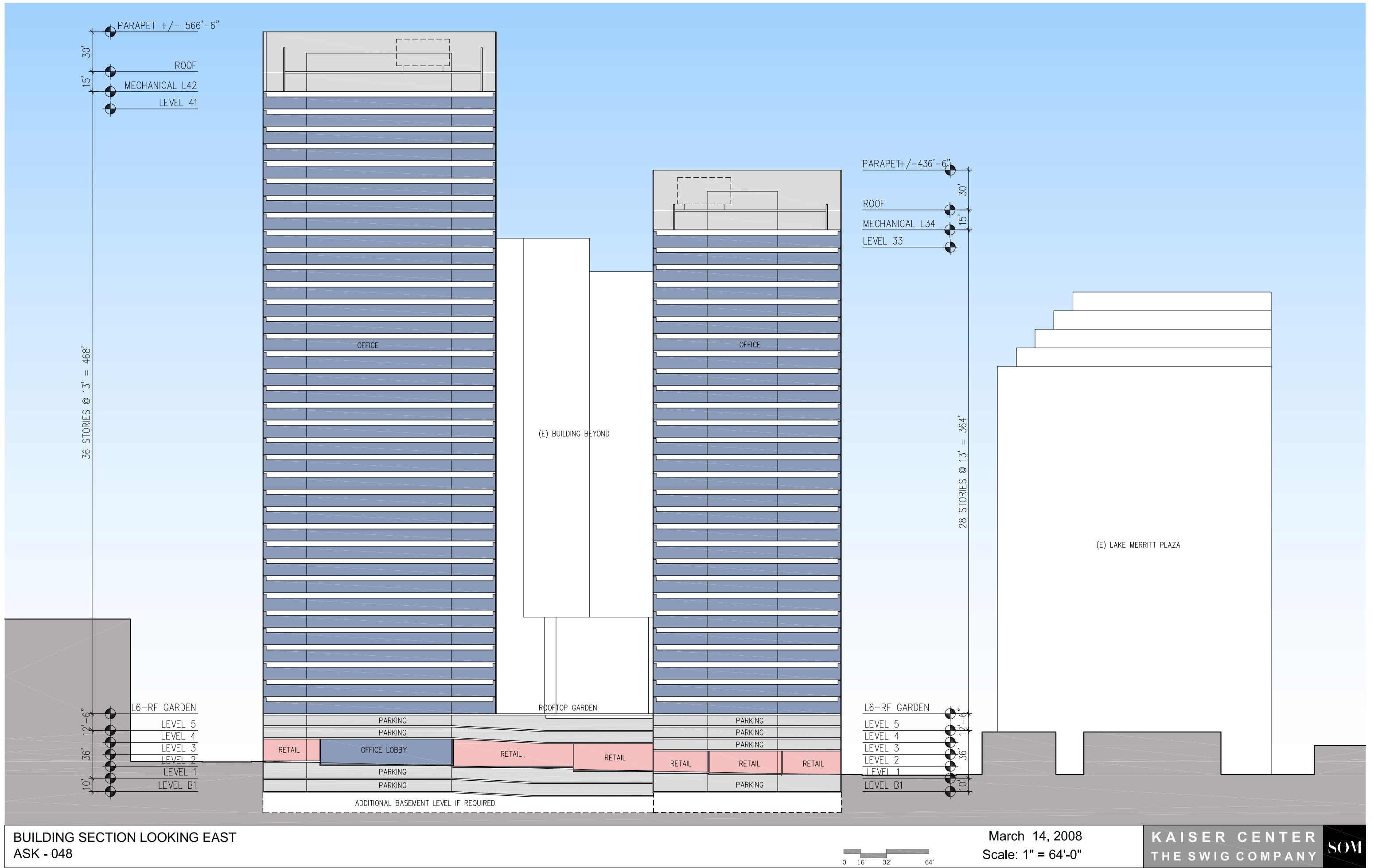
EXISTING & PROPOSED AREA OVERVIEW

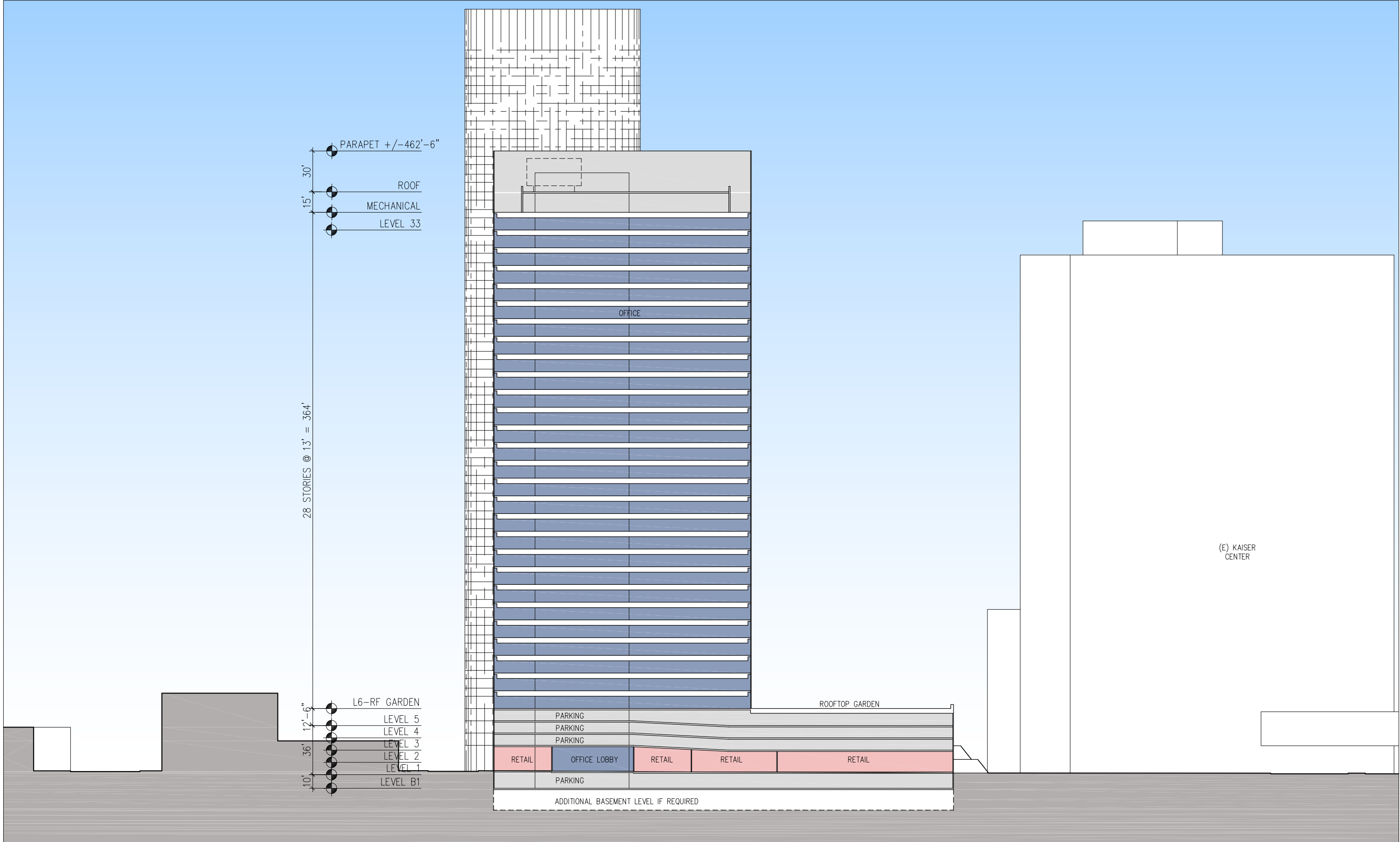
| | TOTAL EXISTING | - | EXISTING TO
BE DEMOLISHED | = | EXISTING TO
REMAIN | + | NEW | = | TOTAL | % CHANGE |
|-------------------------------|----------------|---|------------------------------|---|-----------------------|---|--------------|---|--------------|----------|
| TOTAL LOT AREA* | 311,741GSF | | 0 | | 311,741GSF | | 0 | | 311,741GSF | 0% |
| TOTAL BUILDING FOOTPRINT AREA | 197,460GSF | | 74,900GSF | | 122,560GSF | | 80,168GSF | | 202,728GSF | +3% |
| TOTAL FLOOR AREA | 1,690,879GSF | | 280,002GSF | | 1,410,877GSF | | 1,830,984GSF | | 3,241,861GSF | +92% |
| BUILDING HEIGHT | | | | | | | | | | |
| MAXIMUM STORIES | 29 | | N/A | | 29 | | 42 | | N/A | N/A |
| MAXIMUM FEET | 386' | | N/A | | 386' | | ±566.5' | | ±566.5' | +47% |
| NUMBER OF PARKING SPACES ** | 1340 | | 155 | | 1185 | | 852 | | 2037 | +52% |

* LOT AREA INCLUDES ALL FOUR POSSIBLE FUTURE PARCELS
** PARKING INCLUDES SPACES RESERVED FOR (E) KAISER CENTER TOWER AND ORDWAY BUILDING. SEE ASK-059

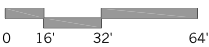
NOTE : POSSIBLE PARCELS SHOWN ON THIS DRAWING ARE FOR REFERENCE ONLY AND ARE INTENDED ONLY TO FACILITATE DESCRIPTION OF THE RELEVANT AREAS AND LOCATION OF THE PROPOSED PROJECT. THIS DRAWING DOES NOT SUGGEST OR PROPOSE A LEGAL SUBDIVISION.







BUILDING SECTION LOOKING NORTH
ASK - 049



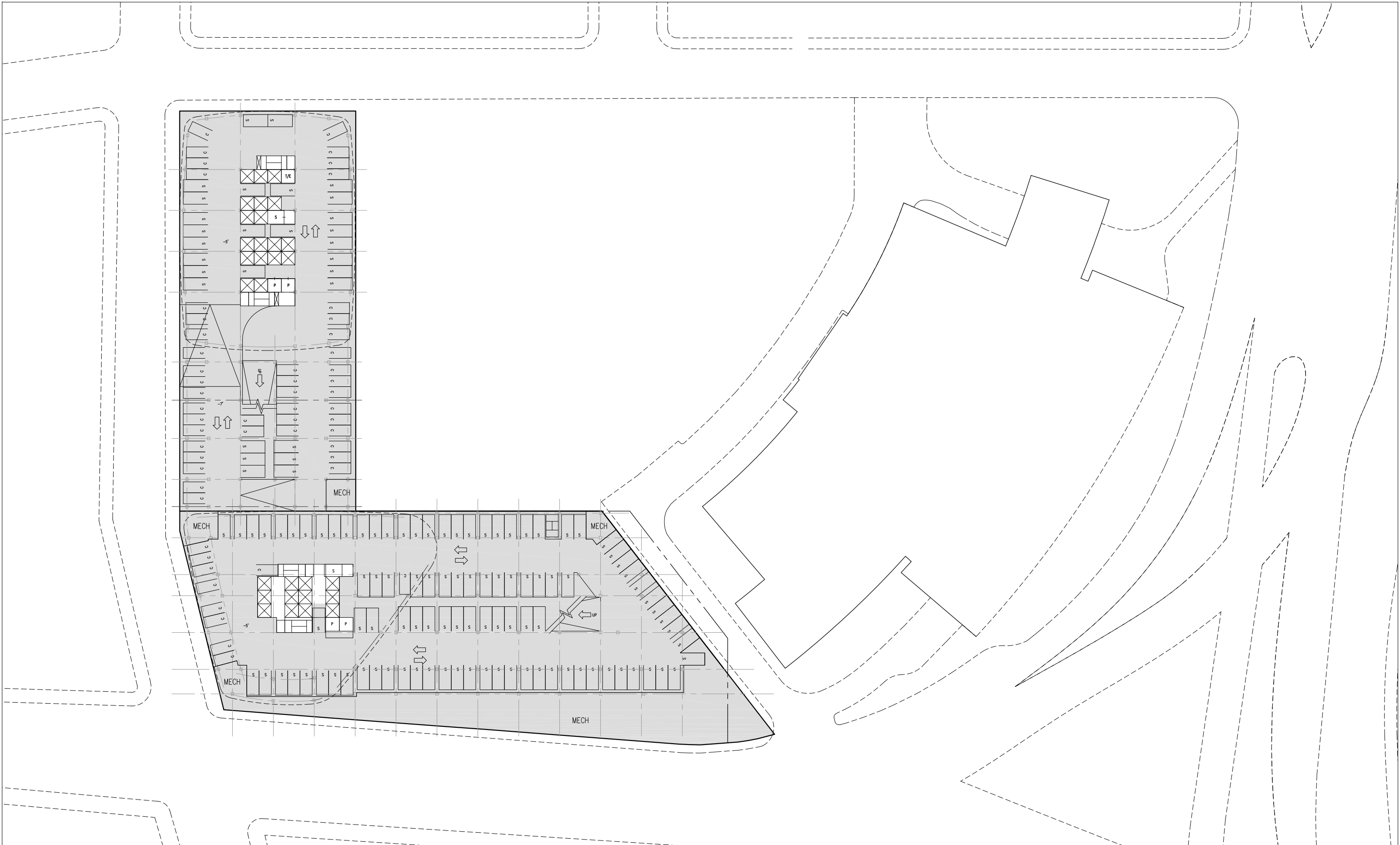
March 14, 2008
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KAISER CENTER
THE SWIG COMPANY





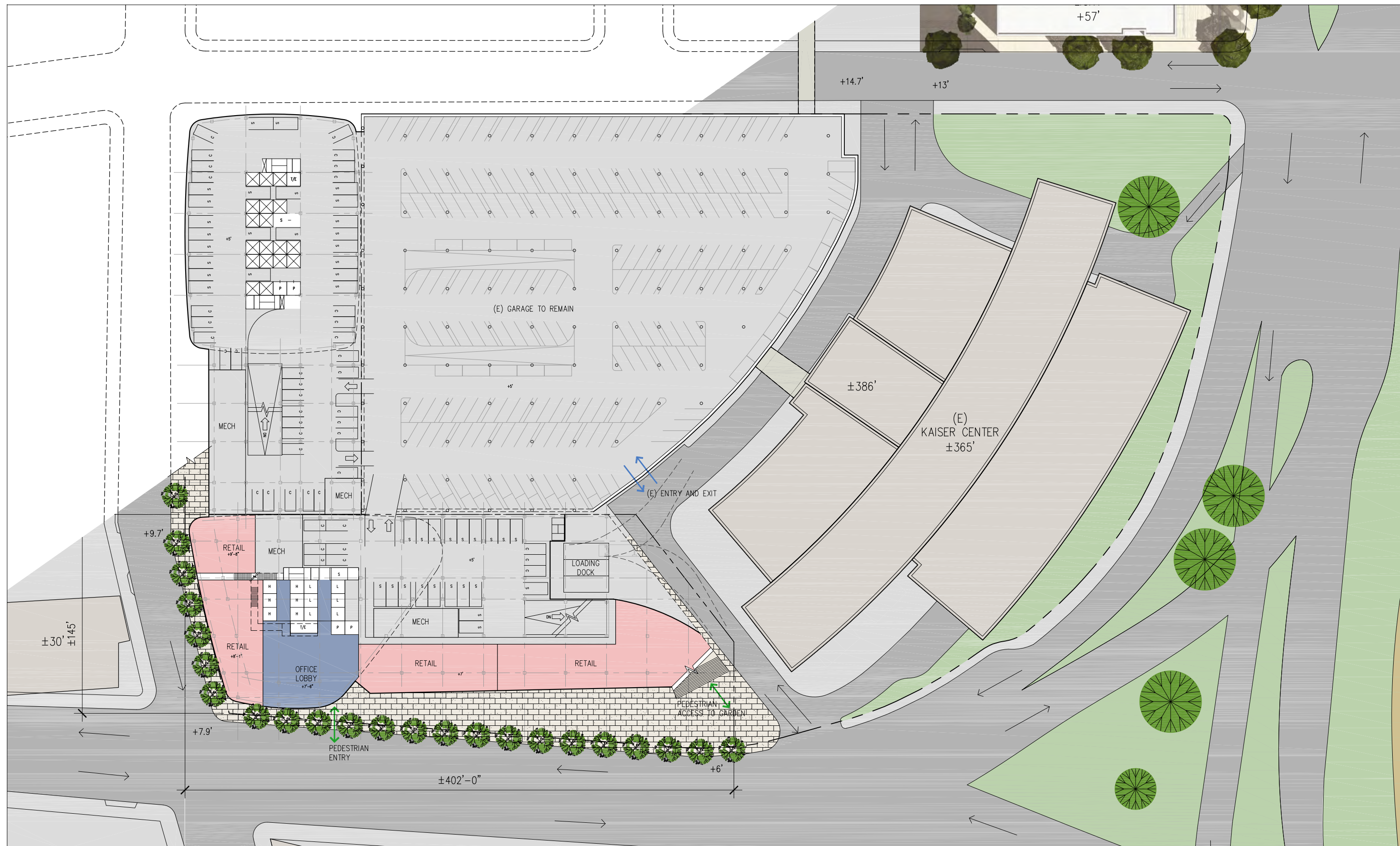


BASEMENT LEVEL FLOOR PLAN
ASK - 051

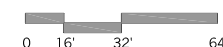


March 14, 2008
Scale: 1" = 64'-0"





FIRST LEVEL FLOOR PLAN
ASK - 052

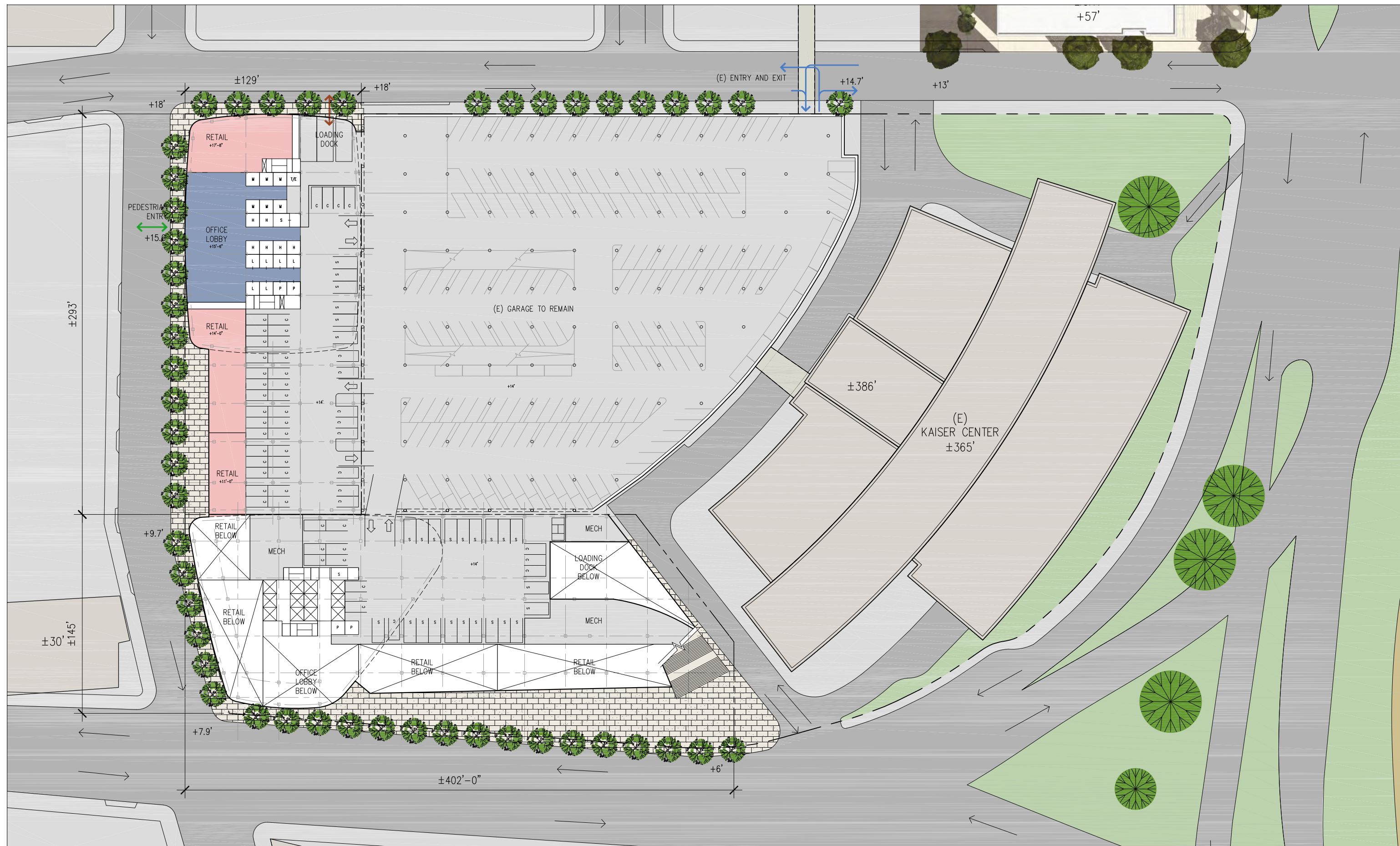


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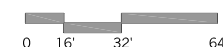


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SOM



SECOND LEVEL FLOOR PLAN
ASK - 053

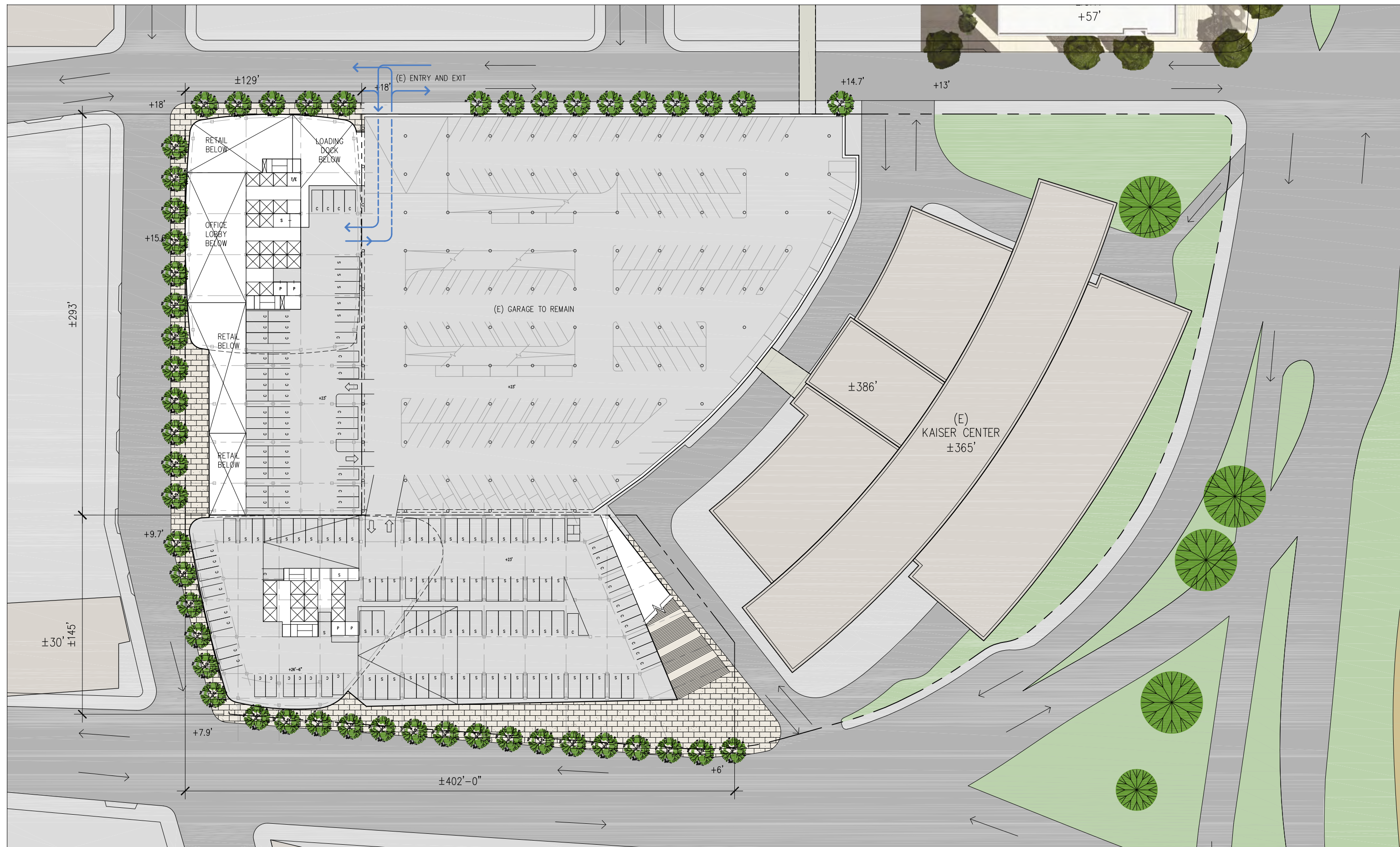


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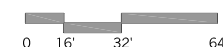


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THE SWIG COMPANY

SOM



THIRD LEVEL FLOOR PLAN
ASK - 054

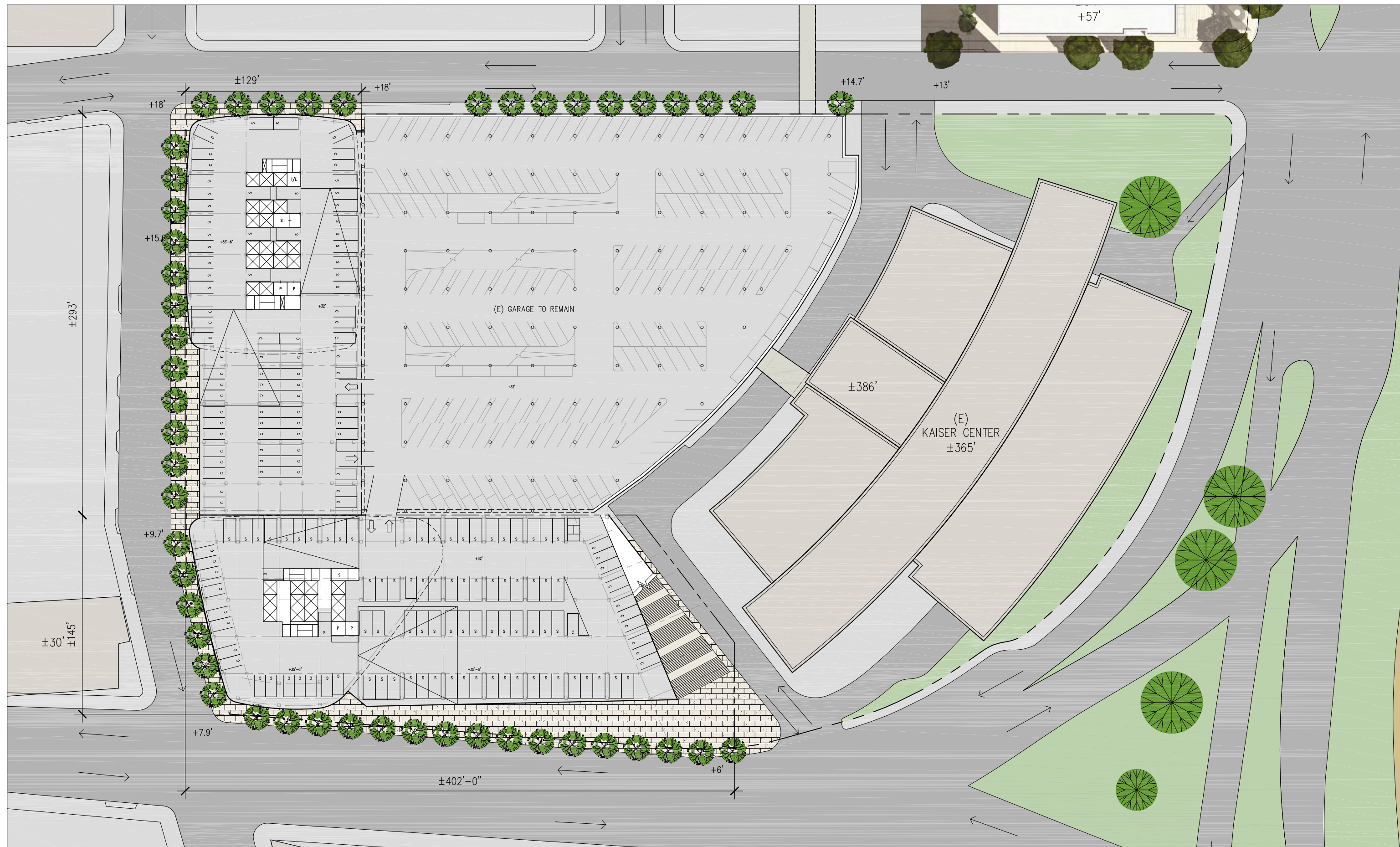


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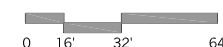


KAISER CENTER
THE SWIG COMPANY

SOM



FOURTH LEVEL FLOOR PLAN
ASK - 055

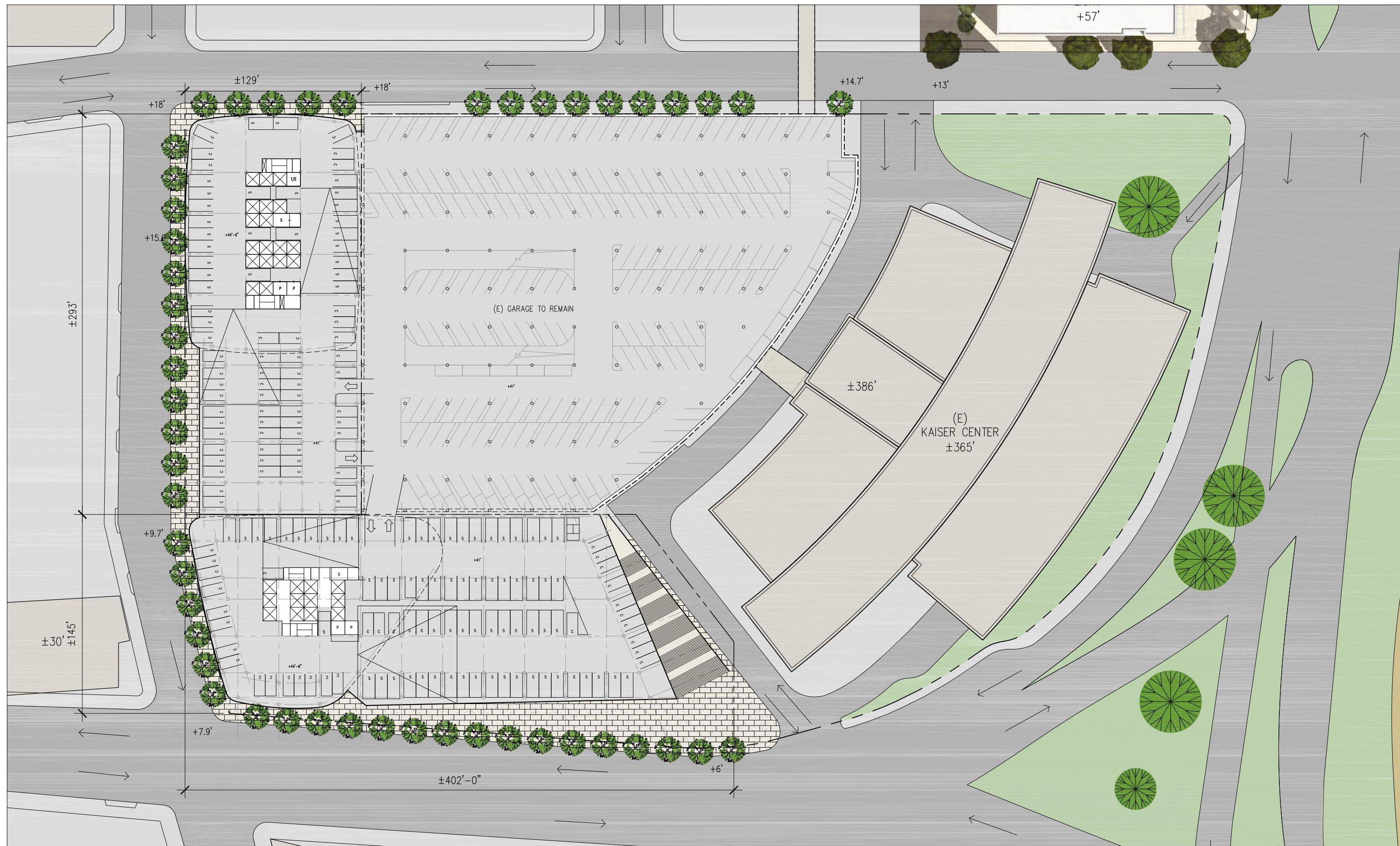


March 14, 2008
Scale: 1" = 64'-0"



KAISER CENTER
THE SWIG COMPANY

SOM



FIFTH LEVEL FLOOR PLAN
ASK - 056

0 16' 32' 64'

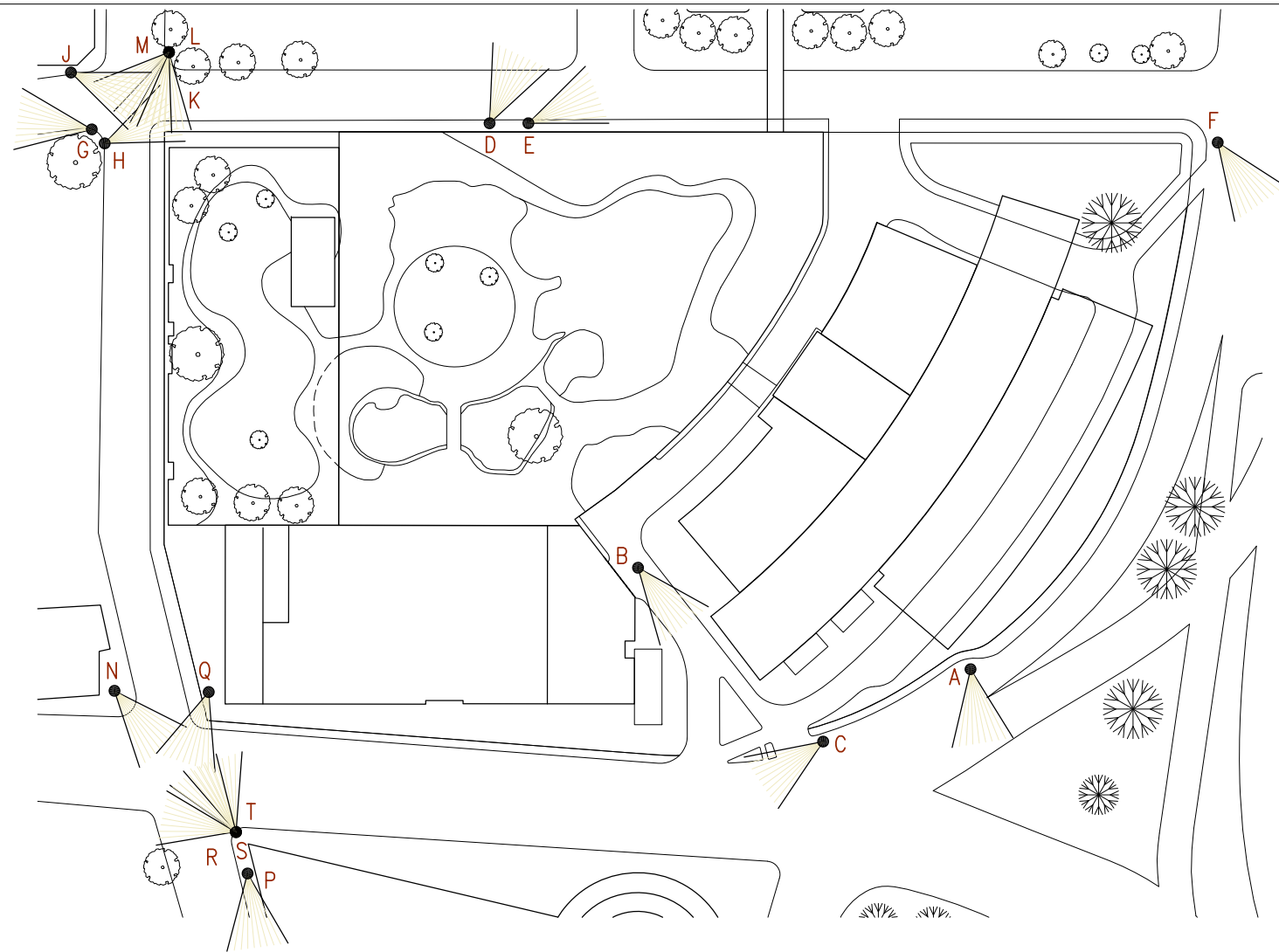
March 14, 2008
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KAISER CENTER
THE SWIG COMPANY

SOM





A



B



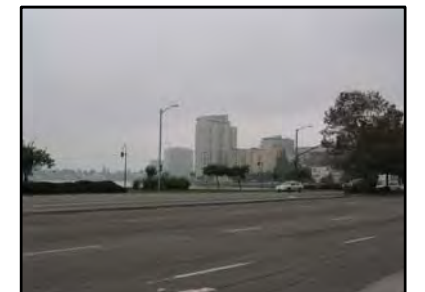
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D



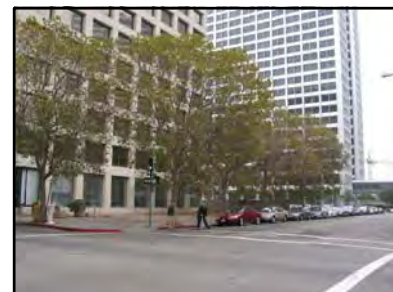
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F



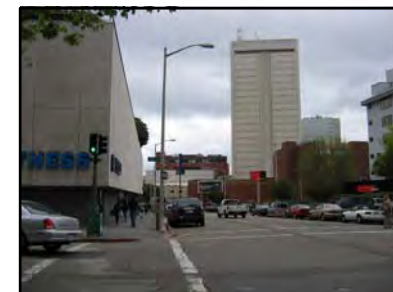
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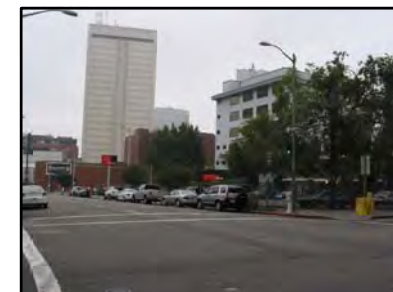
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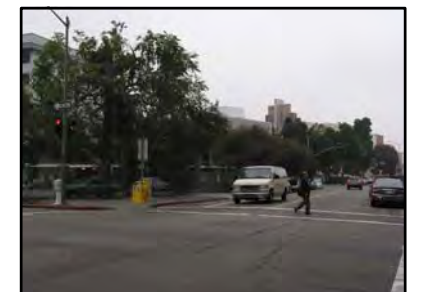
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K



L



M



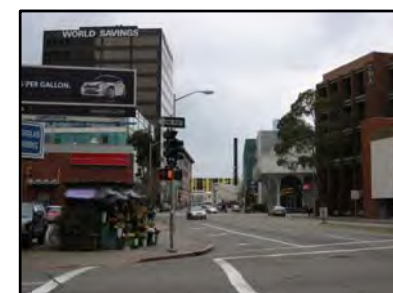
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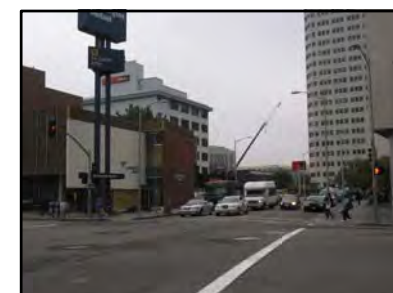
P



Q



R

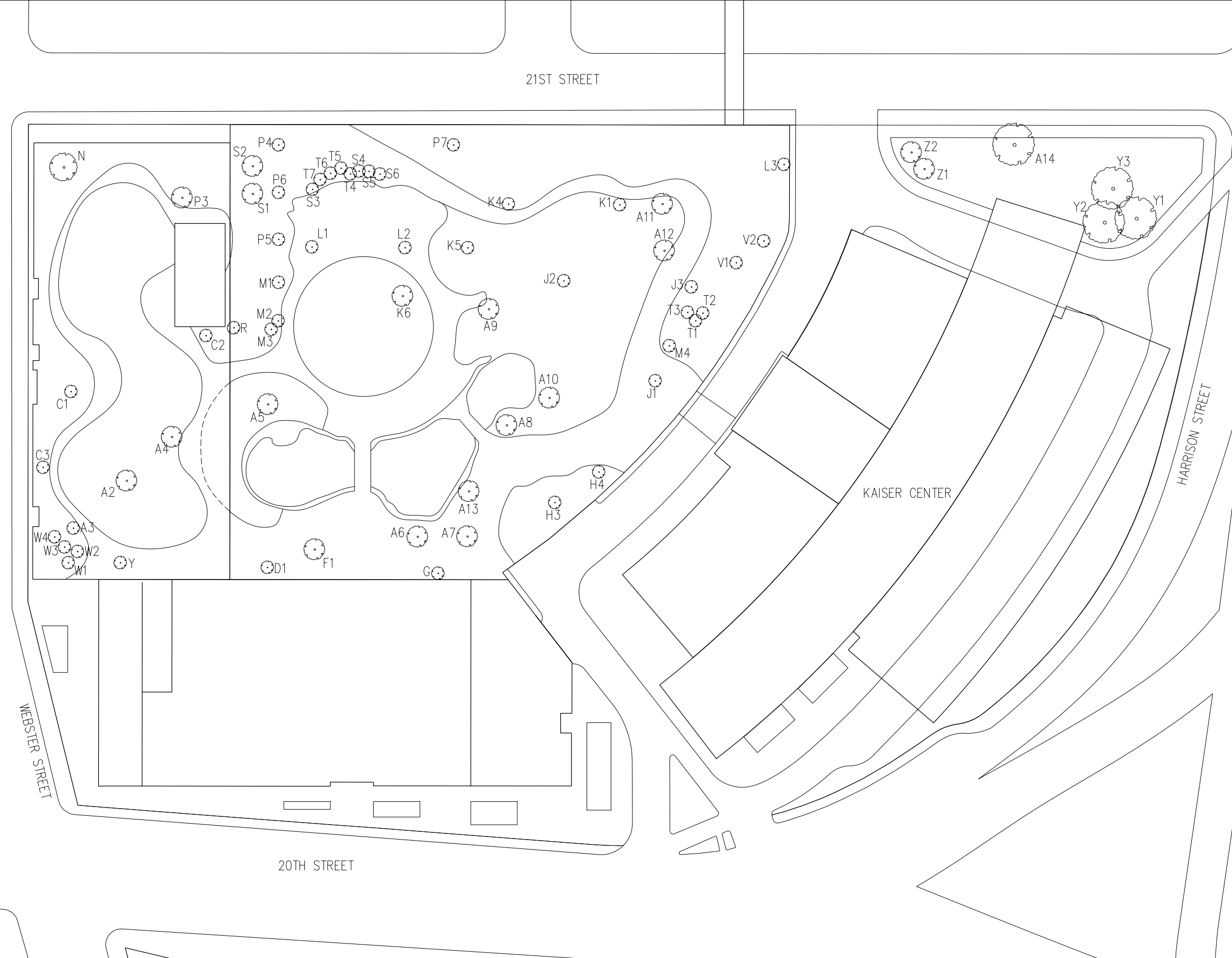


S

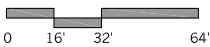


T



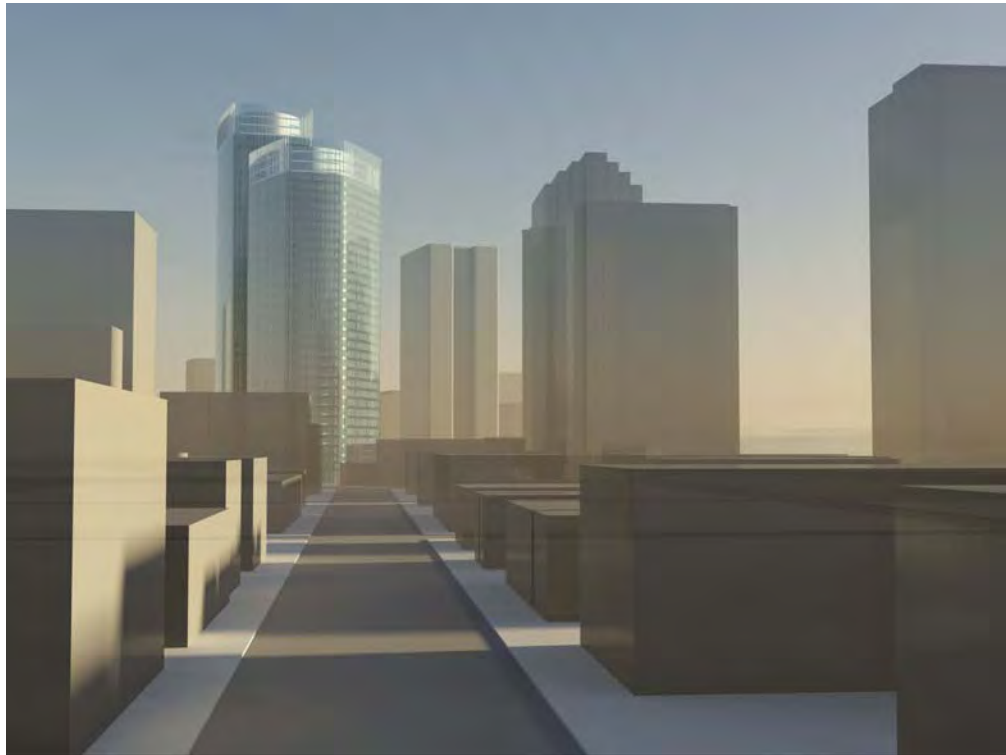


| TREE | SPECIES | COMMON NAME | TRUNK DIAMETER |
|------|-------------------------------|------------------------------|----------------|
| A2 | OLEA EUROPEA | EUROPEAN OLIVE | 30.1" |
| A3 | OLEA EUROPEA | EUROPEAN OLIVE | 11.5" |
| A4 | OLEA EUROPEA | EUROPEAN OLIVE | 43.3" |
| A5 | OLEA EUROPEA | EUROPEAN OLIVE | 24.4" |
| A6 | OLEA EUROPEA | EUROPEAN OLIVE | 34.1" |
| A7 | OLEA EUROPEA | EUROPEAN OLIVE | 22.9" |
| A8 | OLEA EUROPEA | EUROPEAN OLIVE | 36.0" |
| A9 | OLEA EUROPEA | EUROPEAN OLIVE | 45.5" |
| A10 | OLEA EUROPEA | EUROPEAN OLIVE | 35.0" |
| A11 | OLEA EUROPEA | EUROPEAN OLIVE | 33.9" |
| A12 | OLEA EUROPEA | EUROPEAN OLIVE | 32.0" |
| A13 | OLEA EUROPEA | EUROPEAN OLIVE | 27.3" |
| A14 | OLEA EUROPEA | EUROPEAN OLIVE | 33.6" |
| C1 | PITTOSPORUM UNDULATUM | VICTORIAN BOX | 16.2" |
| C2 | PITTOSPORUM UNDULATUM | VICTORIAN BOX | 23.3" |
| C3 | PITTOSPORUM UNDULATUM | VICTORIAN BOX | 23.9" |
| D1 | ACER PALMATUM | JAPANESE MAPLE | 35.1" |
| F1 | MAGNOLIA GRANDIFLORA | SAMUEL SOMMER MAGNOLIA | 23.3" |
| G | PODOCARPUS MACROPHYLLIA | JAPANESE YEW PINE | 11.3" |
| H3 | MALUS FLORIBUNDA | JAPANESE FLOWERING CRABAPPLE | 11.9" |
| H4 | MALUS FLORIBUNDA | JAPANESE FLOWERING CRABAPPLE | 9.2" |
| J1 | QUERCUS SUBER | CORK OAK | 29.0" |
| J2 | QUERCUS SUBER | CORK OAK | 16.0" |
| J3 | QUERCUS SUBER | CORK OAK | 31.5" |
| K1 | RHUS LANCEA | AFRICAN SUMAC | 14.3" |
| K4 | RHUS LANCEA | AFRICAN SUMAC | 21.2" |
| K5 | RHUS LANCEA | AFRICAN SUMAC | 18.5" |
| K6 | RHUS LANCEA | AFRICAN SUMAC | 14.0" |
| L1 | PINUS MUGO | SWISS MOUNTAIN PINE | 19.1" |
| L2 | PINUS MUGO | SWISS MOUNTAIN PINE | 21.0" |
| L3 | PINUS MUGO | SWISS MOUNTAIN PINE | 19.0" |
| M1 | ARBUTUS UNEDO | STRAWBERRY TREE | 32.4" |
| M2 | ARBUTUS UNEDO | STRAWBERRY TREE | 29.5" |
| M3 | ARBUTUS UNEDO | STRAWBERRY TREE | 21.7" |
| M4 | ARBUTUS UNEDO | STRAWBERRY TREE | 30.3" |
| N | BETULA PENDULA | EUROPEAN WHITE BIRCH | 24.0" |
| P3 | QUERCUS ILEX | HOLLY OAK | 9.1" |
| P4 | QUERCUS ILEX | HOLLY OAK | 17.2" |
| P5 | QUERCUS ILEX | HOLLY OAK | 12.7" |
| P6 | QUERCUS ILEX | HOLLY OAK | 15.3" |
| P7 | QUERCUS ILEX | HOLLY OAK | 18.6" |
| R | PRUNUS CAROLINIANA | CAROLINA CHERRY LAUREL | 19.4" |
| S1 | GRISELINA LITTORALIS | KAPUKA | 32.2" |
| S2 | GRISELINA LITTORALIS | KAPUKA | 18.5" |
| S3 | GRISELINA LITTORALIS | KAPUKA | 16.6" |
| S4 | GRISELINA LITTORALIS | KAPUKA | 29.3" |
| S5 | GRISELINA LITTORALIS | KAPUKA | 26.1" |
| S6 | GRISELINA LITTORALIS | KAPUKA | 26.1" |
| T1 | FEIJOA SELLOWIANA | PINAPPLE GUAVA | 25.5" |
| T2 | FEIJOA SELLOWIANA | PINAPPLE GUAVA | 29.3" |
| T3 | FEIJOA SELLOWIANA | PINAPPLE GUAVA | 8.4" |
| T4 | FEIJOA SELLOWIANA | PINAPPLE GUAVA | 21.0" |
| T5 | FEIJOA SELLOWIANA | PINAPPLE GUAVA | 24.2" |
| T6 | FEIJOA SELLOWIANA | PINAPPLE GUAVA | 19.8" |
| T7 | FEIJOA SELLOWIANA | PINAPPLE GUAVA | 16.6" |
| V1 | MAGNOLIA SOULANGIANA | SAUCER MAGNOLIA | 26.3" |
| V2 | MAGNOLIA SOULANGIANA | SAUCER MAGNOLIA | 22.8" |
| W1 | ILEX ALTACLARENSIS "WILSONII" | WILSON'S HOLLY | 13.3" |
| W2 | ILEX ALTACLARENSIS "WILSONII" | WILSON'S HOLLY | 16.3" |
| W3 | ILEX ALTACLARENSIS "WILSONII" | WILSON'S HOLLY | 12.1" |
| W4 | ILEX ALTACLARENSIS "WILSONII" | WILSON'S HOLLY | 14.5" |
| X1 | LIQUIDAMBAR STYRACIFLUA | SWEETGUM | 14.3" |
| X2 | LIQUIDAMBAR STYRACIFLUA | SWEETGUM | 15.8" |
| X3 | LIQUIDAMBAR STYRACIFLUA | SWEETGUM | 15.9" |
| Y1 | MAGNOLIA GRANDIFLORA | SOUTHERN MAGNOLIA | 18.5" |
| Y2 | MAGNOLIA GRANDIFLORA | SOUTHERN MAGNOLIA | 17.4" |





VIEW FROM EAST



VIEW FROM SOUTH



VIEW FROM WEST

APPENDIX E.2

Native American Heritage Commission Communications



1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 **phone**
707.795.0902 **fax**

www.esassoc.com

April 28, 2008

Jakki Kehl
720 North 2nd Street
Patterson, California 95363

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Kehl:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project is also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medical Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

A handwritten signature in black ink that reads "Heidi Koenig". The signature is fluid and cursive, with the first name "Heidi" and last name "Koenig" clearly distinguishable.

Heidi Koenig
Cultural Resources Group



1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

Katherine Erolinda Perez
P.O. Box 717
Linden, California 95236

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Perez:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project is also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medical Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

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Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

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Heidi Koenig
Cultural Resources Group



1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 **phone**
707.795.0902 **fax**

www.esassoc.com

April 28, 2008

Amah/Mutsun Tribal Band
789 Canada Road
Woodside, California 94062
Attn: Irene Zwierlein, Chairperson

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Zwierlein:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project is also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medical Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

A handwritten signature in black ink, appearing to read "Heidi Koenig", written in a cursive, flowing style.

Heidi Koenig
Cultural Resources Group



1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 **phone**
707.795.0902 **fax**

www.esassoc.com

April 28, 2008

Indian Canyon Mutsun Band of Costanoan
P.O. Box 28
Hollister, California 95024
Attn: Ann Marie Sayers, Chairperson

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Sayers:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project is also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medical Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

A handwritten signature in black ink that reads "Heidi Koenig". The signature is fluid and cursive, with the first name "Heidi" and last name "Koenig" clearly legible.

Heidi Koenig
Cultural Resources Group



1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 **phone**
707.795.0902 **fax**

www.esassoc.com

April 28, 2008

The Ohlone Indian Tribe
P.O. Box 3152
Mission San Jose, California 94539
Attn: Andrew Galvan

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Mr. Galvan:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project is also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medical Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

A handwritten signature in black ink, reading "Heidi Koenig". The signature is written in a cursive, flowing style with a large, sweeping "H" and "K".

Heidi Koenig
Cultural Resources Group



1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 **phone**
707.795.0902 **fax**

www.esassoc.com

April 28, 2008

Trina Marine Ruano Family
16010 Halmar Lane
Lathrop, California 95330
Attn: Ramona Garibay

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Garibay:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project is also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medical Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

A handwritten signature in black ink that reads "Heidi Koenig". The signature is fluid and cursive, with the first name "Heidi" and last name "Koenig" clearly distinguishable.

Heidi Koenig
Cultural Resources Group



1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 **phone**
707.795.0902 **fax**

www.esassoc.com

April 28, 2008

Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
P.O. Box 360791
Milpitas, California 95036
Attn: Rosemary Cambra, Chairperson

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Cambra:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project is also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medical Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

A handwritten signature in black ink that reads "Heidi Koenig". The signature is written in a cursive, flowing style with a large, looped 'H' and 'K'.

Heidi Koenig
Cultural Resources Group

STATE OF CALIFORNIAArnold Schwarzenegger, Governor**NATIVE AMERICAN HERITAGE COMMISSION**

915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov



April 25, 2008

Heidi Koenig
Cultural Resources Group
ESA
1425 N. McDowell Blvd., Suite 105
Petaluma, A 94954

Sent by Fax: 707-795-0902
Number of Pages: 4

Re: Proposed: Kaiser Center Oakland Redevelopment project. Childrens Hospital and Research Center Replacement project. Sutter Medical Center, Castro Valley. All projects in Alameda County.

Dear Ms. Koenig:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
Alameda County
April 25, 2008

Jakki Kehl
720 North 2nd Street
Patterson, CA 95363
jakki@bigvalley.net
(209) 892-2436
(209) 892-2435 - Fax

Ohlone/Costanoan

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
PO Box 360791
Milpitas, CA 95036
muwekma@muwekma.org
408-434-1668
408-434-1673

Ohlone / Costanoan

Katherine Erolinda Perez
PO Box 717
Linden, CA 95236
(209) 887-3415

Ohlone/Costanoan
Northern Valley Yokuts
Bay Miwok

The Ohlone Indian Tribe
Andrew Galvan
PO Box 3152
Fremont, CA 94539
chochenyo@AOL.com
(510) 882-0527 - Cell
(510) 687-9393 - Fax

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Amah/Mutsun Tribal Band
Irene Zwierlein, Chairperson
789 Canada Road
Woodside, CA 94062
amah_mutsun@yahoo.com
(650) 851-7747 - Home
(650) 851-7489 - Fax

Ohlone/Costanoan

Trina Marine Ruano Family
Ramona Garibay, Representative
16010 Halmar Lane
Lathrop, CA 95330

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28
Hollister, CA 95024
ams@garlic.com
831-637-4238

Ohlone/Costanoan

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Kaiser Center Oakland Redevelopment project, Alameda County.

APPENDIX E.3

Exterior Façade Feasibility Analysis



Turner Construction Company
1625 Clay Street
Oakland, California 94612
phone: (510) 267-8100
fax: (510) 267-8118

November 20, 2008

Tomas Schoenberg
The Swig Company, LLC
220 Montgomery Street
San Francisco, CA 94104

Re: Kaiser Center- Mall Buildings Exterior Façade (Dolomite Panels) Feasibility Analysis

Dear Tomas,

Thank you for requesting Turner Construction Company to provide an analysis of the exterior façade of the two existing Mall Buildings at the Kaiser Center complex. Per your request, we have evaluated the feasibility of the intact salvaging (removal) of the Dolomite Precast Panels from the structure of the Mall Buildings, and then the potential preservation and reinstallation of these panels on a new structure at that location.

Scope

The scope of the study included a detailed review of the original 1958 Architectural and Structural Drawings and Specifications for both the Kaiser Center office tower and Mall Buildings prepared by Welton Becket & Associates, as well as a visual inspection of these buildings. Both the tower and Mall Buildings were reviewed due to the variation in panel thickness and attachment details given their different structural frames.

Findings

A review of the original construction documents for the Mall Buildings yielded two Architectural details and one Structural detail as the primary elements influencing our findings (please reference Architectural Detail "A" and Detail "B", and Structural Detail "C" attached to this document). The key element is the 1 inch thick grout layer shown between the 3 inch thick precast panels and the buildings' concrete frame, as referenced on the attached Details "A" and "B". The grout bonds the panel to the concrete as if the panel were cast in place, thus effectively creating a unified section. While the Structural details do not show how the panels are to be attached, Detail "C" does show the same unified section for the panel and grout of 4 inches thick. From our visual inspection we did not see anything to suggest that the panels were installed other than the manner is shown in the drawings. It should be noted that none of these details reference any mechanical attachment for the precast panels that is common in current construction methods (the fastener shown in Detail "A" is for a vertical aluminum mullion interfacing between the panels and is not for the panels' attachment to the building); please reference attached Details SK1A and SK1B as examples of typical precast attachment details.

It is important to note that in our experience renovating another high-rise building in Oakland of similar vintage with a similar precast system, the precast panels were actually used as the form surface for the shearwall concrete, thus casting the panels into the unified concrete frame. Separating the panels from the building's concrete frame required extensive hand demolition of the panels utilizing chipping guns. It is possible that this method of attachment may have been used in certain areas of the Mall Building as well, and thus removal would have the same result as the grouted bonding of the panels stipulated in the original design.

**Conclusion**

Based upon our review of the design documents and our visual inspection, the attachment of these precast Dolomite panels to the Mall Buildings' concrete frame precludes their mechanical removal other than by destructive methods. Further, even attempting to remove the panels by careful hand demolition would most likely cause them to disintegrate due to the nature of their material composition and age. Therefore, it is our opinion that, irrespective of cost, it would be infeasible for the Dolomite precast exterior façade at the Mall Buildings to be salvaged in a manner that would allow their reuse on any new structure. In addition, while it may be possible to salvage some limited amounts of the Dolomite material from the panels, a reasonable approach to demolition of the structure would not yield any "clean" or consistent material for incorporation into the proposed new building façade.

We also consulted two other construction firms that specialize in precast panel manufacturing and installation, Walters & Wolf and Clark Pacific, who reviewed and commented on the pertinent design documents with respect to the Dolomite panels and their opinions and conclusions align with ours.

We welcome the opportunity to discuss this analysis with you or whomever else you feel is appropriate, and would be glad to answer any further questions you may have.

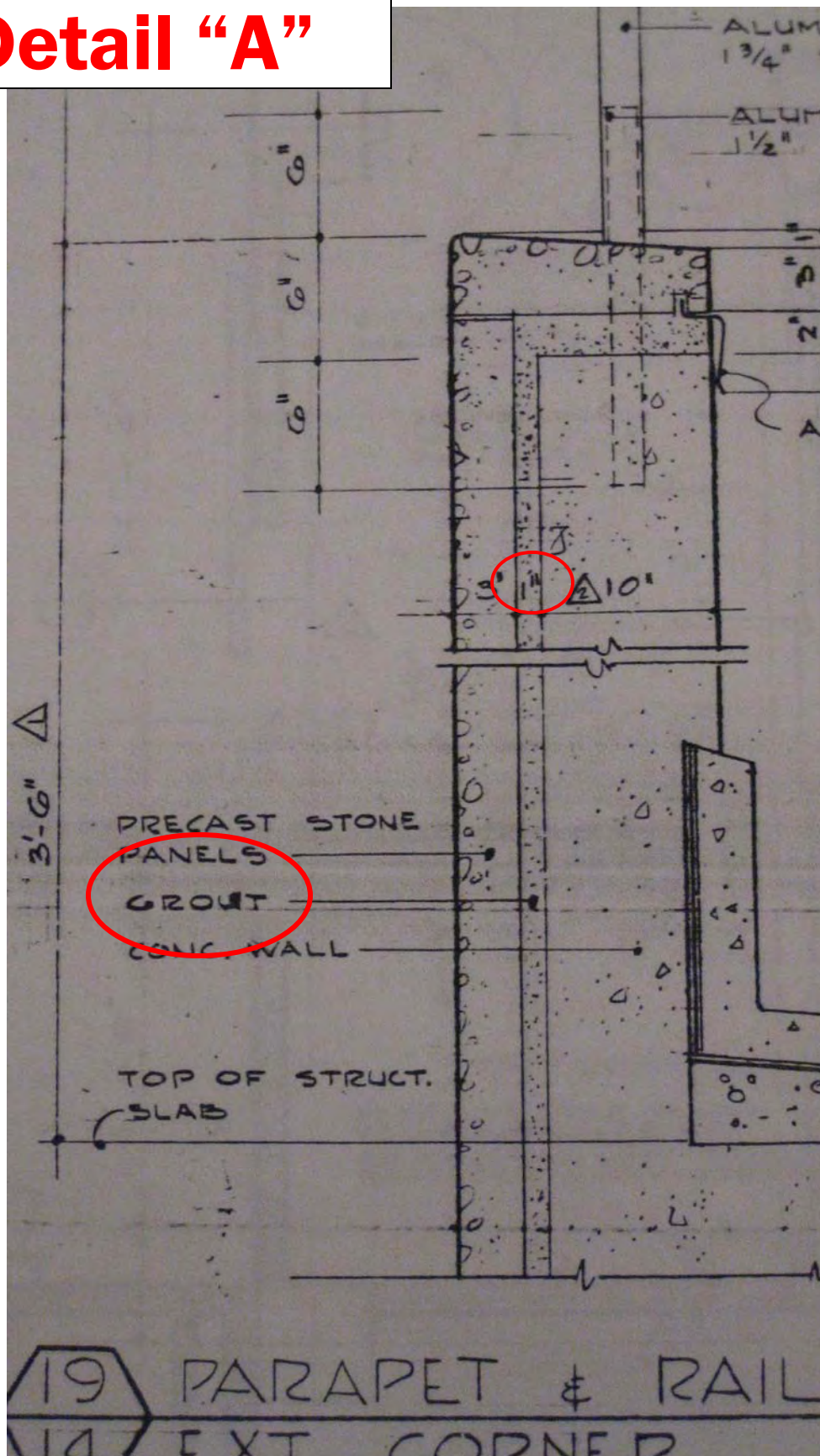
Sincerely,

A handwritten signature in black ink that reads "Willy Mautner". The signature is stylized, with the first name "Willy" written in a cursive-like script and the last name "Mautner" in a more formal, blocky script.

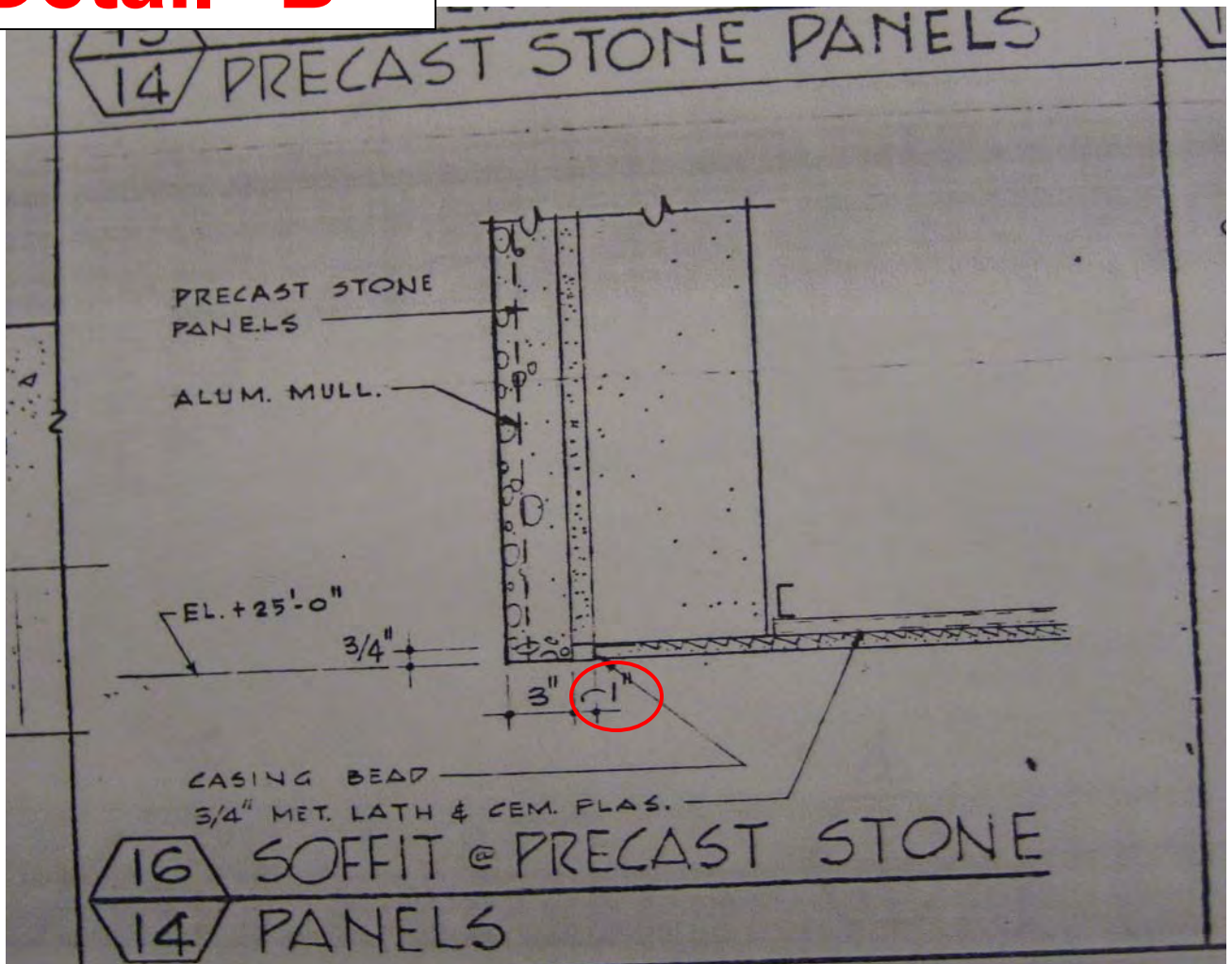
Willy Mautner, AIA
Chief Estimator

Cc: Deborah Boyer, The Swig Company, LLC
Scott Eastman, Turner Construction Company

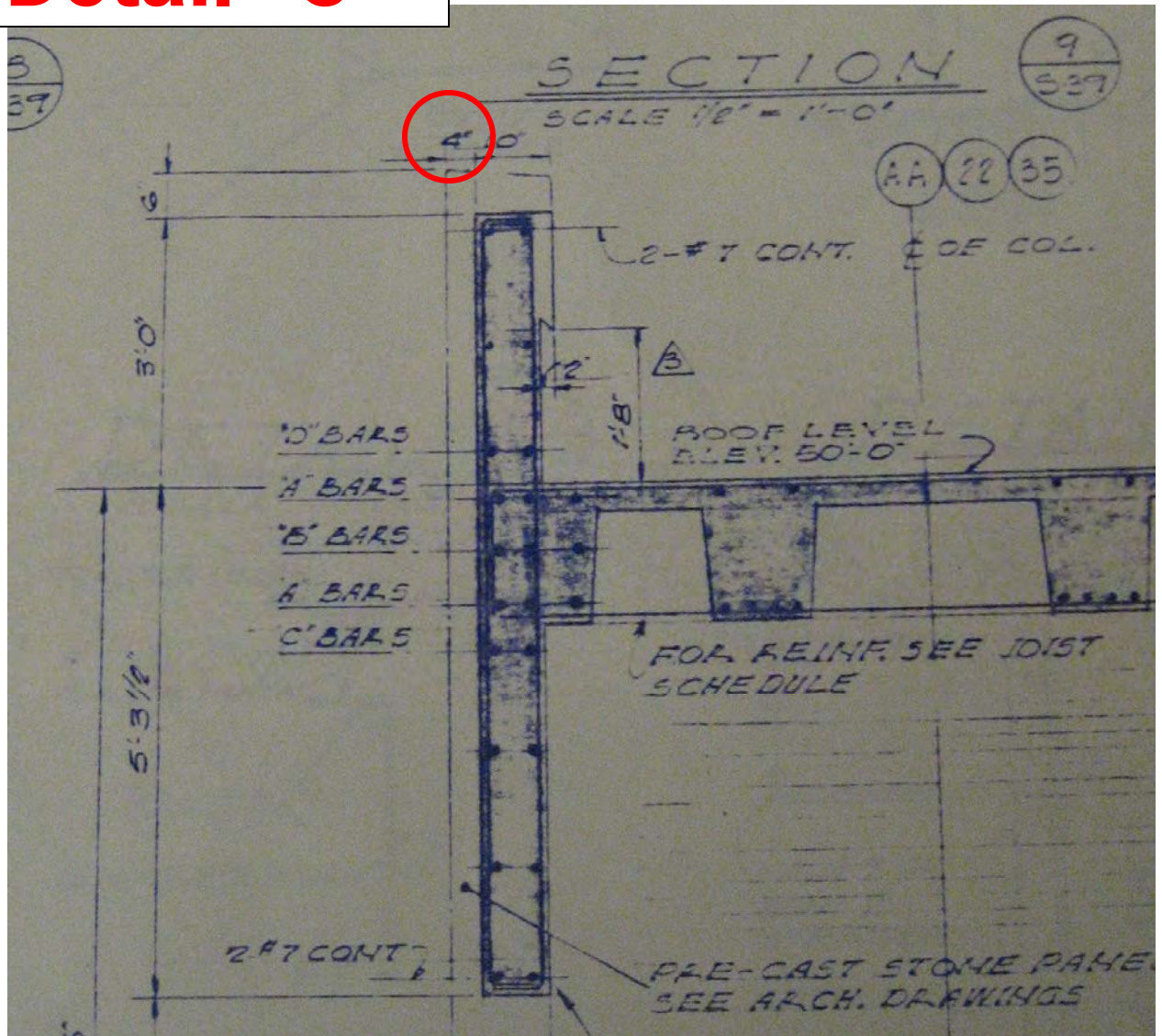
Detail "A"



Detail "B"



Detail "C"





CLARK PACIFIC

1980 SOUTH RIVER ROAD TEL: (916) 371-0305
W SACRAMENTO, CA 95691 FAX: (916) 372-0323
13592 SLOVER AVENUE TEL: (909) 823-1433
FONTANA, CA 92337 FAX: (909) 823-1361

PROJECT

CONTRACTOR

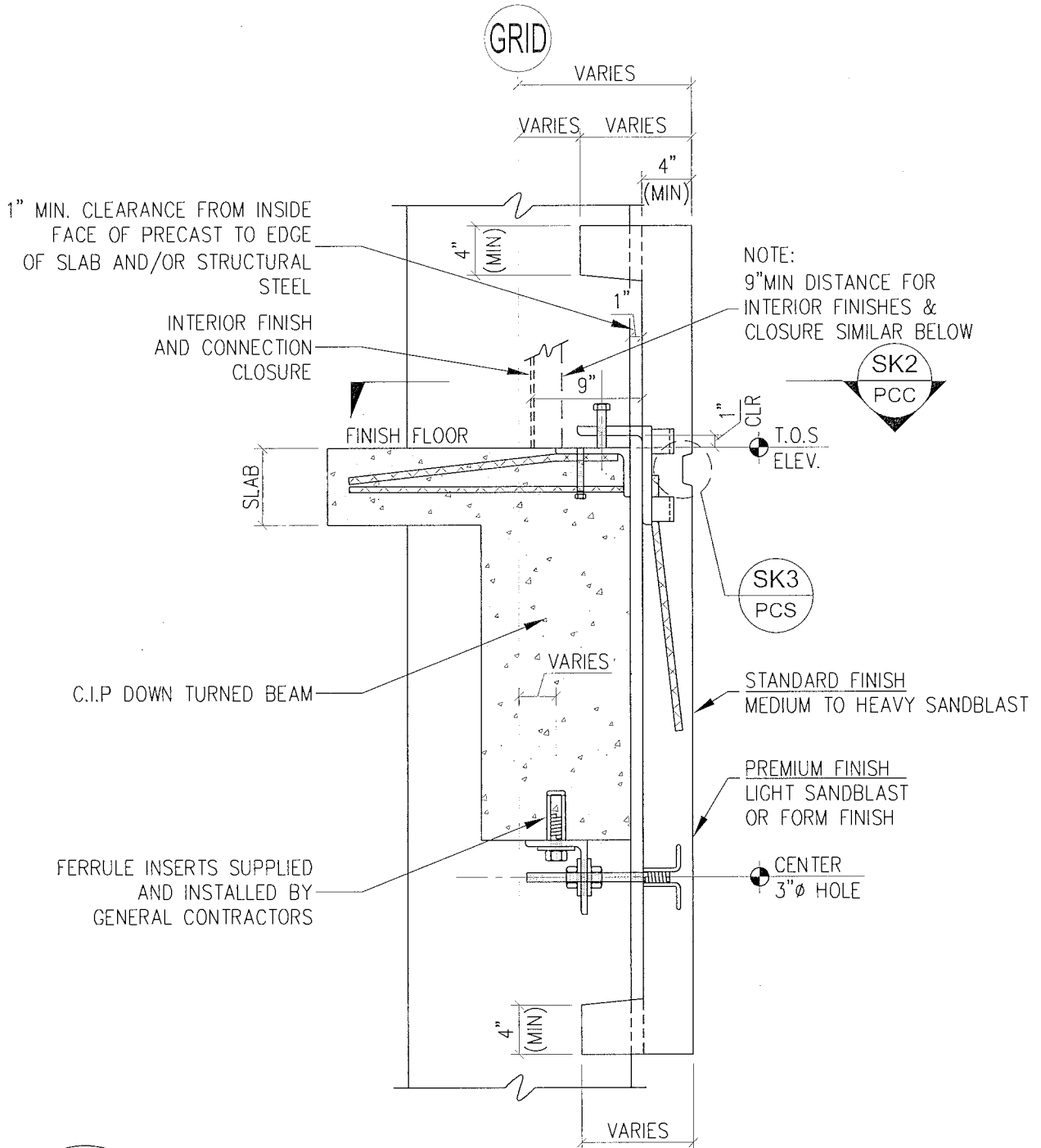
TYPICAL PRE-CAST SECTION AT C.I.P STRUCTURE

JOB

SHEET **PCC-SK1**

DATE **3/15/07**

BY **TA** CHECK **DW**



SK1

A

TYPICAL PRECAST PANEL CONNECTIONS (FLOOR SECTION-C.I.P STRUCTURE)

SCALE: 1" = 1'-0"



CLARK PACIFIC

1980 SOUTH RIVER ROAD TEL: (916) 371-0305
W SACRAMENTO, CA 95691 FAX: (916) 372-0323
13592 SLOVER AVENUE TEL: (909) 823-1433
FONTANA, CA 92337 FAX: (909) 623-1361

PROJECT

CONTRACTOR

JOB

SHEET

PCS-SK1

DATE

3/15/07

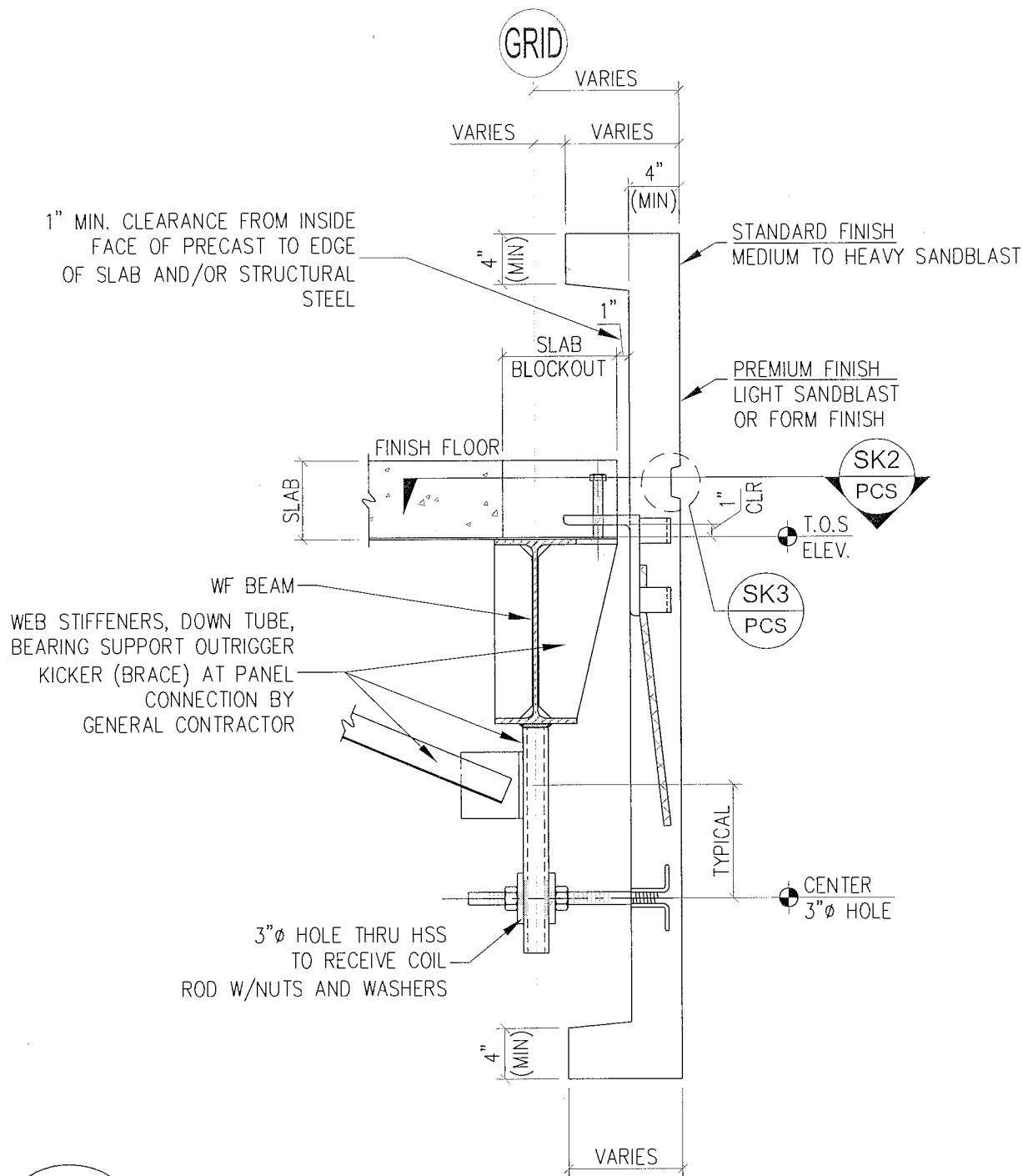
BY

TA

CHECK

DW

TYPICAL PRE-CAST SECTION AT STEEL STRUCTURE



SK1
B

TYPICAL PRECAST PANEL CONNECTIONS (FLOOR SECTION)

SCALE: 1" = 1'-0"

APPENDIX F

Noise Data

| ROAD SEGMENT #1: Harrison Street north of Grand Avenue | | TOTAL
VEHICLES | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | Calculated dBA
(15 meters from
roadway center) | Receptor
Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
|--|--|---------------------|----------------|------------------------|---------------------|------|----|----|---------------|-----------|-----------|----|------|------|-----------------|--|---|---|---|
| | | | Auto
% | Medium Truck
Auto % | Heavy Truck
MT % | HT % | | | Auto
k/h | MT
k/h | HT
k/h | | | | Auto MT HT | | | | |
| Existing AM | | 1,471 | 97.0 | 1,427 2.0 | 29 1.0 | 15 | 25 | 40 | 25 | 40 | 25 | 40 | 61.6 | 56.4 | 61.1 | 65.0 | 20 | 63.8 | 63.2 |
| Existing+Project | | 1,769 | 97.0 | 1,716 2.0 | 35 1.0 | 18 | 25 | 40 | 25 | 40 | 25 | 40 | 62.4 | 57.2 | 61.9 | 65.8 | 20 | 64.6 | 64.0 |
| Near Term AM | | 1,771 | 97.0 | 1,718 2.0 | 35 1.0 | 18 | 25 | 40 | 25 | 40 | 25 | 40 | 62.5 | 57.2 | 61.9 | 65.8 | 20 | 64.6 | 64.0 |
| Near Term+Project | | 2,069 | 97.0 | 2,007 2.0 | 41 1.0 | 21 | 25 | 40 | 25 | 40 | 25 | 40 | 63.1 | 57.9 | 62.6 | 66.5 | 20 | 65.3 | 64.6 |
| Future | | 2,801 | 97.0 | 2,717 2.0 | 56 1.0 | 28 | 25 | 40 | 25 | 40 | 25 | 40 | 64.4 | 59.2 | 63.9 | 67.8 | 20 | 66.6 | 65.9 |
| Future+Project | | 3,099 | 97.0 | 3,006 2.0 | 62 1.0 | 31 | 25 | 40 | 25 | 40 | 25 | 40 | 64.9 | 59.7 | 64.3 | 68.3 | 20 | 67.0 | 66.4 |
| ROAD SEGMENT #2: Harrison Street south of Grand Avenue | | TOTAL
VEHICLES | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | Calculated dBA
(15 meters from
roadway center) | Receptor
Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | Auto
% | Medium Truck
Auto % | Heavy Truck
MT % | HT % | | | Auto
k/h | MT
k/h | HT
k/h | | | | Auto MT HT | | | | |
| Existing AM | | 2,016 | 97.0 | 1,956 2.0 | 40 1.0 | 20 | 25 | 40 | 25 | 40 | 25 | 40 | 63.0 | 57.8 | 62.4 | 66.4 | 20 | 65.1 | 64.5 |
| Existing+Project | | 2,314 | 97.0 | 2,245 2.0 | 46 1.0 | 23 | 25 | 40 | 25 | 40 | 25 | 40 | 63.6 | 58.4 | 63.0 | 67.0 | 20 | 65.7 | 65.1 |
| Near Term AM | | 2,411 | 97.0 | 2,339 2.0 | 48 1.0 | 24 | 25 | 40 | 25 | 40 | 25 | 40 | 63.8 | 58.6 | 63.2 | 67.2 | 20 | 65.9 | 65.3 |
| Near Term+Project | | 2,709 | 97.0 | 2,628 2.0 | 54 1.0 | 27 | 25 | 40 | 25 | 40 | 25 | 40 | 64.3 | 59.1 | 63.7 | 67.7 | 20 | 66.4 | 65.8 |
| Future | | 3,581 | 97.0 | 3,474 2.0 | 72 1.0 | 36 | 25 | 40 | 25 | 40 | 25 | 40 | 65.5 | 60.3 | 64.9 | 68.9 | 20 | 67.6 | 67.0 |
| Future+Project | | 3,879 | 97.0 | 3,763 2.0 | 78 1.0 | 39 | 25 | 40 | 25 | 40 | 25 | 40 | 65.9 | 60.7 | 65.3 | 69.2 | 20 | 68.0 | 67.4 |
| ROAD SEGMENT #3: Grand Avenue east of Harrison Street | | TOTAL
VEHICLES | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | Calculated dBA
(15 meters from
roadway center) | Receptor
Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | Auto
% | Medium Truck
Auto % | Heavy Truck
MT % | HT % | | | Auto
k/h | MT
k/h | HT
k/h | | | | Auto MT HT | | | | |
| Existing AM | | 1,355 | 97.0 | 1,314 2.0 | 27 1.0 | 14 | 25 | 40 | 25 | 40 | 25 | 40 | 61.3 | 56.1 | 60.7 | 64.7 | 20 | 63.4 | 62.8 |
| Existing+Project | | 1,355 | 97.0 | 1,314 2.0 | 27 1.0 | 14 | 25 | 40 | 25 | 40 | 25 | 40 | 61.3 | 56.1 | 60.7 | 64.7 | 20 | 63.4 | 62.8 |
| Near Term AM | | 1,647 | 97.0 | 1,598 2.0 | 33 1.0 | 16 | 25 | 40 | 25 | 40 | 25 | 40 | 62.1 | 56.9 | 61.6 | 65.5 | 20 | 64.3 | 63.6 |
| Near Term+Project | | 1,647 | 97.0 | 1,598 2.0 | 33 1.0 | 16 | 25 | 40 | 25 | 40 | 25 | 40 | 62.1 | 56.9 | 61.6 | 65.5 | 20 | 64.3 | 63.6 |
| Future | | 2,286 | 97.0 | 2,217 2.0 | 46 1.0 | 23 | 25 | 40 | 25 | 40 | 25 | 40 | 63.6 | 58.4 | 63.0 | 66.9 | 20 | 65.7 | 65.1 |
| Future+Project | | 2,286 | 97.0 | 2,217 2.0 | 46 1.0 | 23 | 25 | 40 | 25 | 40 | 25 | 40 | 63.6 | 58.4 | 63.0 | 66.9 | 20 | 65.7 | 65.1 |
| ROAD SEGMENT #4: Grand Avenue west of Harrison Street | | TOTAL
VEHICLES | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | Calculated dBA
(15 meters from
roadway center) | Receptor
Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | Auto
% | Medium Truck
Auto % | Heavy Truck
MT % | HT % | | | Auto
k/h | MT
k/h | HT
k/h | | | | Auto MT HT | | | | |
| Existing AM | | 888 | 97.0 | 861 2.0 | 18 1.0 | 9 | 25 | 40 | 25 | 40 | 25 | 40 | 59.5 | 54.2 | 58.9 | 62.8 | 20 | 61.6 | 61.0 |
| Existing+Project | | 888 | 97.0 | 861 2.0 | 18 1.0 | 9 | 25 | 40 | 25 | 40 | 25 | 40 | 59.5 | 54.2 | 58.9 | 62.8 | 20 | 61.6 | 61.0 |
| Near Term AM | | 1,143 | 97.0 | 1,109 2.0 | 23 1.0 | 11 | 25 | 40 | 25 | 40 | 25 | 40 | 60.5 | 55.3 | 60.0 | 63.9 | 20 | 62.7 | 62.1 |
| Near Term+Project | | 1,143 | 97.0 | 1,109 2.0 | 23 1.0 | 11 | 25 | 40 | 25 | 40 | 25 | 40 | 60.5 | 55.3 | 60.0 | 63.9 | 20 | 62.7 | 62.1 |
| Future | | 1,866 | 97.0 | 1,810 2.0 | 37 1.0 | 19 | 25 | 40 | 25 | 40 | 25 | 40 | 62.7 | 57.5 | 62.1 | 66.1 | 20 | 64.8 | 64.2 |
| Future+Project | | 1,866 | 97.0 | 1,810 2.0 | 37 1.0 | 19 | 25 | 40 | 25 | 40 | 25 | 40 | 62.7 | 57.5 | 62.1 | 66.1 | 20 | 64.8 | 64.2 |
| ROAD SEGMENT #5: Harrison Street north of 21st Street | | TOTAL
VEHICLES | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | Calculated dBA
(15 meters from
roadway center) | Receptor
Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | Auto
% | Medium Truck
Auto % | Heavy Truck
MT % | HT % | | | Auto
k/h | MT
k/h | HT
k/h | | | | Auto MT HT | | | | |
| Existing AM | | 2,046 | 97.0 | 1,985 2.0 | 41 1.0 | 20 | 25 | 40 | 25 | 40 | 25 | 40 | 63.1 | 57.9 | 62.5 | 66.5 | 20 | 65.2 | 64.6 |
| Existing+Project | | 2,344 | 97.0 | 2,274 2.0 | 47 1.0 | 23 | 25 | 40 | 25 | 40 | 25 | 40 | 63.7 | 58.5 | 63.1 | 67.1 | 20 | 65.8 | 65.2 |
| Near Term AM | | 2,407 | 97.0 | 2,335 2.0 | 48 1.0 | 24 | 25 | 40 | 25 | 40 | 25 | 40 | 63.8 | 58.6 | 63.2 | 67.2 | 20 | 65.9 | 65.3 |
| Near Term+Project | | 2,705 | 97.0 | 2,624 2.0 | 54 1.0 | 27 | 25 | 40 | 25 | 40 | 25 | 40 | 64.3 | 59.1 | 63.7 | 67.7 | 20 | 66.4 | 65.8 |
| Future | | 2,769 | 97.0 | 2,686 2.0 | 55 1.0 | 28 | 25 | 40 | 25 | 40 | 25 | 40 | 64.4 | 59.2 | 63.8 | 67.8 | 20 | 66.5 | 65.9 |
| Future+Project | | 3,067 | 97.0 | 2,975 2.0 | 61 1.0 | 31 | 25 | 40 | 25 | 40 | 25 | 40 | 64.8 | 59.6 | 64.3 | 68.2 | 20 | 67.0 | 66.3 |
| ROAD SEGMENT #6: Harrison Street south of 21st Street | | TOTAL
VEHICLES | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | Calculated dBA
(15 meters from
roadway center) | Receptor
Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | Auto
% | Medium Truck
Auto % | Heavy Truck
MT % | HT % | | | Auto
k/h | MT
k/h | HT
k/h | | | | Auto MT HT | | | | |
| Existing AM | | 1,846 | 97.0 | 1,791 2.0 | 37 1.0 | 18 | 25 | 40 | 25 | 40 | 25 | 40 | 62.6 | 57.4 | 62.1 | 66.0 | 20 | 64.8 | 64.1 |
| Existing+Project | | 2,027 | 97.0 | 1,966 2.0 | 41 1.0 | 20 | 25 | 40 | 25 | 40 | 25 | 40 | 63.0 | 57.8 | 62.5 | 66.4 | 20 | 65.2 | 64.5 |
| Near Term AM | | 2,172 | 97.0 | 2,107 2.0 | 43 1.0 | 22 | 25 | 40 | 25 | 40 | 25 | 40 | 63.3 | 58.1 | 62.8 | 66.7 | 20 | 65.5 | 64.8 |
| Near Term+Project | | 2,353 | 97.0 | 2,282 2.0 | 47 1.0 | 24 | 25 | 40 | 25 | 40 | 25 | 40 | 63.7 | 58.5 | 63.1 | 67.1 | 20 | 65.8 | 65.2 |

Noise Appendix
Table NA-2

| | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------|------|--------------|-------------|----|------|---------------|----|-----|----|-----|------|-----------------|-------|-------|------------------------------------|------------------------|----------------|----------------|-------|
| Future | | 2,498 | 97.0 | 2,423 | 2.0 | 50 | 1.0 | 25 | 25 | 40 | 25 | 40 | 25 | 40 | 63.9 | 58.7 | 63.4 | 67.3 | 20 | 66.1 | 65.5 |
| Future+Project | | 2,679 | 97.0 | 2,599 | 2.0 | 54 | 1.0 | 27 | 25 | 40 | 25 | 40 | 25 | 40 | 64.2 | 59.0 | 63.7 | 67.6 | 20 | 66.4 | 65.8 |
| TOTAL | | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | (15 meters from
roadway center) | Roadway
Center (m.) | Level
(dBA) | Level
(dBA) | |
| ROAD SEGMENT #7: 21st Street east of Harrison Street | | # VEHICLES | Auto | Medium Truck | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | | | | | | |
| | | % | Auto | % | MT | % | HT | | | | | | | | | | | | | | |
| Existing AM | | 0 | 97.0 | 0 | 2.0 | 0 | 1.0 | 0 | 25 | 40 | 25 | 40 | 25 | 40 | #NUM! | #NUM! | #NUM! | #NUM! | 20 | #NUM! | #NUM! |
| Existing+Project | | 0 | 97.0 | 0 | 2.0 | 0 | 1.0 | 0 | 25 | 40 | 25 | 40 | 25 | 40 | #NUM! | #NUM! | #NUM! | #NUM! | 20 | #NUM! | #NUM! |
| Near Term AM | | 0 | 97.0 | 0 | 2.0 | 0 | 1.0 | 0 | 25 | 40 | 25 | 40 | 25 | 40 | #NUM! | #NUM! | #NUM! | #NUM! | 20 | #NUM! | #NUM! |
| Near Term+Project | | 0 | 97.0 | 0 | 2.0 | 0 | 1.0 | 0 | 25 | 40 | 25 | 40 | 25 | 40 | #NUM! | #NUM! | #NUM! | #NUM! | 20 | #NUM! | #NUM! |
| Future | | 0 | 97.0 | 0 | 2.0 | 0 | 1.0 | 0 | 25 | 40 | 25 | 40 | 25 | 40 | #NUM! | #NUM! | #NUM! | #NUM! | 20 | #NUM! | #NUM! |
| Future+Project | | 0 | 97.0 | 0 | 2.0 | 0 | 1.0 | 0 | 25 | 40 | 25 | 40 | 25 | 40 | #NUM! | #NUM! | #NUM! | #NUM! | 20 | #NUM! | #NUM! |

| | | | | | | | | | | | | | | | | | Receptor | | | | | | |
|--|--|--|--|------------|----------------|--------------|-----|-------------|-----|------|---------------|----|-----|----|-----|------|--|---|---|---|----|------|------|
| | | | | | | | | | | | | | | | | | Calculated dBA
(15 meters from
roadway center) | Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)

3 dBA Atten | Adjusted
Level
(dBA)

4.5 dBA Atten | | | |
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| ROAD SEGMENT #8: 21st Street west of Harrison Street | | | | TOTAL | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | | | | |
| | | | | # VEHICLES | Auto | Medium Truck | | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | | | | | |
| | | | | | % | Auto | % | MT | % | HT | | | | | | | | | | | | | |
| Existing AM | | | | 432 | 97.0 | 419 | 2.0 | 9 | 1.0 | 4 | 25 | 40 | 25 | 40 | 25 | 40 | 56.3 | 51.1 | 55.8 | 59.7 | 20 | 58.5 | 57.8 |
| Existing+Project | | | | 911 | 97.0 | 884 | 2.0 | 18 | 1.0 | 9 | 25 | 40 | 25 | 40 | 25 | 40 | 59.6 | 54.4 | 59.0 | 62.9 | 20 | 61.7 | 61.1 |
| Near Term AM | | | | 509 | 97.0 | 494 | 2.0 | 10 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 57.0 | 51.8 | 56.5 | 60.4 | 20 | 59.2 | 58.5 |
| Near Term+Project | | | | 988 | 97.0 | 958 | 2.0 | 20 | 1.0 | 10 | 25 | 40 | 25 | 40 | 25 | 40 | 59.9 | 54.7 | 59.3 | 63.3 | 20 | 62.0 | 61.4 |
| Future | | | | 585 | 97.0 | 567 | 2.0 | 12 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.6 | 52.4 | 57.1 | 61.0 | 20 | 59.8 | 59.1 |
| Future+Project | | | | 1,064 | 97.0 | 1,032 | 2.0 | 21 | 1.0 | 11 | 25 | 40 | 25 | 40 | 25 | 40 | 60.2 | 55.0 | 59.7 | 63.6 | 20 | 62.4 | 61.7 |

| ROAD SEGMENT #9: Webster Street north of 21st Street | | | | | | | | | | | | | | | | | Calculated dBA | | Distance from | Adjusted | Adjusted |
|--|--|----------------|--------------|-----|-------------|----|------|---------------|----|-----|----|-----|------|-----------------|------|------|---------------------------------|---------------------|---------------|-------------|----------|
| | | | | | | | | | | | | | | | | | (15 meters from roadway center) | Roadway Center (m.) | Level (dBA) | Level (dBA) | |
| TOTAL | | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | | | | | |
| # VEHICLES | | Auto | Medium Truck | | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | | | | | | |
| | | % | Auto | % | MT | % | HT | | | | | | | | | | | 3 dBA Atten | 4.5 dBA Atten | | |
| Existing AM | | 470 | 97.0 | 456 | 2.0 | 9 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 56.7 | 51.5 | 56.1 | 60.1 | 20 | 58.8 | 58.2 |
| Existing+Project | | 609 | 97.0 | 591 | 2.0 | 12 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.8 | 52.6 | 57.2 | 61.2 | 20 | 59.9 | 59.3 |
| Near Term AM | | 584 | 97.0 | 566 | 2.0 | 12 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.6 | 52.4 | 57.1 | 61.0 | 20 | 59.8 | 59.1 |
| Near Term+Project | | 723 | 97.0 | 701 | 2.0 | 14 | 1.0 | 7 | 25 | 40 | 25 | 40 | 25 | 40 | 58.6 | 53.4 | 58.0 | 61.9 | 20 | 60.7 | 60.1 |
| Future | | 697 | 97.0 | 676 | 2.0 | 14 | 1.0 | 7 | 25 | 40 | 25 | 40 | 25 | 40 | 58.4 | 53.2 | 57.8 | 61.8 | 20 | 60.5 | 59.9 |
| Future+Project | | 836 | 97.0 | 811 | 2.0 | 17 | 1.0 | 8 | 25 | 40 | 25 | 40 | 25 | 40 | 59.2 | 54.0 | 58.6 | 62.6 | 20 | 61.3 | 60.7 |

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| | | | | | | | | | | | | | | | | | Calculated dBA
(15 meters from
roadway center) | Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA) | Adjusted
Level
(dBA) |
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| ROAD SEGMENT #11: 21st Street east of Webster Street | | | TOTAL | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | (15 meters from roadway center) | Roadway Center (m.) | Level | Level |
|--|--|-------|------------|----------------|--------------|----|-------------|----|------|---------------|----|-----|----|-----|------|-----------------|------|-------|---------------------------------|---------------------|-------------|---------------|
| | | | # VEHICLES | Auto | Medium Truck | | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | (dBA) | | | (dBA) | |
| | | | | % | Auto | % | MT | % | HT | | | | | | | | | | | | 3 dBA Atten | 4.5 dBA Atten |
| Existing AM | | 358 | 97.0 | 347 | 2.0 | 7 | 1.0 | 4 | 25 | 40 | 25 | 40 | 25 | 40 | 55.5 | 50.3 | 54.9 | 58.9 | 20 | 57.6 | 57.0 | |
| Existing+Project | | 1,023 | 97.0 | 992 | 2.0 | 20 | 1.0 | 10 | 25 | 40 | 25 | 40 | 25 | 40 | 60.1 | 54.9 | 59.5 | 63.4 | 20 | 62.2 | 61.6 | |
| Near Term AM | | 445 | 97.0 | 432 | 2.0 | 9 | 1.0 | 4 | 25 | 40 | 25 | 40 | 25 | 40 | 56.5 | 51.2 | 55.9 | 59.8 | 20 | 58.6 | 58.0 | |
| Near Term+Project | | 1,110 | 97.0 | 1,077 | 2.0 | 22 | 1.0 | 11 | 25 | 40 | 25 | 40 | 25 | 40 | 60.4 | 55.2 | 59.9 | 63.8 | 20 | 62.6 | 61.9 | |
| Future | | 531 | 97.0 | 515 | 2.0 | 11 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 57.2 | 52.0 | 56.7 | 60.6 | 20 | 59.4 | 58.7 | |
| Future+Project | | 1,196 | 97.0 | 1,160 | 2.0 | 24 | 1.0 | 12 | 25 | 40 | 25 | 40 | 25 | 40 | 60.7 | 55.5 | 60.2 | 64.1 | 20 | 62.9 | 62.3 | |

| | | | | | | | | | | | | | | | | | Receptor | | | | | |
|--|--|--|----------------|------|--------------|-----|-------------|---------------|----------|----|--------|----|-----------------|----|------|------|--|---|---|---|------|------|
| | | | | | | | | | | | | | | | | | Calculated dBA
(15 meters from
roadway center) | Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)

3 dBA Atten | Adjusted
Level
(dBA)

4.5 dBA Atten | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL | | | VEHICLE TYPE % | | | | | VEHICLE SPEED | | | | | calveno factors | | | | | | | | | |
| ROAD SEGMENT #12: 21st Street west of Webster Street | | | # VEHICLES | Auto | Medium Truck | | Heavy Truck | | Auto k/h | | MT k/h | | HT k/h | | Auto | MT | HT | | | | | |
| | | | % | Auto | % | MT | % | HT | | | | | | | | | | | | | | |
| Existing AM | | | 263 | 97.0 | 255 | 2.0 | 5 | 1.0 | 3 | 25 | 40 | 25 | 40 | 25 | 40 | 54.2 | 49.0 | 53.6 | 57.6 | 20 | 56.3 | 55.7 |
| Existing+Project | | | 778 | 97.0 | 755 | 2.0 | 16 | 1.0 | 8 | 25 | 40 | 25 | 40 | 25 | 40 | 58.9 | 53.7 | 58.3 | 62.3 | 20 | 61.0 | 60.4 |
| Near Term AM | | | 327 | 97.0 | 317 | 2.0 | 7 | 1.0 | 3 | 25 | 40 | 25 | 40 | 25 | 40 | 55.1 | 49.9 | 54.5 | 58.5 | 20 | 57.2 | 56.6 |
| Near Term+Project | | | 842 | 97.0 | 817 | 2.0 | 17 | 1.0 | 8 | 25 | 40 | 25 | 40 | 25 | 40 | 59.2 | 54.0 | 58.7 | 62.6 | 20 | 61.4 | 60.7 |
| Future | | | 391 | 97.0 | 379 | 2.0 | 8 | 1.0 | 4 | 25 | 40 | 25 | 40 | 25 | 40 | 55.9 | 50.7 | 55.3 | 59.3 | 20 | 58.0 | 57.4 |
| Future+Project | | | 906 | 97.0 | 879 | 2.0 | 18 | 1.0 | 9 | 25 | 40 | 25 | 40 | 25 | 40 | 59.5 | 54.3 | 59.0 | 62.9 | 20 | 61.7 | 61.0 |

Noise Appendix
Table NA-2

| ROAD SEGMENT #13: Franklin Street | | north of 20th Street | | TOTAL | | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | Calculated dBA
(15 meters from
roadway center) | Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
|-----------------------------------|--|-------------------------|--|------------|------|----------------|--------------|----|-------------|----|------|---------------|----|-----|----|-----|------|-----------------|------|------|--|---|---|---|
| | | | | # VEHICLES | Auto | | Medium Truck | | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | | | | | |
| | | | | | % | Auto | % | MT | % | HT | | | | | | | | | | | | | | |
| Existing AM | | | | 245 | 97.0 | 238 | 2.0 | 5 | 1.0 | 2 | 25 | 40 | 25 | 40 | 25 | 40 | 53.9 | 48.7 | 53.3 | 57.2 | 20 | 56.0 | 55.4 | |
| Existing+Project | | | | 477 | 97.0 | 463 | 2.0 | 10 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 56.8 | 51.5 | 56.2 | 60.1 | 20 | 58.9 | 58.3 | |
| Near Term AM | | | | 305 | 97.0 | 296 | 2.0 | 6 | 1.0 | 3 | 25 | 40 | 25 | 40 | 25 | 40 | 54.8 | 49.6 | 54.2 | 58.2 | 20 | 56.9 | 56.3 | |
| Near Term+Project | | | | 537 | 97.0 | 521 | 2.0 | 11 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 57.3 | 52.1 | 56.7 | 60.7 | 20 | 59.4 | 58.8 | |
| Future | | | | 363 | 97.0 | 352 | 2.0 | 7 | 1.0 | 4 | 25 | 40 | 25 | 40 | 25 | 40 | 55.6 | 50.4 | 55.0 | 58.9 | 20 | 57.7 | 57.1 | |
| Future+Project | | | | 595 | 97.0 | 577 | 2.0 | 12 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.7 | 52.5 | 57.1 | 61.1 | 20 | 59.8 | 59.2 | |
| Receptor | | | | | | | | | | | | | | | | | | | | | | | | |
| ROAD SEGMENT #14: Franklin Street | | south of 20th Street | | TOTAL | | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | Calculated dBA
(15 meters from
roadway center) | Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | | # VEHICLES | Auto | | Medium Truck | | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | | | | | |
| | | | | | % | Auto | % | MT | % | HT | | | | | | | | | | | | | | |
| Existing AM | | | | 255 | 97.0 | 247 | 2.0 | 5 | 1.0 | 3 | 25 | 40 | 25 | 40 | 25 | 40 | 54.0 | 48.8 | 53.5 | 57.4 | 20 | 56.2 | 55.5 | |
| Existing+Project | | | | 463 | 97.0 | 449 | 2.0 | 9 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 56.6 | 51.4 | 56.1 | 60.0 | 20 | 58.8 | 58.1 | |
| Near Term AM | | | | 316 | 97.0 | 307 | 2.0 | 6 | 1.0 | 3 | 25 | 40 | 25 | 40 | 25 | 40 | 55.0 | 49.8 | 54.4 | 58.3 | 20 | 57.1 | 56.5 | |
| Near Term+Project | | | | 524 | 97.0 | 508 | 2.0 | 10 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 57.2 | 52.0 | 56.6 | 60.5 | 20 | 59.3 | 58.7 | |
| Future | | | | 379 | 97.0 | 368 | 2.0 | 8 | 1.0 | 4 | 25 | 40 | 25 | 40 | 25 | 40 | 55.8 | 50.5 | 55.2 | 59.1 | 20 | 57.9 | 57.3 | |
| Future+Project | | | | 587 | 97.0 | 569 | 2.0 | 12 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.7 | 52.4 | 57.1 | 61.0 | 20 | 59.8 | 59.2 | |
| Receptor | | | | | | | | | | | | | | | | | | | | | | | | |
| ROAD SEGMENT #15: 20th Street | | east of Franklin Street | | TOTAL | | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | Calculated dBA
(15 meters from
roadway center) | Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | | # VEHICLES | Auto | | Medium Truck | | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | | | | | |
| | | | | | % | Auto | % | MT | % | HT | | | | | | | | | | | | | | |
| Existing AM | | | | 571 | 97.0 | 554 | 2.0 | 11 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.5 | 52.3 | 57.0 | 60.9 | 20 | 59.7 | 59.0 | |
| Existing+Project | | | | 623 | 97.0 | 604 | 2.0 | 12 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.9 | 52.7 | 57.3 | 61.3 | 20 | 60.0 | 59.4 | |
| Near Term AM | | | | 709 | 97.0 | 688 | 2.0 | 14 | 1.0 | 7 | 25 | 40 | 25 | 40 | 25 | 40 | 58.5 | 53.3 | 57.9 | 61.9 | 20 | 60.6 | 60.0 | |
| Near Term+Project | | | | 761 | 97.0 | 738 | 2.0 | 15 | 1.0 | 8 | 25 | 40 | 25 | 40 | 25 | 40 | 58.8 | 53.6 | 58.2 | 62.2 | 20 | 60.9 | 60.3 | |
| Future | | | | 846 | 97.0 | 821 | 2.0 | 17 | 1.0 | 8 | 25 | 40 | 25 | 40 | 25 | 40 | 59.2 | 54.0 | 58.7 | 62.6 | 20 | 61.4 | 60.8 | |
| Future+Project | | | | 898 | 97.0 | 871 | 2.0 | 18 | 1.0 | 9 | 25 | 40 | 25 | 40 | 25 | 40 | 59.5 | 54.3 | 58.9 | 62.9 | 20 | 61.6 | 61.0 | |
| Receptor | | | | | | | | | | | | | | | | | | | | | | | | |
| ROAD SEGMENT #16: 20th Street | | west of Franklin Street | | TOTAL | | VEHICLE TYPE % | | | | | | VEHICLE SPEED | | | | | | calveno factors | | | Calculated dBA
(15 meters from
roadway center) | Distance from
Roadway
Center (m.) | Adjusted
Level
(dBA)
3 dBA Atten | Adjusted
Level
(dBA)
4.5 dBA Atten |
| | | | | # VEHICLES | Auto | | Medium Truck | | Heavy Truck | | Auto | k/h | MT | k/h | HT | k/h | Auto | MT | HT | | | | | |
| | | | | | % | Auto | % | MT | % | HT | | | | | | | | | | | | | | |
| Existing AM | | | | 475 | 97.0 | 461 | 2.0 | 10 | 1.0 | 5 | 25 | 40 | 25 | 40 | 25 | 40 | 56.7 | 51.5 | 56.2 | 60.1 | 20 | 58.9 | 58.2 | |
| Existing+Project | | | | 551 | 97.0 | 534 | 2.0 | 11 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.4 | 52.2 | 56.8 | 60.8 | 20 | 59.5 | 58.9 | |
| Near Term AM | | | | 590 | 97.0 | 572 | 2.0 | 12 | 1.0 | 6 | 25 | 40 | 25 | 40 | 25 | 40 | 57.7 | 52.5 | 57.1 | 61.1 | 20 | 59.8 | 59.2 | |
| Near Term+Project | | | | 666 | 97.0 | 646 | 2.0 | 13 | 1.0 | 7 | 25 | 40 | 25 | 40 | 25 | 40 | 58.2 | 53.0 | 57.6 | 61.6 | 20 | 60.3 | 59.7 | |
| Future | | | | 704 | 97.0 | 683 | 2.0 | 14 | 1.0 | 7 | 25 | 40 | 25 | 40 | 25 | 40 | 58.4 | 53.2 | 57.9 | 61.8 | 20 | 60.6 | 60.0 | |
| Future+Project | | | | 780 | 97.0 | 757 | 2.0 | 16 | 1.0 | 8 | 25 | 40 | 25 | 40 | 25 | 40 | 58.9 | 53.7 | 58.3 | 62.3 | 20 | 61.0 | 60.4 | |

APPENDIX G

Traffic Data

Appendix G Contents:

| | | |
|------|---|--------|
| G.1 | Intersection Turning Movement Counts | G.1-1 |
| G.2 | Intersection LOS Calculation Worksheets | G.2-1 |
| G.3 | Revision of Measure DD Configuration for Harrison Street /
Lakeside Drive / 20th Street Triangle | G.3-1 |
| G.4 | Pedestrian Facilities Survey | G.4-1 |
| G.5 | Mode Split Findings | G.5-1 |
| G.6 | Travel Demand Model Land Use Findings | G.6-1 |
| G.7 | Queue Calculations | G.7-1 |
| G.8 | Collision Summary Sheets | G.8-1 |
| G.9 | Roadway LOS Calculations | G.9-1 |
| G.10 | Supplemental Analysis of Planned Transportation Improvements | G.10-1 |
| G.11 | Alternative Freeway Access Route Analysis Memo | G.11-1 |
| G.12 | Harrison Street-Oakland Avenue Study | G.12-1 |
| G.13 | Proposed Westbound Signal Phase Sequence for Intersection #3
(Harrison Street / 27th Street / 24th Street) | G.13-1 |

APPENDIX G.1

Intersection Turning Movement Counts

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-001 HARRISON-STANLEY-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

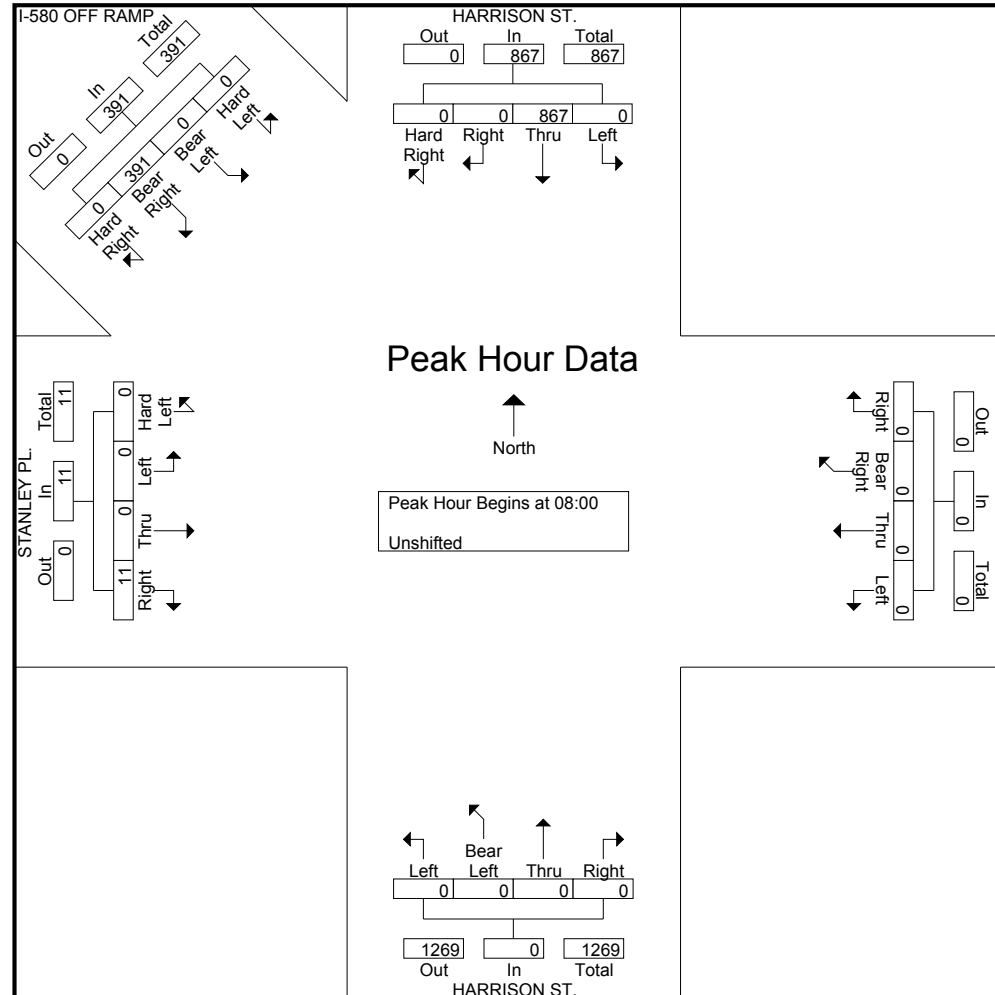
| | HARRISON ST.
Southbound | | | | | | Westbound | | | | | | HARRISON ST.
Northbound | | | | | | STANLEY PL.
Eastbound | | | | | | I-580 OFF RAMP
Southeastbound | | | | | | | | |
|---------------|----------------------------|------|-------|---------------|------|------------|-----------|------|---------------|-------|------|------------|----------------------------|--------------|------|-------|------|------------|--------------------------|------|------|-------|------|------------|----------------------------------|--------------|---------------|---------------|------|------------|-----------------|--------------|------------|
| Start Time | Left | Thru | Right | Hard
Right | Peds | App. Total | Left | Thru | Bear
Right | Right | Peds | App. Total | Left | Bear
Left | Thru | Right | Peds | App. Total | Hard
Left | Left | Thru | Right | Peds | App. Total | Hard
Left | Bear
Left | Bear
Right | Hard
Right | Peds | App. Total | Exclu.
Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 124 | 0 | 0 | 0 | 124 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 1 | 7 | 0 | 0 | 43 | 0 | 0 | 43 | 1 | 174 | 175 |
| 07:15 | 0 | 144 | 0 | 0 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 67 | 0 | 0 | 67 | 0 | 212 | 212 | |
| 07:30 | 0 | 164 | 0 | 0 | 0 | 164 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 64 | 0 | 0 | 64 | 1 | 229 | 230 | |
| 07:45 | 0 | 208 | 0 | 0 | 0 | 208 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 2 | 6 | 0 | 0 | 92 | 0 | 0 | 92 | 2 | 306 | 308 | |
| Total | 0 | 640 | 0 | 0 | 0 | 640 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 4 | 15 | 0 | 0 | 266 | 0 | 0 | 266 | 4 | 921 | 925 |
| 08:00 | 0 | 206 | 0 | 0 | 0 | 206 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 96 | 0 | 0 | 96 | 0 | 305 | 305 | |
| 08:15 | 0 | 239 | 0 | 0 | 0 | 239 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 6 | 0 | 0 | 99 | 0 | 0 | 99 | 1 | 344 | 345 | |
| 08:30 | 0 | 219 | 0 | 0 | 0 | 219 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 91 | 0 | 0 | 91 | 1 | 311 | 312 | |
| 08:45 | 0 | 203 | 0 | 0 | 0 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 105 | 0 | 0 | 105 | 3 | 309 | 312 | |
| Total | 0 | 867 | 0 | 0 | 0 | 867 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 5 | 11 | 0 | 0 | 391 | 0 | 0 | 391 | 5 | 1269 | 1274 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 158 | 0 | 0 | 0 | 158 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 5 | 0 | 0 | 63 | 0 | 0 | 63 | 3 | 226 | 229 | |
| 16:15 | 0 | 139 | 0 | 0 | 0 | 139 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 0 | 0 | 52 | 0 | 0 | 52 | 5 | 196 | 201 | |
| 16:30 | 0 | 127 | 0 | 0 | 0 | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 61 | 0 | 0 | 61 | 2 | 189 | 191 | |
| 16:45 | 0 | 136 | 0 | 0 | 0 | 136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 4 | 0 | 0 | 60 | 0 | 0 | 60 | 1 | 200 | 201 | |
| Total | 0 | 560 | 0 | 0 | 0 | 560 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 11 | 15 | 0 | 0 | 236 | 0 | 0 | 236 | 11 | 811 | 822 |
| 17:00 | 0 | 158 | 0 | 0 | 0 | 158 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 3 | 0 | 0 | 58 | 0 | 0 | 58 | 6 | 219 | 225 | |
| 17:15 | 0 | 147 | 0 | 0 | 0 | 147 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 3 | 0 | 0 | 54 | 0 | 0 | 54 | 2 | 204 | 206 | |
| 17:30 | 0 | 135 | 0 | 0 | 0 | 135 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 56 | 0 | 0 | 56 | 4 | 192 | 196 | |
| 17:45 | 0 | 134 | 0 | 0 | 0 | 134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 77 | 0 | 0 | 77 | 3 | 211 | 214 |
| Total | 0 | 574 | 0 | 0 | 0 | 574 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 15 | 7 | 0 | 0 | 245 | 0 | 0 | 245 | 15 | 826 | 841 |
| Grand Total | 0 | 2641 | 0 | 0 | 0 | 2641 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 35 | 48 | 0 | 0 | 1138 | 0 | 0 | 1138 | 35 | 3827 | 3862 |
| Apprch % | 0 | 100 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | | | 0 | 0 | 100 | 0 | 0 | | | | |
| Total % | 0 | 69 | 0 | 0 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 1.3 | | 0 | 0 | 29.7 | 0 | 0 | 29.7 | 0.9 | 99.1 | |

| | HARRISON ST.
Southbound | | | | | | Westbound | | | | | | HARRISON ST.
Northbound | | | | | | STANLEY PL.
Eastbound | | | | | | I-580 OFF RAMP
Southeastbound | | | | | | |
|--|----------------------------|------------|-------|---------------|---------------|--|-----------|------|---------------|-------|------------|--|----------------------------|--------------|------|-------|------------|--|--------------------------|------|------|----------|------------|--|----------------------------------|--------------|---------------|---------------|------------|--|---------------|
| Start Time | Left | Thru | Right | Hard
Right | App.
Total | | Left | Thru | Bear
Right | Right | App. Total | | Left | Bear
Left | Thru | Right | App. Total | | Hard
Left | Left | Thru | Right | App. Total | | Hard
Left | Bear
Left | Bear
Right | Hard
Right | App. Total | | Int.
Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 206 | 0 | 0 | 206 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 3 | 3 | | 0 | 0 | 96 | 0 | 96 | | 305 |
| 08:15 | 0 | 239 | 0 | 0 | 239 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 6 | 6 | | 0 | 0 | 99 | 0 | 99 | | 344 |
| 08:30 | 0 | 219 | 0 | 0 | 219 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 91 | 0 | 91 | | 311 |
| 08:45 | 0 | 203 | 0 | 0 | 203 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 105 | 0 | 105 | | 309 |
| Total Volume | 0 | 867 | 0 | 0 | 867 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 11 | 11 | | 0 | 0 | 391 | 0 | 391 | | 1269 |
| % App. Total | 0 | 100 | 0 | 0 | | | 0 | 0 | 0 | 0 | | | 0 | 0 | 0 | 0 | | | 0 | 0 | 0 | 100 | | | 0 | 0 | 100 | 0 | | | |
| PHF | .000 | .907 | .000 | .000 | .907 | | .000 | .000 | .000 | .000 | .000 | | .000 | .000 | .000 | .000 | .000 | | .000 | .000 | .000 | .458 | .458 | | .000 | .000 | .931 | .000 | .931 | | .922 |

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-001 HARRISON-STANLEY-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

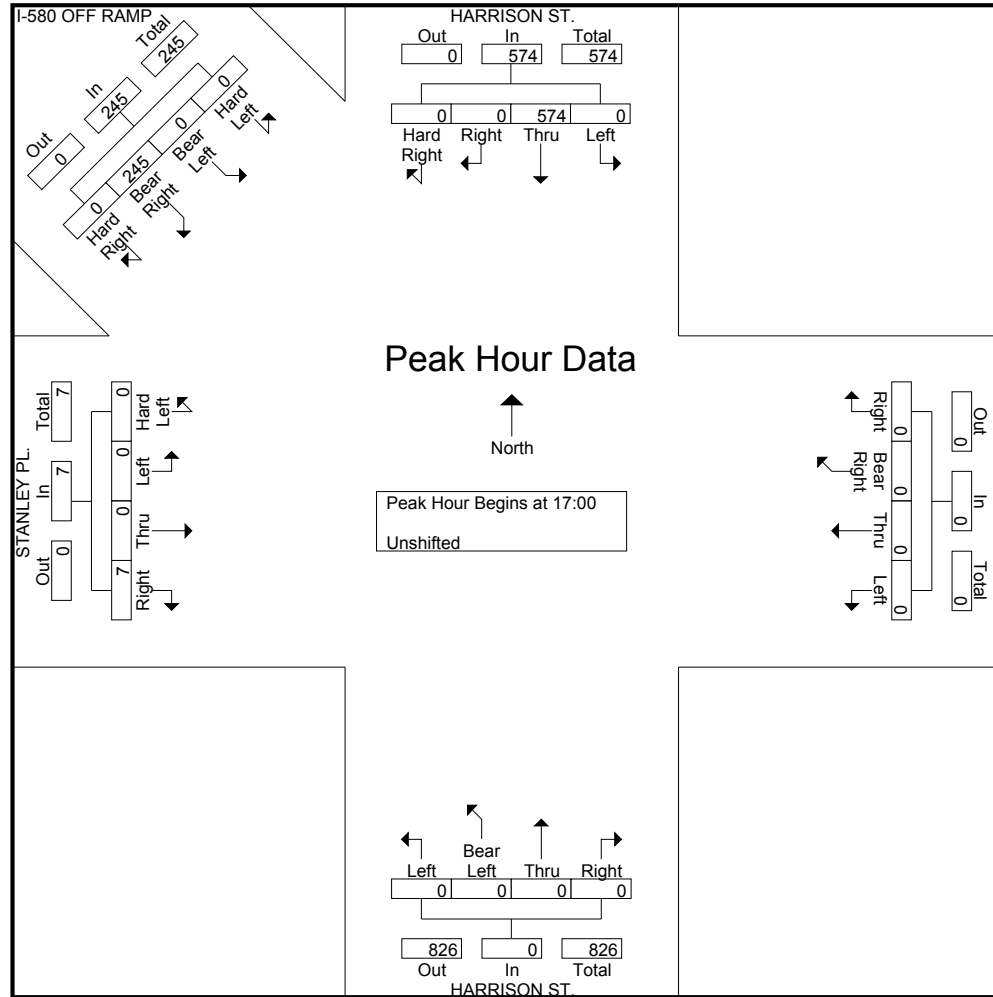
| Peak Hour(s) | | Entire Intersection Begins at 17:00 | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|------|-------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 0 | 158 | 0 | 0 | 158 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 58 | 0 | 58 | 219 |
| 17:15 | 0 | 147 | 0 | 0 | 147 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 54 | 0 | 54 | 204 |
| 17:30 | 0 | 135 | 0 | 0 | 135 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 56 | 0 | 56 | 192 |
| 17:45 | 0 | 134 | 0 | 0 | 134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 77 | 0 | 77 | 211 |
| Total Volume | 0 | 574 | 0 | 0 | 574 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 245 | 0 | 245 | 826 |
| % App. Total | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | | 0 | 0 | 100 | 0 | | |
| PHF | .000 | .908 | .000 | .000 | .908 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .583 | .583 | .000 | .000 | .795 | .000 | .795 | .943 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-001 HARRISON-STANLEY-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



File Name: P:\Projects\08-7694\PPD\5-OAKLAND-PERRY-F.ppd

Start Date: 11/19/2008

Start Time: 7:15:00 AM

Site Code: 00000000

Comment 1: OAKLAND

Comment 2:

Comment 3:

Comment 4:

| | OAKLAND AVE.
Southbound | | | | | EB 580 ON RAMP
Southwestbound | | | | | PERRY PL.
Westbound | | | | | OAKLAND AVE.
Northbound | | | | | EB 580 OFF RAMP
Eastbound | | | | | |
|------------|----------------------------|------|------|-------|------|----------------------------------|-----------|------------|------------|------|------------------------|------|-------|------------|------|----------------------------|------|------------|-------|------|------------------------------|-----------|------|-------|------|---|
| Start Time | Hard Left | Left | Thru | Right | Peds | Hard Left | Bear Left | Bear Right | Hard Right | Peds | Left | Thru | Right | Hard Right | Peds | Left | Thru | Bear Right | Right | Peds | Left | Bear Left | Thru | Right | Peds | |
| 07:15 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 126 | 57 | 5 | 1 | 60 | 0 | 14 | 0 | 0 |
| 07:30 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 167 | 73 | 4 | 1 | 102 | 1 | 19 | 0 | 0 |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 188 | 75 | 4 | 2 | 95 | 1 | 19 | 0 | 0 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 208 | 93 | 5 | 0 | 97 | 0 | 36 | 0 | 0 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 232 | 95 | 10 | 3 | 92 | 0 | 37 | 0 | 0 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 193 | 82 | 4 | 1 | 99 | 2 | 40 | 0 | 0 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 179 | 62 | 9 | 4 | 85 | 1 | 38 | 0 | 0 |
| 09:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 171 | 61 | 7 | 2 | 82 | 0 | 35 | 0 | 0 |
| 09:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 173 | 140 | 16 | 2 | 112 | 2 | 49 | 0 | 0 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 139 | 13 | 0 | 111 | 2 | 48 | 0 | 0 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 205 | 132 | 14 | 1 | 107 | 1 | 61 | 0 | 0 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 221 | 150 | 19 | 2 | 125 | 1 | 56 | 0 | 0 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 257 | 149 | 14 | 2 | 154 | 0 | 60 | 0 | 0 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 214 | 134 | 24 | 2 | 127 | 1 | 62 | 0 | 0 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 223 | 116 | 15 | 2 | 137 | 1 | 76 | 0 | 0 |
| 18:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 178 | 119 | 17 | 0 | 139 | 4 | 68 | 0 | 0 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-003 HARRISON-27TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

| | HARRISON ST.
Southbound | | | | | | BAY PL.
Westbound | | | | | | HARRISON ST.
Northbound | | | | | | 24TH ST.
Northeastbound | | | | | | 27TH ST.
Eastbound | | | | | | Exclu.
Total | Inclu. Total | Int. Total |
|---------------|----------------------------|------|---------------|-------|------|------------|----------------------|--------------|------|-------|------|------------|----------------------------|------|------|-------|------|------------|----------------------------|--------------|---------------|---------------|------|------------|-----------------------|------|-------|---------------|------|------------|-----------------|--------------|------------|
| Start Time | Left | Thru | Bear
Right | Right | Peds | App. Total | Left | Bear
Left | Thru | Right | Peds | App. Total | Hard
Left | Left | Thru | Right | Peds | App. Total | Hard
Left | Bear
Left | Bear
Right | Hard
Right | Peds | App. Total | Left | Thru | Right | Hard
Right | Peds | App. Total | Exclu.
Total | Inclu. Total | Int. Total |
| 07:00 | 13 | 95 | 24 | 17 | 6 | 149 | 2 | 1 | 14 | 18 | 5 | 35 | 1 | 16 | 38 | 2 | 2 | 57 | 0 | 0 | 0 | 0 | 3 | 0 | 7 | 12 | 5 | 2 | 5 | 26 | 21 | 267 | 288 |
| 07:15 | 22 | 118 | 22 | 14 | 10 | 176 | 7 | 2 | 16 | 25 | 4 | 50 | 0 | 26 | 24 | 5 | 6 | 55 | 0 | 0 | 0 | 0 | 6 | 0 | 6 | 5 | 8 | 4 | 7 | 23 | 33 | 304 | 337 |
| 07:30 | 8 | 132 | 19 | 17 | 7 | 176 | 3 | 0 | 25 | 15 | 7 | 43 | 2 | 38 | 42 | 2 | 9 | 84 | 0 | 0 | 0 | 0 | 3 | 0 | 6 | 17 | 16 | 1 | 5 | 40 | 31 | 343 | 374 |
| 07:45 | 15 | 177 | 25 | 15 | 11 | 232 | 15 | 1 | 26 | 21 | 4 | 63 | 3 | 43 | 48 | 5 | 4 | 99 | 0 | 0 | 0 | 0 | 10 | 0 | 8 | 12 | 9 | 2 | 19 | 31 | 48 | 425 | 473 |
| Total | 58 | 522 | 90 | 63 | 34 | 733 | 27 | 4 | 81 | 79 | 20 | 191 | 6 | 123 | 152 | 14 | 21 | 295 | 0 | 0 | 0 | 0 | 22 | 0 | 27 | 46 | 38 | 9 | 36 | 120 | 133 | 1339 | 1472 |
| 08:00 | 15 | 182 | 22 | 21 | 8 | 240 | 9 | 3 | 25 | 27 | 15 | 64 | 5 | 40 | 55 | 7 | 7 | 107 | 0 | 0 | 0 | 0 | 4 | 0 | 8 | 18 | 12 | 3 | 11 | 41 | 45 | 452 | 497 |
| 08:15 | 14 | 222 | 24 | 15 | 8 | 275 | 6 | 5 | 25 | 27 | 14 | 63 | 4 | 49 | 48 | 6 | 7 | 107 | 0 | 0 | 0 | 0 | 12 | 0 | 12 | 21 | 18 | 2 | 19 | 53 | 60 | 498 | 558 |
| 08:30 | 27 | 224 | 14 | 17 | 10 | 282 | 6 | 4 | 46 | 30 | 9 | 86 | 2 | 62 | 87 | 4 | 1 | 155 | 0 | 0 | 0 | 0 | 5 | 0 | 5 | 19 | 15 | 4 | 5 | 43 | 30 | 566 | 596 |
| 08:45 | 26 | 170 | 21 | 27 | 10 | 244 | 17 | 1 | 32 | 30 | 16 | 80 | 1 | 49 | 71 | 5 | 2 | 126 | 0 | 0 | 0 | 0 | 4 | 0 | 7 | 36 | 18 | 8 | 7 | 69 | 39 | 519 | 558 |
| Total | 82 | 798 | 81 | 80 | 36 | 1041 | 38 | 13 | 128 | 114 | 54 | 293 | 12 | 200 | 261 | 22 | 17 | 495 | 0 | 0 | 0 | 0 | 25 | 0 | 32 | 94 | 63 | 17 | 42 | 206 | 174 | 2035 | 2209 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 31 | 75 | 4 | 19 | 9 | 129 | 11 | 2 | 37 | 28 | 8 | 78 | 2 | 55 | 159 | 11 | 11 | 227 | 0 | 0 | 0 | 0 | 3 | 0 | 34 | 43 | 19 | 1 | 4 | 97 | 35 | 531 | 566 |
| 16:15 | 33 | 70 | 6 | 11 | 17 | 120 | 7 | 4 | 35 | 21 | 19 | 67 | 3 | 60 | 142 | 16 | 12 | 221 | 0 | 0 | 0 | 0 | 6 | 0 | 26 | 56 | 21 | 1 | 8 | 104 | 62 | 512 | 574 |
| 16:30 | 27 | 80 | 10 | 11 | 8 | 128 | 8 | 3 | 29 | 34 | 15 | 74 | 0 | 60 | 171 | 15 | 10 | 246 | 0 | 0 | 0 | 0 | 6 | 0 | 32 | 66 | 21 | 2 | 11 | 121 | 50 | 569 | 619 |
| 16:45 | 28 | 80 | 2 | 7 | 4 | 117 | 9 | 2 | 29 | 41 | 19 | 81 | 2 | 63 | 204 | 20 | 9 | 289 | 0 | 0 | 0 | 0 | 8 | 0 | 28 | 64 | 17 | 2 | 6 | 111 | 46 | 598 | 644 |
| Total | 119 | 305 | 22 | 48 | 38 | 494 | 35 | 11 | 130 | 124 | 61 | 300 | 7 | 238 | 676 | 62 | 42 | 983 | 0 | 0 | 0 | 0 | 23 | 0 | 120 | 229 | 78 | 6 | 29 | 433 | 193 | 2210 | 2403 |
| 17:00 | 37 | 105 | 4 | 18 | 6 | 164 | 7 | 2 | 27 | 40 | 18 | 76 | 1 | 70 | 216 | 19 | 7 | 306 | 0 | 0 | 0 | 0 | 10 | 0 | 32 | 53 | 24 | 4 | 15 | 113 | 56 | 659 | 715 |
| 17:15 | 28 | 92 | 5 | 15 | 22 | 140 | 16 | 5 | 35 | 32 | 27 | 88 | 0 | 68 | 210 | 31 | 10 | 309 | 0 | 0 | 0 | 0 | 8 | 0 | 38 | 76 | 23 | 3 | 13 | 140 | 80 | 677 | 757 |
| 17:30 | 51 | 96 | 1 | 17 | 12 | 165 | 13 | 1 | 56 | 38 | 24 | 108 | 2 | 75 | 218 | 20 | 14 | 315 | 0 | 0 | 0 | 0 | 12 | 0 | 33 | 52 | 15 | 1 | 16 | 101 | 78 | 689 | 767 |
| 17:45 | 42 | 101 | 7 | 11 | 12 | 161 | 12 | 0 | 37 | 45 | 23 | 94 | 0 | 57 | 207 | 15 | 9 | 279 | 0 | 0 | 0 | 0 | 6 | 0 | 19 | 69 | 11 | 0 | 7 | 99 | 57 | 633 | 690 |
| Total | 158 | 394 | 17 | 61 | 52 | 630 | 48 | 8 | 155 | 155 | 92 | 366 | 3 | 270 | 851 | 85 | 40 | 1209 | 0 | 0 | 0 | 0 | 36 | 0 | 122 | 250 | 73 | 8 | 51 | 453 | 271 | 2658 | 2929 |
| Grand Total | 417 | 2019 | 210 | 252 | 160 | 2898 | 148 | 36 | 494 | 472 | 227 | 1150 | 28 | 831 | 1940 | 183 | 120 | 2982 | 0 | 0 | 0 | 0 | 106 | 0 | 301 | 619 | 252 | 40 | 158 | 1212 | 771 | 8242 | 9013 |
| Apprch % | 14.4 | 69.7 | 7.2 | 8.7 | | | 12.9 | 3.1 | 43 | 41 | | | 0.9 | 27.9 | 65.1 | 6.1 | | | 0 | 0 | 0 | 0 | | | 24.8 | 51.1 | 20.8 | 3.3 | | | | | |
| Total % | 5.1 | 24.5 | 2.5 | 3.1 | | 35.2 | 1.8 | 0.4 | 6 | 5.7 | | 14 | 0.3 | 10.1 | 23.5 | 2.2 | | 36.2 | 0 | 0 | 0 | 0 | | 0 | 3.7 | 7.5 | 3.1 | 0.5 | | 14.7 | 8.6 | 91.4 | |

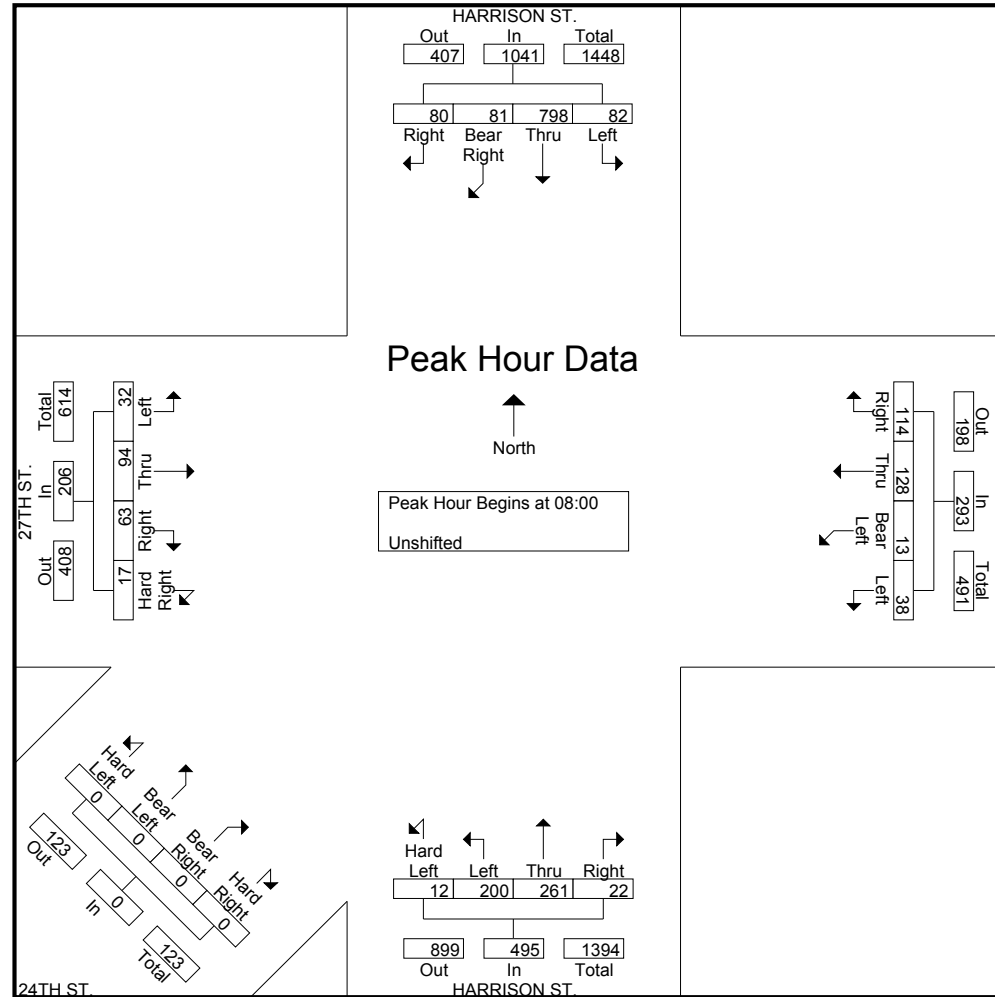
| | HARRISON ST.
Southbound | | | | | BAY PL.
Westbound | | | | | HARRISON ST.
Northbound | | | | | 24TH ST.
Northeastbound | | | | | 27TH ST.
Eastbound | | | | | Int.
Total |
|--------------|----------------------------|------|------------|-------|------------|----------------------|-----------|------|-------|------------|----------------------------|------|------|-------|------------|----------------------------|-----------|------------|------------|------------|-----------------------|------|-------|------------|------------|---------------|
| Start Time | Left | Thru | Bear Right | Right | App. Total | Left | Bear Left | Thru | Right | App. Total | Hard Left | Left | Thru | Right | App. Total | Hard Left | Bear Left | Bear Right | Hard Right | App. Total | Left | Thru | Right | Hard Right | App. Total | Int. Total |
| 08:00 | 15 | 182 | 22 | 21 | 240 | 9 | 3 | 25 | 27 | 64 | 5 | 40 | 55 | 7 | 107 | 0 | 0 | 0 | 0 | 0 | 8 | 18 | 12 | 3 | 41 | 452 |
| 08:15 | 14 | 222 | 24 | 15 | 275 | 6 | 5 | 25 | 27 | 63 | 4 | 49 | 48 | 6 | 107 | 0 | 0 | 0 | 0 | 0 | 12 | 21 | 18 | 2 | 53 | 498 |
| 08:30 | 27 | 224 | 14 | 17 | 282 | 6 | 4 | 46 | 30 | 86 | 2 | 62 | 87 | 4 | 155 | 0 | 0 | 0 | 0 | 0 | 5 | 19 | 15 | 4 | 43 | 566 |
| 08:45 | 26 | 170 | 21 | 27 | 244 | 17 | 1 | 32 | 30 | 80 | 1 | 49 | 71 | 5 | 126 | 0 | 0 | 0 | 0 | 0 | 7 | 36 | 18 | 8 | 69 | 519 |
| Total Volume | 82 | 798 | 81 | 80 | 1041 | 38 | 13 | 128 | 114 | 293 | 12 | 200 | 261 | 22 | 495 | 0 | 0 | 0 | 0 | 0 | 32 | 94 | 63 | 17 | 206 | 2035 |
| % App. Total | 7.9 | 76.7 | 7.8 | 7.7 | | 13 | 4.4 | 43.7 | 38.9 | | 2.4 | 40.4 | 52.7 | 4.4 | | 0 | 0 | 0 | 0 | | 15.5 | 45.6 | 30.6 | 8.3 | | |
| PHF | .759 | .891 | .844 | .741 | .923 | .559 | .650 | .696 | .950 | .852 | .600 | .806 | .750 | .786 | .798 | .000 | .000 | .000 | .000 | .000 | .667 | .653 | .875 | .531 | .746 | .899 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-003 HARRISON-27TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

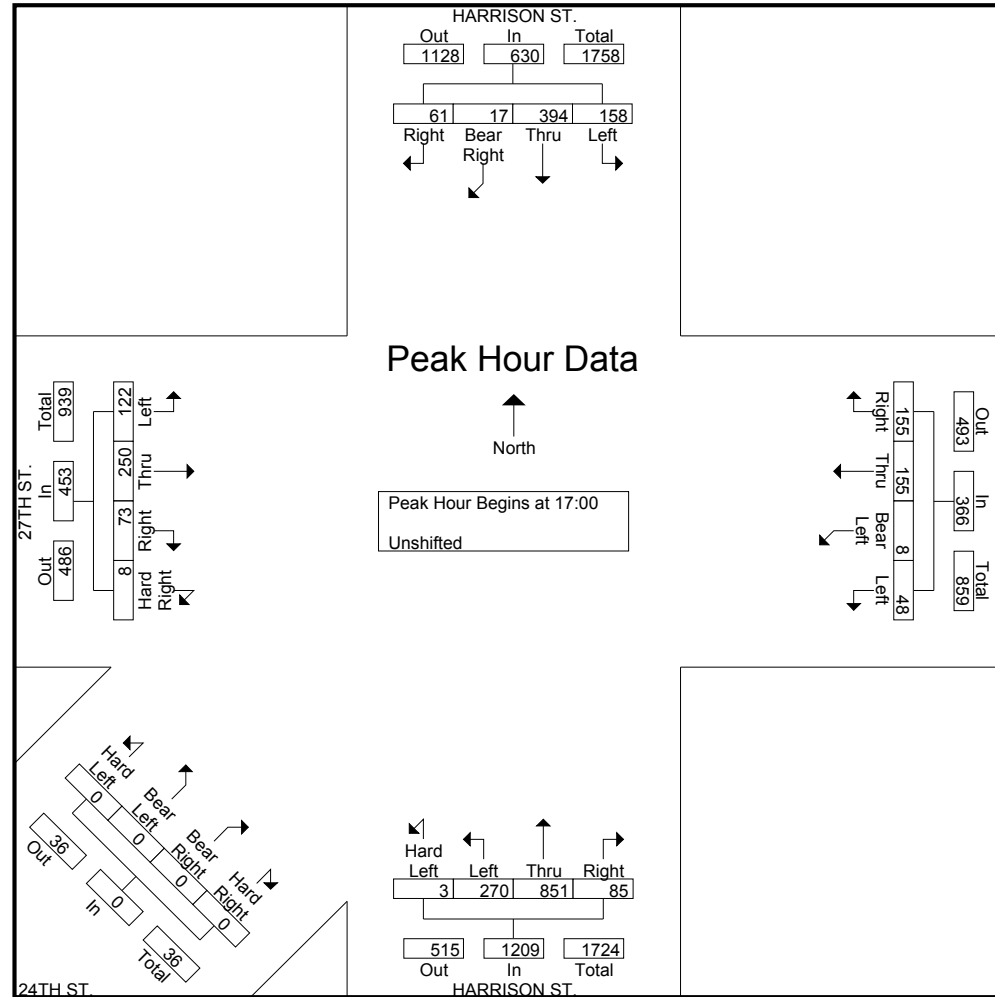
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|-----------|------------|----------|-----------|------------|-----------|----------|-----------|-----------|------------|----------|-----------|------------|-----------|------------|------|------|------|------|------|-----------|-----------|-----------|----------|------------|------------|
| 17:00 | 37 | 105 | 4 | 18 | 164 | 7 | 2 | 27 | 40 | 76 | 1 | 70 | 216 | 19 | 306 | 0 | 0 | 0 | 0 | 0 | 32 | 53 | 24 | 4 | 113 | 659 |
| 17:15 | 28 | 92 | 5 | 15 | 140 | 16 | 5 | 35 | 32 | 88 | 0 | 68 | 210 | 31 | 309 | 0 | 0 | 0 | 0 | 0 | 38 | 76 | 23 | 3 | 140 | 677 |
| 17:30 | 51 | 96 | 1 | 17 | 165 | 13 | 1 | 56 | 38 | 108 | 2 | 75 | 218 | 20 | 315 | 0 | 0 | 0 | 0 | 0 | 33 | 52 | 15 | 1 | 101 | 689 |
| 17:45 | 42 | 101 | 7 | 11 | 161 | 12 | 0 | 37 | 45 | 94 | 0 | 57 | 207 | 15 | 279 | 0 | 0 | 0 | 0 | 0 | 19 | 69 | 11 | 0 | 99 | 633 |
| Total Volume | 158 | 394 | 17 | 61 | 630 | 48 | 8 | 155 | 155 | 366 | 3 | 270 | 851 | 85 | 1209 | 0 | 0 | 0 | 0 | 0 | 122 | 250 | 73 | 8 | 453 | 2658 |
| % App. Total | 25.1 | 62.5 | 2.7 | 9.7 | | 13.1 | 2.2 | 42.3 | 42.3 | | 0.2 | 22.3 | 70.4 | 7 | | 0 | 0 | 0 | 0 | | 26.9 | 55.2 | 16.1 | 1.8 | | |
| PHF | .775 | .938 | .607 | .847 | .955 | .750 | .400 | .692 | .861 | .847 | .375 | .900 | .976 | .685 | .960 | .000 | .000 | .000 | .000 | .000 | .803 | .822 | .760 | .500 | .809 | .964 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-003 HARRISON-27TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



COMPARISON OF COUNTS USED FOR HARRISON-27TH PM ANALYSIS (gl, 5/18/09)

| Count Date | Results | 27th Street onto... | | | | Bay Place onto.... | | | | Harrison onto... | | | | Harrison onto... | | | | Totals |
|-------------------|---------|---------------------|------|---------------|------|--------------------|------|---------------|------|------------------|------|------|------|------------------|------|-----------|------|--------|
| | | Harrison Bay | | Harrison 24th | | Harrison 24th | | 27th Harrison | | 24th 27th | | Bay | | Bay | | 24th 27th | | |
| | | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR | SBL | SBT | SBR | SBR2 | |
| 2008/11/20
PHF | LOS E | 182 | 365 | 85 | 17 | 45 | 14 | 155 | 177 | 8 | 286 | 942 | 86 | 185 | 397 | 39 | 65 | 3048 |
| | | 0.94 | 0.94 | 0.94 | 0.94 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.93 | 0.93 | 0.93 | |
| 2008/08/07 | LOS C | 122 | 250 | 73 | 8 | 48 | 8 | 155 | 155 | 3 | 270 | 851 | 85 | 158 | 394 | 17 | 61 | 2658 |

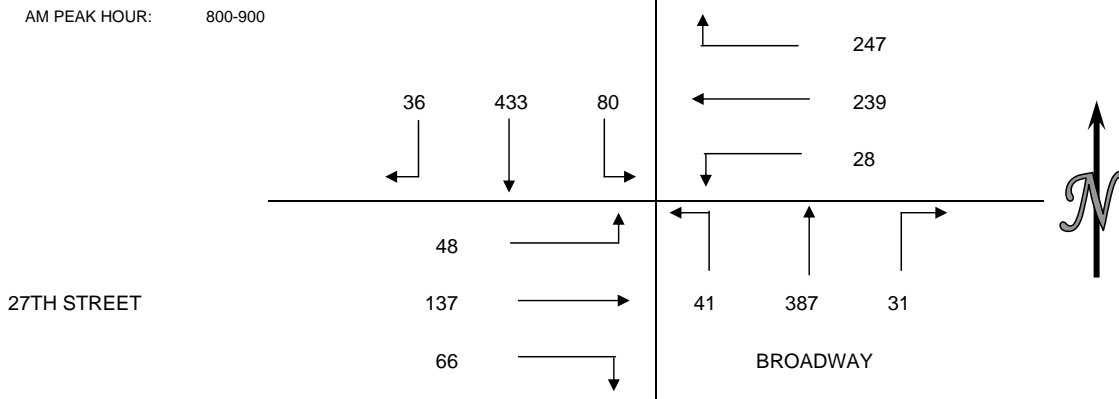
Overall, the 11/20/08 count is 15% higher than the 8/7/08 count, when school was not in session and gas was more expensive.

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: TUESDAY OCTOBER 21, 2008
 PERIOD: 7:00 AM TO 9:00 AM
 INTERSECTION: N/S BROADWAY
 E/W 27TH STREET
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-715 | 6 | 68 | 8 | 17 | 16 | 9 | 4 | 54 | 4 | 7 | 19 | 6 | 218 |
| 715-730 | 3 | 83 | 12 | 44 | 23 | 2 | 3 | 76 | 7 | 7 | 11 | 7 | 278 |
| 730-745 | 9 | 94 | 17 | 44 | 43 | 5 | 4 | 81 | 6 | 18 | 22 | 11 | 354 |
| 745-800 | 10 | 113 | 18 | 51 | 51 | 6 | 6 | 90 | 9 | 20 | 33 | 11 | 418 |
| 800-815 | 15 | 104 | 17 | 55 | 59 | 2 | 6 | 100 | 7 | 18 | 35 | 11 | 429 |
| 815-830 | 4 | 119 | 13 | 61 | 63 | 12 | 9 | 94 | 15 | 17 | 32 | 7 | 446 |
| 830-845 | 7 | 113 | 28 | 73 | 62 | 6 | 8 | 93 | 7 | 14 | 33 | 10 | 454 |
| 845-900 | 10 | 97 | 22 | 58 | 55 | 8 | 8 | 100 | 12 | 17 | 37 | 20 | 444 |
| HOURLY TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-800 | 28 | 358 | 55 | 156 | 133 | 22 | 17 | 301 | 26 | 52 | 85 | 35 | 1268 |
| 715-815 | 37 | 394 | 64 | 194 | 176 | 15 | 19 | 347 | 29 | 63 | 101 | 40 | 1479 |
| 730-830 | 38 | 430 | 65 | 211 | 216 | 25 | 25 | 365 | 37 | 73 | 122 | 40 | 1647 |
| 745-845 | 36 | 449 | 76 | 240 | 235 | 26 | 29 | 377 | 38 | 69 | 133 | 39 | 1747 |
| 800-900 | 36 | 433 | 80 | 247 | 239 | 28 | 31 | 387 | 41 | 66 | 137 | 48 | 1773 |

PHF 0.6 0.909664 0.714286 0.84589 0.948413 0.583333 0.861111 0.9675 0.683333 0.916667 0.925676 0.6



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 3 | 2 | 4 | 3 | 12 |
| 715-730 | 0 | 12 | 5 | 5 | 22 |
| 730-745 | 0 | 6 | 6 | 8 | 20 |
| 745-800 | 0 | 10 | 8 | 14 | 32 |
| 800-815 | 1 | 13 | 20 | 7 | 41 |
| 815-830 | 0 | 15 | 7 | 9 | 31 |
| 830-845 | 0 | 14 | 6 | 18 | 38 |
| 845-900 | 1 | 16 | 6 | 21 | 44 |
| HOURLY TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 3 | 30 | 23 | 30 | 86 |
| 715-815 | 1 | 41 | 39 | 34 | 115 |
| 730-830 | 1 | 44 | 41 | 38 | 124 |
| 745-845 | 1 | 52 | 41 | 48 | 142 |
| 800-900 | 2 | 58 | 39 | 55 | 154 |

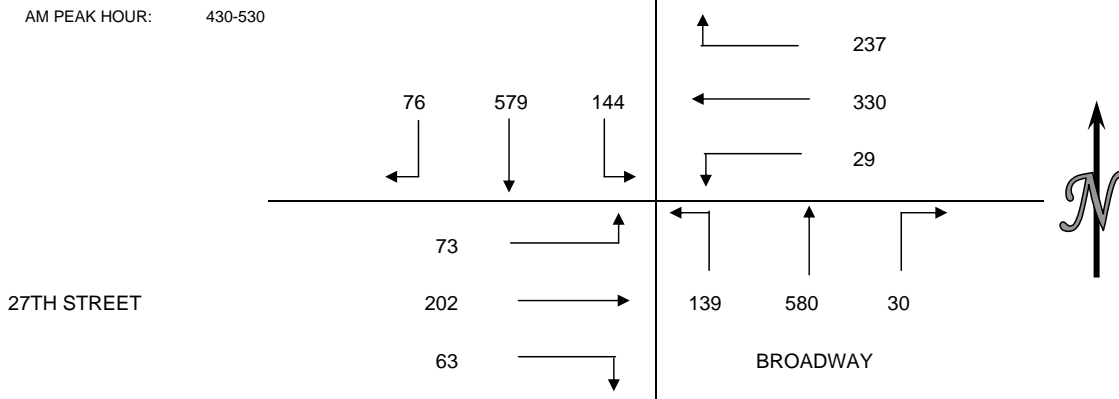
| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 0 | 1 | 2 | 2 | 5 |
| 715-730 | 0 | 0 | 0 | 4 | 4 |
| 730-745 | 0 | 3 | 9 | 3 | 15 |
| 745-800 | 0 | 3 | 10 | 5 | 18 |
| 800-815 | 0 | 3 | 3 | 5 | 11 |
| 815-830 | 1 | 3 | 6 | 10 | 20 |
| 830-845 | 0 | 5 | 8 | 4 | 17 |
| 845-900 | 0 | 6 | 6 | 8 | 20 |
| HOURLY TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 0 | 7 | 21 | 14 | 42 |
| 715-815 | 0 | 9 | 22 | 17 | 48 |
| 730-830 | 1 | 12 | 28 | 23 | 64 |
| 745-845 | 1 | 14 | 27 | 24 | 66 |
| 800-900 | 1 | 17 | 23 | 27 | 68 |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: TUESDAY OCTOBER 21, 2008
 PERIOD: 4:00 PM TO 6:00 PM
 INTERSECTION: N/S BROADWAY
 E/W 27TH STREET
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-415 | 21 | 139 | 28 | 53 | 62 | 8 | 5 | 98 | 28 | 7 | 29 | 22 | 500 |
| 415-430 | 25 | 142 | 32 | 52 | 67 | 7 | 6 | 123 | 31 | 14 | 37 | 16 | 552 |
| 430-445 | 21 | 142 | 34 | 48 | 72 | 7 | 9 | 141 | 42 | 12 | 59 | 15 | 602 |
| 445-500 | 12 | 157 | 31 | 57 | 86 | 4 | 5 | 158 | 35 | 24 | 44 | 14 | 627 |
| 500-515 | 22 | 136 | 35 | 68 | 86 | 10 | 10 | 135 | 29 | 15 | 49 | 27 | 622 |
| 515-530 | 21 | 144 | 44 | 64 | 86 | 8 | 6 | 146 | 33 | 12 | 50 | 17 | 631 |
| 530-545 | 18 | 123 | 44 | 61 | 60 | 13 | 4 | 146 | 34 | 15 | 58 | 17 | 593 |
| 545-600 | 19 | 115 | 47 | 38 | 61 | 10 | 8 | 114 | 23 | 18 | 56 | 17 | 526 |
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-500 | 79 | 580 | 125 | 210 | 287 | 26 | 25 | 520 | 136 | 57 | 169 | 67 | 2281 |
| 415-515 | 80 | 577 | 132 | 225 | 311 | 28 | 30 | 557 | 137 | 65 | 189 | 72 | 2403 |
| 430-530 | 76 | 579 | 144 | 237 | 330 | 29 | 30 | 580 | 139 | 63 | 202 | 73 | 2482 |
| 445-545 | 73 | 560 | 154 | 250 | 318 | 35 | 25 | 585 | 131 | 66 | 201 | 75 | 2473 |
| 500-600 | 80 | 518 | 170 | 231 | 293 | 41 | 28 | 541 | 119 | 60 | 213 | 78 | 2372 |

PHF 0.863636 0.921975 0.818182 0.871324 0.959302 0.725 0.75 0.917722 0.827381 0.65625 0.855932 0.675926



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 1 | 6 | 8 | 7 | 22 |
| 415-430 | 1 | 11 | 5 | 9 | 26 |
| 430-445 | 0 | 16 | 9 | 8 | 33 |
| 445-500 | 2 | 11 | 5 | 25 | 43 |
| 500-515 | 1 | 14 | 6 | 7 | 28 |
| 515-530 | 0 | 10 | 9 | 9 | 28 |
| 530-545 | 2 | 23 | 6 | 7 | 38 |
| 545-600 | 0 | 16 | 7 | 10 | 33 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 4 | 44 | 27 | 49 | 124 |
| 415-515 | 4 | 52 | 25 | 49 | 130 |
| 430-530 | 3 | 51 | 29 | 49 | 132 |
| 445-545 | 5 | 58 | 26 | 48 | 137 |
| 500-600 | 3 | 63 | 28 | 33 | 127 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 1 | 8 | 6 | 5 | 20 |
| 415-430 | 0 | 10 | 10 | 3 | 23 |
| 430-445 | 0 | 8 | 4 | 11 | 23 |
| 445-500 | 1 | 9 | 5 | 2 | 17 |
| 500-515 | 0 | 7 | 8 | 3 | 18 |
| 515-530 | 0 | 8 | 12 | 5 | 25 |
| 530-545 | 1 | 12 | 7 | 9 | 29 |
| 545-600 | 1 | 13 | 8 | 11 | 33 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 2 | 35 | 25 | 21 | 83 |
| 415-515 | 1 | 34 | 27 | 19 | 81 |
| 430-530 | 1 | 32 | 29 | 21 | 83 |
| 445-545 | 2 | 36 | 32 | 19 | 89 |
| 500-600 | 2 | 40 | 35 | 28 | 105 |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Telegraph Ave & 27th Ave

Date: 05/22/2008

| | Telegraph Ave Southbound | | | | 27th Ave Westbound | | | | Telegraph Ave Northbound | | | | 27th Ave Eastbound | | | | |
|------------|--------------------------|------|-------|------------|--------------------|------|-------|------------|--------------------------|------|-------|------------|--------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 3 | 28 | 25 | 56 | 5 | 16 | 3 | 24 | 15 | 38 | 5 | 58 | 39 | 34 | 21 | 94 | 232 |
| 7:15 | 5 | 47 | 12 | 64 | 5 | 15 | 5 | 25 | 8 | 53 | 2 | 63 | 39 | 46 | 17 | 102 | 254 |
| 7:30 | 10 | 43 | 33 | 86 | 6 | 25 | 13 | 44 | 13 | 55 | 9 | 77 | 48 | 53 | 24 | 125 | 332 |
| 7:45 | 9 | 61 | 29 | 99 | 9 | 34 | 13 | 56 | 20 | 62 | 5 | 87 | 48 | 66 | 27 | 141 | 383 |
| Total | 27 | 179 | 99 | 305 | 25 | 90 | 34 | 149 | 56 | 208 | 21 | 285 | 174 | 199 | 89 | 462 | 1201 |
| 8:00 | 14 | 67 | 32 | 113 | 5 | 38 | 18 | 61 | 17 | 70 | 4 | 91 | 54 | 66 | 31 | 151 | 416 |
| 8:15 | 10 | 71 | 21 | 102 | 11 | 61 | 23 | 95 | 16 | 84 | 7 | 107 | 70 | 72 | 28 | 170 | 474 |
| 8:30 | 10 | 80 | 23 | 113 | 11 | 43 | 24 | 78 | 18 | 76 | 6 | 100 | 78 | 88 | 29 | 195 | 486 |
| 8:45 | 5 | 59 | 37 | 101 | 10 | 66 | 26 | 102 | 18 | 75 | 2 | 95 | 91 | 76 | 26 | 193 | 491 |
| Total | 39 | 277 | 113 | 429 | 37 | 208 | 91 | 336 | 69 | 305 | 19 | 393 | 293 | 302 | 114 | 709 | 1867 |
| 16:00 | 18 | 102 | 82 | 202 | 15 | 102 | 22 | 139 | 44 | 97 | 7 | 148 | 44 | 42 | 25 | 111 | 600 |
| 16:15 | 17 | 92 | 60 | 169 | 14 | 101 | 19 | 134 | 47 | 94 | 11 | 152 | 47 | 53 | 26 | 126 | 581 |
| 16:30 | 19 | 90 | 81 | 190 | 12 | 105 | 25 | 142 | 33 | 93 | 9 | 135 | 42 | 76 | 28 | 146 | 613 |
| 16:45 | 20 | 105 | 69 | 194 | 11 | 98 | 34 | 143 | 42 | 94 | 6 | 142 | 39 | 75 | 28 | 142 | 621 |
| Total | 74 | 389 | 292 | 755 | 52 | 406 | 100 | 558 | 166 | 378 | 33 | 577 | 172 | 246 | 107 | 525 | 2415 |
| 17:00 | 26 | 94 | 81 | 201 | 17 | 129 | 23 | 169 | 40 | 92 | 14 | 146 | 53 | 93 | 29 | 175 | 691 |
| 17:15 | 31 | 95 | 76 | 202 | 10 | 122 | 23 | 155 | 36 | 116 | 11 | 163 | 45 | 82 | 27 | 154 | 674 |
| 17:30 | 35 | 92 | 68 | 195 | 17 | 106 | 18 | 141 | 29 | 101 | 8 | 138 | 43 | 96 | 33 | 172 | 646 |
| 17:45 | 28 | 101 | 62 | 191 | 15 | 94 | 19 | 128 | 42 | 113 | 17 | 172 | 29 | 67 | 27 | 123 | 614 |
| Total | 120 | 382 | 287 | 789 | 59 | 451 | 83 | 593 | 147 | 422 | 50 | 619 | 170 | 338 | 116 | 624 | 2625 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|
| Grand Total | 260 | 1227 | 791 | 2278 | 173 | 1155 | 308 | 1636 | 438 | 1313 | 123 | 1874 | 809 | 1085 | 426 | 2320 | 8108 |
| Apprch% | #### | 53.9% | 34.7% | | 10.6% | 70.6% | 18.8% | | 23.4% | 70.1% | 6.6% | | 34.9% | 46.8% | 18.4% | | |
| Total % | 3.2% | 15.1% | 9.8% | 28.1% | 2.1% | 14.2% | 3.8% | 20.2% | 5.4% | 16.2% | 1.5% | 23.1% | 10.0% | 13.4% | 5.3% | 28.6% | |

City of Oakland

Telegraph Ave & 27th Ave

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| | Telegraph Ave Southbound | | | | 27th Ave Westbound | | | | Telegraph Ave Northbound | | | | 27th Ave Eastbound | | | | |
|--------------|--------------------------|-------|-------|------------|--------------------|-------|-------|------------|--------------------------|-------|-------|------------|--------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 14 | 67 | 32 | 113 | 5 | 38 | 18 | 61 | 17 | 70 | 4 | 91 | 54 | 66 | 31 | 151 | 416 |
| 815 | 10 | 71 | 21 | 102 | 11 | 61 | 23 | 95 | 16 | 84 | 7 | 107 | 70 | 72 | 28 | 170 | 474 |
| 830 | 10 | 80 | 23 | 113 | 11 | 43 | 24 | 78 | 18 | 76 | 6 | 100 | 78 | 88 | 29 | 195 | 486 |
| 845 | 5 | 59 | 37 | 101 | 10 | 66 | 26 | 102 | 18 | 75 | 2 | 95 | 91 | 76 | 26 | 193 | 491 |
| Total Volume | 39 | 277 | 113 | 429 | 37 | 208 | 91 | 336 | 69 | 305 | 19 | 393 | 293 | 302 | 114 | 709 | 1867 |
| % App Total | 9.1% | 64.6% | 26.3% | | 11.0% | 61.9% | 27.1% | | 17.6% | 77.6% | 4.8% | | 41.3% | 42.6% | 16.1% | | |
| PHF | 0.949 | | | | 0.824 | | | | 0.918 | | | | 0.909 | | | | |

PM Peak Hr Begins at 445 PM

| | Telegraph Ave Southbound | | | | 27th Ave Westbound | | | | Telegraph Ave Northbound | | | | 27th Ave Eastbound | | | | |
|--------------|--------------------------|-------|-------|------------|--------------------|-------|-------|------------|--------------------------|-------|-------|------------|--------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 445 | 20 | 105 | 69 | 194 | 11 | 98 | 34 | 143 | 42 | 94 | 6 | 142 | 39 | 75 | 28 | 142 | 621 |
| 500 | 26 | 94 | 81 | 201 | 17 | 129 | 23 | 169 | 40 | 92 | 14 | 146 | 53 | 93 | 29 | 175 | 691 |
| 515 | 31 | 95 | 76 | 202 | 10 | 122 | 23 | 155 | 36 | 116 | 11 | 163 | 45 | 82 | 27 | 154 | 674 |
| 530 | 35 | 92 | 68 | 195 | 17 | 106 | 18 | 141 | 29 | 101 | 8 | 138 | 43 | 96 | 33 | 172 | 646 |
| Total Volume | 112 | 386 | 294 | 792 | 55 | 455 | 98 | 608 | 147 | 403 | 39 | 589 | 180 | 346 | 117 | 643 | 2632 |
| % App Total | #### | 48.7% | 37.1% | | 9.0% | 74.8% | 16.1% | | 25.0% | 68.4% | 6.6% | | 28.0% | 53.8% | 18.2% | | |
| PHF | 0.980 | | | | 0.899 | | | | 0.903 | | | | 0.919 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Northgate Ave (NB)/27th St & I-980 EB On-Ramp

Date: 05/22/2008

| Start Time | Northgate Ave (NB)/27th St Southbound | | | | I-980 EB On-Ramp Westbound | | | | Northgate Ave (NB)/27th St Northbound | | | | I-980 EB On-Ramp Eastbound | | | | Int Total |
|------------|---------------------------------------|------|-------|------------|----------------------------|------|-------|------------|---------------------------------------|------|-------|------------|----------------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 7:00 | 0 | 0 | 0 | 0 | 0 | 18 | 41 | 59 | 0 | 32 | 1 | 33 | 18 | 91 | 0 | 109 | 201 |
| 7:15 | 0 | 0 | 0 | 0 | 0 | 13 | 24 | 37 | 1 | 29 | 2 | 32 | 11 | 106 | 0 | 117 | 186 |
| 7:30 | 0 | 0 | 0 | 0 | 0 | 26 | 47 | 73 | 0 | 42 | 4 | 46 | 19 | 118 | 0 | 137 | 256 |
| 7:45 | 0 | 0 | 0 | 0 | 0 | 23 | 66 | 89 | 0 | 52 | 6 | 58 | 19 | 135 | 0 | 154 | 301 |
| Total | 0 | 0 | 0 | 0 | 0 | 80 | 178 | 258 | 1 | 155 | 13 | 169 | 67 | 450 | 0 | 517 | 944 |
| 8:00 | 0 | 0 | 0 | 0 | 0 | 25 | 53 | 78 | 1 | 54 | 3 | 58 | 36 | 145 | 0 | 181 | 317 |
| 8:15 | 0 | 0 | 0 | 0 | 0 | 30 | 60 | 90 | 2 | 62 | 5 | 69 | 37 | 172 | 0 | 209 | 368 |
| 8:30 | 0 | 0 | 0 | 0 | 0 | 35 | 48 | 83 | 1 | 49 | 9 | 59 | 24 | 187 | 0 | 211 | 353 |
| 8:45 | 0 | 0 | 0 | 0 | 0 | 37 | 83 | 120 | 0 | 54 | 4 | 58 | 35 | 198 | 0 | 233 | 411 |
| Total | 0 | 0 | 0 | 0 | 0 | 127 | 244 | 371 | 4 | 219 | 21 | 244 | 132 | 702 | 0 | 834 | 1449 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 40 | 202 | 242 | 7 | 182 | 9 | 198 | 73 | 112 | 0 | 185 | 625 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 53 | 207 | 260 | 1 | 178 | 7 | 186 | 52 | 121 | 0 | 173 | 619 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 44 | 192 | 236 | 3 | 186 | 14 | 203 | 53 | 128 | 0 | 181 | 620 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 59 | 196 | 255 | 7 | 171 | 16 | 194 | 57 | 127 | 0 | 184 | 633 |
| Total | 0 | 0 | 0 | 0 | 0 | 196 | 797 | 993 | 18 | 717 | 46 | 781 | 235 | 488 | 0 | 723 | 2497 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 62 | 201 | 263 | 5 | 156 | 19 | 180 | 54 | 156 | 0 | 210 | 653 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 56 | 188 | 244 | 3 | 169 | 14 | 186 | 47 | 150 | 0 | 197 | 627 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 37 | 176 | 213 | 6 | 130 | 19 | 155 | 43 | 151 | 0 | 194 | 562 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 47 | 153 | 200 | 2 | 142 | 22 | 166 | 46 | 108 | 0 | 154 | 520 |
| Total | 0 | 0 | 0 | 0 | 0 | 202 | 718 | 920 | 16 | 597 | 74 | 687 | 190 | 565 | 0 | 755 | 2362 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|------|------|------|------|-------|-------|-------|------|-------|------|-------|-------|-------|------|-------|------|
| Grand Total | 0 | 0 | 0 | 0 | 0 | 605 | 1937 | 2542 | 39 | 1688 | 154 | 1881 | 624 | 2205 | 0 | 2829 | 7252 |
| Apprch% | 0.0% | 0.0% | 0.0% | | 0.0% | 23.8% | 76.2% | | 2.1% | 89.7% | 8.2% | | 22.1% | 77.9% | 0.0% | | |
| Total % | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 8.3% | 26.7% | 35.1% | 0.5% | 23.3% | 2.1% | 25.9% | 8.6% | 30.4% | 0.0% | 39.0% | |

City of Oakland

Northgate Ave (NB)/27th St & I-980 EB On-Ramp

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| Start Time | Northgate Ave (NB)/27th St Southbound | | | | I-980 EB On-Ramp Westbound | | | | Northgate Ave (NB)/27th St Northbound | | | | I-980 EB On-Ramp Eastbound | | | | Int Total |
|--------------|---------------------------------------|------|-------|------------|----------------------------|-------|-------|------------|---------------------------------------|-------|-------|------------|----------------------------|-------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 800 | 0 | 0 | 0 | 0 | 0 | 25 | 53 | 78 | 1 | 54 | 3 | 58 | 36 | 145 | 0 | 181 | 317 |
| 815 | 0 | 0 | 0 | 0 | 0 | 30 | 60 | 90 | 2 | 62 | 5 | 69 | 37 | 172 | 0 | 209 | 368 |
| 830 | 0 | 0 | 0 | 0 | 0 | 35 | 48 | 83 | 1 | 49 | 9 | 59 | 24 | 187 | 0 | 211 | 353 |
| 845 | 0 | 0 | 0 | 0 | 0 | 37 | 83 | 120 | 0 | 54 | 4 | 58 | 35 | 198 | 0 | 233 | 411 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 127 | 244 | 371 | 4 | 219 | 21 | 244 | 132 | 702 | 0 | 834 | 1449 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 34.2% | 65.8% | | 1.6% | 89.8% | 8.6% | | 15.8% | 84.2% | 0.0% | | |
| PHF | 0.000 | | | | 0.773 | | | | 0.884 | | | | 0.895 | | | | |

PM Peak Hr Begins at 430 PM

| Start Time | Northgate Ave (NB)/27th St Southbound | | | | I-980 EB On-Ramp Westbound | | | | Northgate Ave (NB)/27th St Northbound | | | | I-980 EB On-Ramp Eastbound | | | | Int Total |
|--------------|---------------------------------------|------|-------|------------|----------------------------|-------|-------|------------|---------------------------------------|-------|-------|------------|----------------------------|-------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 430 | 0 | 0 | 0 | 0 | 0 | 44 | 192 | 236 | 3 | 186 | 14 | 203 | 53 | 128 | 0 | 181 | 620 |
| 445 | 0 | 0 | 0 | 0 | 0 | 59 | 196 | 255 | 7 | 171 | 16 | 194 | 57 | 127 | 0 | 184 | 633 |
| 500 | 0 | 0 | 0 | 0 | 0 | 62 | 201 | 263 | 5 | 156 | 19 | 180 | 54 | 156 | 0 | 210 | 653 |
| 515 | 0 | 0 | 0 | 0 | 0 | 56 | 188 | 244 | 3 | 169 | 14 | 186 | 47 | 150 | 0 | 197 | 627 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 221 | 777 | 998 | 18 | 682 | 63 | 763 | 211 | 561 | 0 | 772 | 2533 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 22.1% | 77.9% | | 2.4% | 89.4% | 8.3% | | 27.3% | 72.7% | 0.0% | | |
| PHF | 0.000 | | | | 0.949 | | | | 0.940 | | | | 0.919 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Northgate Ave (SB)/27th St & I-980 WB Off-Ramp

Date: 05/22/2008

| Start Time | Northgate Ave (SB)/27th St Southbound | | | | I-980 WB Off-Ramp Westbound | | | | Northgate Ave (SB)/27th St Northbound | | | | I-980 WB Off-Ramp Eastbound | | | | Int Total |
|------------|---------------------------------------|------|-------|------------|-----------------------------|------|-------|------------|---------------------------------------|------|-------|------------|-----------------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 7:00 | 79 | 140 | 53 | 272 | 0 | 10 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 26 | 3 | 29 | 311 |
| 7:15 | 86 | 168 | 62 | 316 | 2 | 16 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 28 | 3 | 31 | 365 |
| 7:30 | 96 | 168 | 59 | 323 | 2 | 24 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 43 | 5 | 48 | 397 |
| 7:45 | 105 | 177 | 63 | 345 | 4 | 18 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 48 | 7 | 55 | 422 |
| Total | 366 | 653 | 237 | 1256 | 8 | 68 | 0 | 76 | 0 | 0 | 0 | 0 | 0 | 145 | 18 | 163 | 1495 |
| 8:00 | 136 | 223 | 71 | 430 | 2 | 25 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 54 | 4 | 58 | 515 |
| 8:15 | 140 | 226 | 97 | 463 | 2 | 30 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 57 | 9 | 66 | 561 |
| 8:30 | 137 | 213 | 73 | 423 | 1 | 39 | 0 | 40 | 0 | 0 | 0 | 0 | 0 | 62 | 9 | 71 | 534 |
| 8:45 | 164 | 176 | 56 | 396 | 4 | 41 | 0 | 45 | 0 | 0 | 0 | 0 | 0 | 66 | 1 | 67 | 508 |
| Total | 577 | 838 | 297 | 1712 | 9 | 135 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 239 | 23 | 262 | 2118 |
| 16:00 | 79 | 68 | 50 | 197 | 6 | 42 | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 95 | 7 | 102 | 347 |
| 16:15 | 85 | 54 | 58 | 197 | 2 | 49 | 0 | 51 | 0 | 0 | 0 | 0 | 0 | 91 | 9 | 100 | 348 |
| 16:30 | 83 | 67 | 44 | 194 | 5 | 37 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 96 | 4 | 100 | 336 |
| 16:45 | 71 | 77 | 45 | 193 | 2 | 56 | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 99 | 8 | 107 | 358 |
| Total | 318 | 266 | 197 | 781 | 15 | 184 | 0 | 199 | 0 | 0 | 0 | 0 | 0 | 381 | 28 | 409 | 1389 |
| 17:00 | 78 | 59 | 47 | 184 | 2 | 61 | 0 | 63 | 0 | 0 | 0 | 0 | 0 | 111 | 6 | 117 | 364 |
| 17:15 | 93 | 57 | 31 | 181 | 2 | 55 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 109 | 10 | 119 | 357 |
| 17:30 | 98 | 49 | 49 | 196 | 4 | 37 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 104 | 9 | 113 | 350 |
| 17:45 | 84 | 52 | 36 | 172 | 2 | 47 | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 90 | 11 | 101 | 322 |
| Total | 353 | 217 | 163 | 733 | 10 | 200 | 0 | 210 | 0 | 0 | 0 | 0 | 0 | 414 | 36 | 450 | 1393 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|-------|-------|------|-------|------|------|------|------|------|---|------|-------|------|-------|------|
| Grand Total | 1614 | 1974 | 894 | 4482 | 42 | 587 | 0 | 629 | 0 | 0 | 0 | 0 | 0 | 1179 | 105 | 1284 | 6395 |
| Apprch% | #### | 44.0% | 19.9% | | 6.7% | 93.3% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 91.8% | 8.2% | | |
| Total % | #### | 30.9% | 14.0% | 70.1% | 0.7% | 9.2% | 0.0% | 9.8% | 0.0% | 0.0% | 0.0% | | 0.0% | 18.4% | 1.6% | 20.1% | |

City of Oakland

Northgate Ave (SB)/27th St & I-980 WB Off-Ramp

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| Start Time | Northgate Ave (SB)/27th St Southbound | | | | I-980 WB Off-Ramp Westbound | | | | Northgate Ave (SB)/27th St Northbound | | | | I-980 WB Off-Ramp Eastbound | | | | Int Total |
|--------------|---------------------------------------|-------|-------|------------|-----------------------------|-------|-------|------------|---------------------------------------|------|-------|------------|-----------------------------|-------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 800 | 136 | 223 | 71 | 430 | 2 | 25 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 54 | 4 | 58 | 515 |
| 815 | 140 | 226 | 97 | 463 | 2 | 30 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 57 | 9 | 66 | 561 |
| 830 | 137 | 213 | 73 | 423 | 1 | 39 | 0 | 40 | 0 | 0 | 0 | 0 | 0 | 62 | 9 | 71 | 534 |
| 845 | 164 | 176 | 56 | 396 | 4 | 41 | 0 | 45 | 0 | 0 | 0 | 0 | 0 | 66 | 1 | 67 | 508 |
| Total Volume | 577 | 838 | 297 | 1712 | 9 | 135 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 239 | 23 | 262 | 2118 |
| % App Total. | #### | 48.9% | 17.3% | | 6.3% | 93.8% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 91.2% | 8.8% | | |
| PHF | 0.924 | | | | 0.800 | | | | 0.000 | | | | 0.923 | | | | |

PM Peak Hr Begins at 445 PM

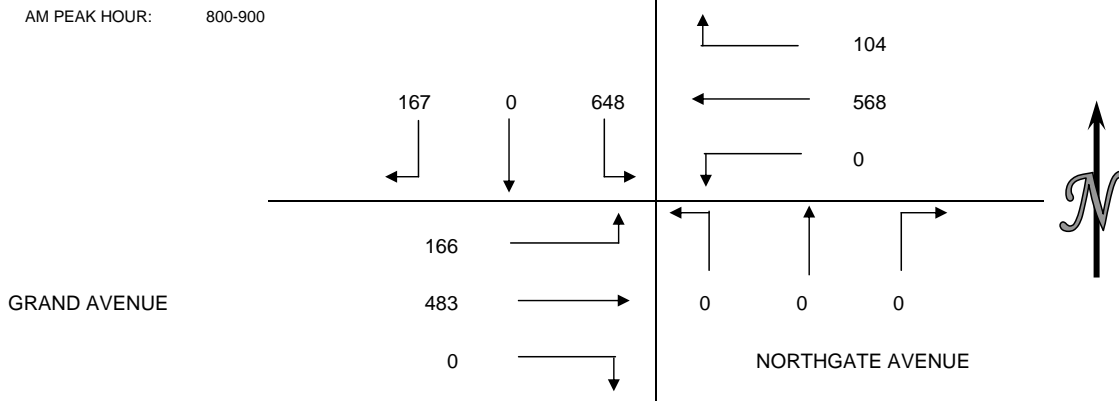
| Start Time | Northgate Ave (SB)/27th St Southbound | | | | I-980 WB Off-Ramp Westbound | | | | Northgate Ave (SB)/27th St Northbound | | | | I-980 WB Off-Ramp Eastbound | | | | Int Total |
|--------------|---------------------------------------|-------|-------|------------|-----------------------------|-------|-------|------------|---------------------------------------|------|-------|------------|-----------------------------|-------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 445 | 71 | 77 | 45 | 193 | 2 | 56 | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 99 | 8 | 107 | 358 |
| 500 | 78 | 59 | 47 | 184 | 2 | 61 | 0 | 63 | 0 | 0 | 0 | 0 | 0 | 111 | 6 | 117 | 364 |
| 515 | 93 | 57 | 31 | 181 | 2 | 55 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 109 | 10 | 119 | 357 |
| 530 | 98 | 49 | 49 | 196 | 4 | 37 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 104 | 9 | 113 | 350 |
| Total Volume | 340 | 242 | 172 | 754 | 10 | 209 | 0 | 219 | 0 | 0 | 0 | 0 | 0 | 423 | 33 | 456 | 1429 |
| % App Total. | #### | 32.1% | 22.8% | | 4.6% | 95.4% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 92.8% | 7.2% | | |
| PHF | 0.962 | | | | 0.869 | | | | 0.000 | | | | 0.958 | | | | |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: TUESDAY OCTOBER 21, 2008
 PERIOD: 7:00 AM TO 9:00 AM
 INTERSECTION: N/S NORTHGATE AVENUE
 E/W GRAND AVENUE
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-715 | 35 | 0 | 77 | 10 | 84 | 0 | 0 | 0 | 0 | 0 | 59 | 19 | 284 |
| 715-730 | 42 | 0 | 106 | 11 | 77 | 0 | 0 | 0 | 0 | 0 | 53 | 33 | 322 |
| 730-745 | 50 | 0 | 119 | 20 | 117 | 0 | 0 | 0 | 0 | 0 | 68 | 28 | 402 |
| 745-800 | 51 | 0 | 133 | 25 | 110 | 0 | 0 | 0 | 0 | 0 | 121 | 34 | 474 |
| 800-815 | 50 | 0 | 144 | 27 | 131 | 0 | 0 | 0 | 0 | 0 | 110 | 54 | 516 |
| 815-830 | 39 | 0 | 151 | 26 | 154 | 0 | 0 | 0 | 0 | 0 | 130 | 47 | 547 |
| 830-845 | 44 | 0 | 191 | 31 | 160 | 0 | 0 | 0 | 0 | 0 | 108 | 26 | 560 |
| 845-900 | 34 | 0 | 162 | 20 | 123 | 0 | 0 | 0 | 0 | 0 | 135 | 39 | 513 |
| HOUR TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-800 | 178 | 0 | 435 | 66 | 388 | 0 | 0 | 0 | 0 | 0 | 301 | 114 | 1482 |
| 715-815 | 193 | 0 | 502 | 83 | 435 | 0 | 0 | 0 | 0 | 0 | 352 | 149 | 1714 |
| 730-830 | 190 | 0 | 547 | 98 | 512 | 0 | 0 | 0 | 0 | 0 | 429 | 163 | 1939 |
| 745-845 | 184 | 0 | 619 | 109 | 555 | 0 | 0 | 0 | 0 | 0 | 469 | 161 | 2097 |
| 800-900 | 167 | 0 | 648 | 104 | 568 | 0 | 0 | 0 | 0 | 0 | 483 | 166 | 2136 |

PHF 0.835 0.848168 0.83871 0.8875 0.894444 0.768519



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 3 | 1 | 0 | 1 | 5 |
| 715-730 | 4 | 0 | 0 | 1 | 5 |
| 730-745 | 5 | 2 | 0 | 5 | 12 |
| 745-800 | 2 | 1 | 0 | 10 | 13 |
| 800-815 | 6 | 0 | 0 | 7 | 13 |
| 815-830 | 7 | 1 | 0 | 7 | 15 |
| 830-845 | 12 | 1 | 0 | 2 | 15 |
| 845-900 | 7 | 2 | 0 | 2 | 11 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 14 | 4 | 0 | 17 | 35 |
| 715-815 | 17 | 3 | 0 | 23 | 43 |
| 730-830 | 20 | 4 | 0 | 29 | 53 |
| 745-845 | 27 | 3 | 0 | 26 | 56 |
| 800-900 | 32 | 4 | 0 | 18 | 54 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 1 | 0 | 0 | 0 | 1 |
| 715-730 | 0 | 1 | 0 | 3 | 4 |
| 730-745 | 3 | 0 | 0 | 3 | 6 |
| 745-800 | 1 | 0 | 0 | 2 | 3 |
| 800-815 | 2 | 0 | 0 | 0 | 2 |
| 815-830 | 2 | 0 | 0 | 9 | 11 |
| 830-845 | 4 | 1 | 0 | 5 | 10 |
| 845-900 | 7 | 1 | 0 | 4 | 12 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 5 | 1 | 0 | 8 | 14 |
| 715-815 | 6 | 1 | 0 | 8 | 15 |
| 730-830 | 8 | 0 | 0 | 14 | 22 |
| 745-845 | 9 | 1 | 0 | 16 | 26 |
| 800-900 | 15 | 2 | 0 | 18 | 35 |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Northgate Ave & West Grand Ave

Date: 05/22/2008

| | Northgate Ave Southbound | | | | West Grand Ave Westbound | | | | Northgate Ave Northbound | | | | West Grand Ave Eastbound | | | | |
|------------|--------------------------|------|-------|------------|--------------------------|------|-------|------------|--------------------------|------|-------|------------|--------------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 92 | 0 | 42 | 134 | 0 | 51 | 13 | 64 | 0 | 0 | 0 | 0 | 17 | 57 | 0 | 74 | 272 |
| 7:15 | 97 | 0 | 52 | 149 | 0 | 99 | 13 | 112 | 0 | 0 | 1 | 1 | 17 | 61 | 0 | 78 | 340 |
| 7:30 | 114 | 0 | 42 | 156 | 0 | 80 | 21 | 101 | 1 | 0 | 1 | 2 | 20 | 66 | 0 | 86 | 345 |
| 7:45 | 122 | 0 | 38 | 160 | 0 | 129 | 23 | 152 | 0 | 0 | 1 | 1 | 21 | 81 | 0 | 102 | 415 |
| Total | 425 | 0 | 174 | 599 | 0 | 359 | 70 | 429 | 1 | 0 | 3 | 4 | 75 | 265 | 0 | 340 | 1372 |
| 8:00 | 156 | 0 | 40 | 196 | 0 | 105 | 22 | 127 | 0 | 0 | 0 | 0 | 30 | 81 | 0 | 111 | 434 |
| 8:15 | 179 | 0 | 47 | 226 | 0 | 139 | 30 | 169 | 0 | 0 | 1 | 1 | 32 | 94 | 0 | 126 | 522 |
| 8:30 | 165 | 0 | 42 | 207 | 0 | 133 | 16 | 149 | 0 | 0 | 0 | 0 | 25 | 117 | 0 | 142 | 498 |
| 8:45 | 147 | 0 | 39 | 186 | 0 | 119 | 16 | 135 | 1 | 0 | 0 | 1 | 33 | 108 | 0 | 141 | 463 |
| Total | 647 | 0 | 168 | 815 | 0 | 496 | 84 | 580 | 1 | 0 | 1 | 2 | 120 | 400 | 0 | 520 | 1917 |
| 16:00 | 44 | 0 | 18 | 62 | 2 | 110 | 69 | 181 | 0 | 0 | 2 | 2 | 51 | 93 | 0 | 144 | 389 |
| 16:15 | 32 | 0 | 21 | 53 | 0 | 127 | 86 | 213 | 0 | 0 | 0 | 0 | 57 | 95 | 0 | 152 | 418 |
| 16:30 | 44 | 0 | 21 | 65 | 0 | 124 | 91 | 215 | 0 | 1 | 0 | 1 | 79 | 115 | 0 | 194 | 475 |
| 16:45 | 55 | 0 | 26 | 81 | 0 | 122 | 91 | 213 | 0 | 0 | 1 | 1 | 54 | 117 | 0 | 171 | 466 |
| Total | 175 | 0 | 86 | 261 | 2 | 483 | 337 | 822 | 0 | 1 | 3 | 4 | 241 | 420 | 0 | 661 | 1748 |
| 17:00 | 27 | 1 | 18 | 46 | 0 | 136 | 90 | 226 | 0 | 0 | 0 | 0 | 57 | 123 | 0 | 180 | 452 |
| 17:15 | 32 | 0 | 24 | 56 | 0 | 146 | 94 | 240 | 0 | 0 | 0 | 0 | 44 | 130 | 1 | 175 | 471 |
| 17:30 | 27 | 0 | 19 | 46 | 0 | 138 | 97 | 235 | 0 | 0 | 0 | 0 | 41 | 132 | 0 | 173 | 454 |
| 17:45 | 31 | 0 | 23 | 54 | 0 | 135 | 58 | 193 | 0 | 0 | 0 | 0 | 46 | 121 | 0 | 167 | 414 |
| Total | 117 | 1 | 84 | 202 | 0 | 555 | 339 | 894 | 0 | 0 | 0 | 0 | 188 | 506 | 1 | 695 | 1791 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|------|
| Grand Total | 1364 | 1 | 512 | 1877 | 2 | 1893 | 830 | 2725 | 2 | 1 | 7 | 10 | 624 | 1591 | 1 | 2216 | 6828 |
| Apprch% | #### | 0.1% | 27.3% | | 0.1% | 69.5% | 30.5% | | 20.0% | 10.0% | 70.0% | | 28.2% | 71.8% | 0.0% | | |
| Total % | #### | 0.0% | 7.5% | 27.5% | 0.0% | 27.7% | 12.2% | 39.9% | 0.0% | 0.0% | 0.1% | 0.1% | 9.1% | 23.3% | 0.0% | 32.5% | |

City of Oakland

Northgate Ave & West Grand Ave

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| | Northgate Ave Southbound | | | | West Grand Ave Westbound | | | | Northgate Ave Northbound | | | | West Grand Ave Eastbound | | | | |
|--------------|--------------------------|------|-------|------------|--------------------------|-------|-------|------------|--------------------------|------|-------|------------|--------------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 156 | 0 | 40 | 196 | 0 | 105 | 22 | 127 | 0 | 0 | 0 | 0 | 30 | 81 | 0 | 111 | 434 |
| 815 | 179 | 0 | 47 | 226 | 0 | 139 | 30 | 169 | 0 | 0 | 1 | 1 | 32 | 94 | 0 | 126 | 522 |
| 830 | 165 | 0 | 42 | 207 | 0 | 133 | 16 | 149 | 0 | 0 | 0 | 0 | 25 | 117 | 0 | 142 | 498 |
| 845 | 147 | 0 | 39 | 186 | 0 | 119 | 16 | 135 | 1 | 0 | 0 | 1 | 33 | 108 | 0 | 141 | 463 |
| Total Volume | 647 | 0 | 168 | 815 | 0 | 496 | 84 | 580 | 1 | 0 | 1 | 2 | 120 | 400 | 0 | 520 | 1917 |
| % App Total. | #### | 0.0% | 20.6% | | 0.0% | 85.5% | 14.5% | | 50.0% | 0.0% | 50.0% | | 23.1% | 76.9% | 0.0% | | |
| PHF | 0.902 | | | | 0.858 | | | | 0.500 | | | | 0.915 | | | | |

PM Peak Hr Begins at 430 PM

| | Northgate Ave Southbound | | | | West Grand Ave Westbound | | | | Northgate Ave Northbound | | | | West Grand Ave Eastbound | | | | |
|--------------|--------------------------|------|-------|------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 430 | 44 | 0 | 21 | 65 | 0 | 124 | 91 | 215 | 0 | 1 | 0 | 1 | 79 | 115 | 0 | 194 | 475 |
| 445 | 55 | 0 | 26 | 81 | 0 | 122 | 91 | 213 | 0 | 0 | 1 | 1 | 54 | 117 | 0 | 171 | 466 |
| 500 | 27 | 1 | 18 | 46 | 0 | 136 | 90 | 226 | 0 | 0 | 0 | 0 | 57 | 123 | 0 | 180 | 452 |
| 515 | 32 | 0 | 24 | 56 | 0 | 146 | 94 | 240 | 0 | 0 | 0 | 0 | 44 | 130 | 1 | 175 | 471 |
| Total Volume | 158 | 1 | 89 | 248 | 0 | 528 | 366 | 894 | 0 | 1 | 1 | 2 | 234 | 485 | 1 | 720 | 1864 |
| % App Total. | #### | 0.4% | 35.9% | | 0.0% | 59.1% | 40.9% | | 0.0% | 50.0% | 50.0% | | 32.5% | 67.4% | 0.1% | | |
| PHF | 0.765 | | | | 0.931 | | | | 0.500 | | | | 0.928 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Telegraph Ave & West Grand Ave

Date: 05/22/2008

| | Telegraph Ave Southbound | | | | West Grand Ave Westbound | | | | Telegraph Ave Northbound | | | | West Grand Ave Eastbound | | | | |
|------------|--------------------------|------|-------|------------|--------------------------|------|-------|------------|--------------------------|------|-------|------------|--------------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 8 | 33 | 9 | 50 | 3 | 38 | 7 | 48 | 12 | 29 | 3 | 44 | 16 | 74 | 37 | 127 | 269 |
| 7:15 | 9 | 47 | 10 | 66 | 8 | 78 | 14 | 100 | 36 | 41 | 4 | 81 | 17 | 99 | 42 | 158 | 405 |
| 7:30 | 9 | 53 | 10 | 72 | 7 | 63 | 9 | 79 | 31 | 49 | 9 | 89 | 24 | 121 | 45 | 190 | 430 |
| 7:45 | 9 | 66 | 17 | 92 | 11 | 86 | 18 | 115 | 54 | 53 | 7 | 114 | 23 | 118 | 69 | 210 | 531 |
| Total | 35 | 199 | 46 | 280 | 29 | 265 | 48 | 342 | 133 | 172 | 23 | 328 | 80 | 412 | 193 | 685 | 1635 |
| 8:00 | 21 | 74 | 21 | 116 | 13 | 81 | 10 | 104 | 37 | 57 | 4 | 98 | 13 | 169 | 80 | 262 | 580 |
| 8:15 | 18 | 82 | 12 | 112 | 13 | 107 | 18 | 138 | 52 | 52 | 6 | 110 | 30 | 171 | 64 | 265 | 625 |
| 8:30 | 17 | 68 | 14 | 99 | 15 | 81 | 8 | 104 | 37 | 51 | 6 | 94 | 27 | 172 | 89 | 288 | 585 |
| 8:45 | 17 | 76 | 18 | 111 | 17 | 87 | 19 | 123 | 44 | 57 | 10 | 111 | 22 | 147 | 70 | 239 | 584 |
| Total | 73 | 300 | 65 | 438 | 58 | 356 | 55 | 469 | 170 | 217 | 26 | 413 | 92 | 659 | 303 | 1054 | 2374 |
| 16:00 | 32 | 69 | 29 | 130 | 2 | 141 | 20 | 163 | 21 | 101 | 4 | 126 | 10 | 97 | 4 | 111 | 530 |
| 16:15 | 15 | 79 | 22 | 116 | 5 | 164 | 21 | 190 | 13 | 94 | 7 | 114 | 8 | 129 | 2 | 139 | 559 |
| 16:30 | 25 | 73 | 18 | 116 | 4 | 162 | 19 | 185 | 19 | 104 | 11 | 134 | 9 | 148 | 6 | 163 | 598 |
| 16:45 | 27 | 95 | 22 | 144 | 4 | 174 | 17 | 195 | 18 | 118 | 8 | 144 | 4 | 136 | 3 | 143 | 626 |
| Total | 99 | 316 | 91 | 506 | 15 | 641 | 77 | 733 | 71 | 417 | 30 | 518 | 31 | 510 | 15 | 556 | 2313 |
| 17:00 | 28 | 92 | 16 | 136 | 7 | 189 | 28 | 224 | 22 | 112 | 2 | 136 | 9 | 181 | 8 | 198 | 694 |
| 17:15 | 33 | 87 | 20 | 140 | 1 | 164 | 29 | 194 | 23 | 140 | 7 | 170 | 7 | 117 | 5 | 129 | 633 |
| 17:30 | 27 | 87 | 31 | 145 | 4 | 166 | 25 | 195 | 17 | 107 | 11 | 135 | 3 | 145 | 11 | 159 | 634 |
| 17:45 | 20 | 66 | 28 | 114 | 5 | 172 | 29 | 206 | 18 | 119 | 3 | 140 | 12 | 126 | 11 | 149 | 609 |
| Total | 108 | 332 | 95 | 535 | 17 | 691 | 111 | 819 | 80 | 478 | 23 | 581 | 31 | 569 | 35 | 635 | 2570 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|-------|------|-------|-------|-------|------|
| Grand Total | 315 | 1147 | 297 | 1759 | 119 | 1953 | 291 | 2363 | 454 | 1284 | 102 | 1840 | 234 | 2150 | 546 | 2930 | 8892 |
| Apprch% | #### | 65.2% | 16.9% | | 5.0% | 82.6% | 12.3% | | 24.7% | 69.8% | 5.5% | | 8.0% | 73.4% | 18.6% | | |
| Total % | 3.5% | 12.9% | 3.3% | 19.8% | 1.3% | 22.0% | 3.3% | 26.6% | 5.1% | 14.4% | 1.1% | 20.7% | 2.6% | 24.2% | 6.1% | 33.0% | |

City of Oakland

Telegraph Ave & West Grand Ave

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| | Telegraph Ave Southbound | | | | West Grand Ave Westbound | | | | Telegraph Ave Northbound | | | | West Grand Ave Eastbound | | | | |
|--------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 21 | 74 | 21 | 116 | 13 | 81 | 10 | 104 | 37 | 57 | 4 | 98 | 13 | 169 | 80 | 262 | 580 |
| 815 | 18 | 82 | 12 | 112 | 13 | 107 | 18 | 138 | 52 | 52 | 6 | 110 | 30 | 171 | 64 | 265 | 625 |
| 830 | 17 | 68 | 14 | 99 | 15 | 81 | 8 | 104 | 37 | 51 | 6 | 94 | 27 | 172 | 89 | 288 | 585 |
| 845 | 17 | 76 | 18 | 111 | 17 | 87 | 19 | 123 | 44 | 57 | 10 | 111 | 22 | 147 | 70 | 239 | 584 |
| Total Volume | 73 | 300 | 65 | 438 | 58 | 356 | 55 | 469 | 170 | 217 | 26 | 413 | 92 | 659 | 303 | 1054 | 2374 |
| % App Total. | #### | 68.5% | 14.8% | | 12.4% | 75.9% | 11.7% | | 41.2% | 52.5% | 6.3% | | 8.7% | 62.5% | 28.7% | | |
| PHF | 0.944 | | | | 0.850 | | | | 0.930 | | | | 0.915 | | | | |

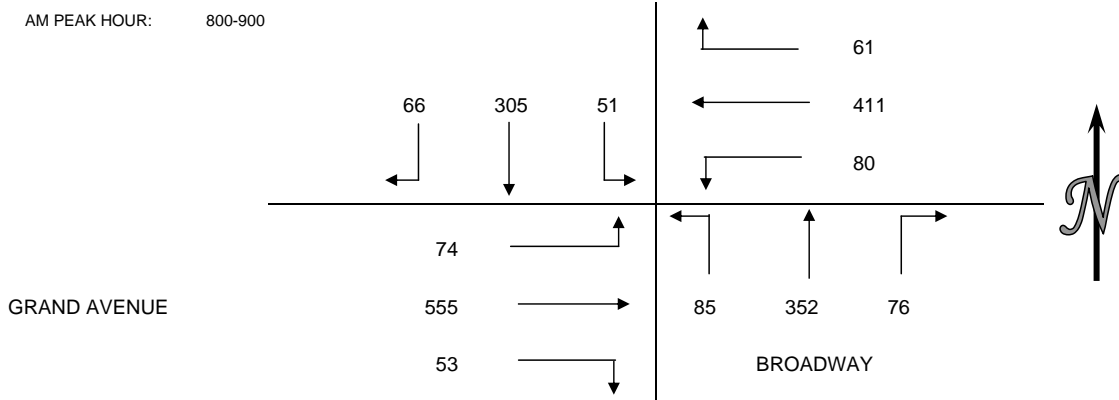
PM Peak Hr Begins at 445 PM

| | Telegraph Ave Southbound | | | | West Grand Ave Westbound | | | | Telegraph Ave Northbound | | | | West Grand Ave Eastbound | | | | |
|--------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|--------------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 445 | 27 | 95 | 22 | 144 | 4 | 174 | 17 | 195 | 18 | 118 | 8 | 144 | 4 | 136 | 3 | 143 | 626 |
| 500 | 28 | 92 | 16 | 136 | 7 | 189 | 28 | 224 | 22 | 112 | 2 | 136 | 9 | 181 | 8 | 198 | 694 |
| 515 | 33 | 87 | 20 | 140 | 1 | 164 | 29 | 194 | 23 | 140 | 7 | 170 | 7 | 117 | 5 | 129 | 633 |
| 530 | 27 | 87 | 31 | 145 | 4 | 166 | 25 | 195 | 17 | 107 | 11 | 135 | 3 | 145 | 11 | 159 | 634 |
| Total Volume | 115 | 361 | 89 | 565 | 16 | 693 | 99 | 808 | 80 | 477 | 28 | 585 | 23 | 579 | 27 | 629 | 2587 |
| % App Total. | #### | 63.9% | 15.8% | | 2.0% | 85.8% | 12.3% | | 13.7% | 81.5% | 4.8% | | 3.7% | 92.1% | 4.3% | | |
| PHF | 0.974 | | | | 0.902 | | | | 0.860 | | | | 0.794 | | | | |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: TUESDAY OCTOBER 21, 2008
 PERIOD: 7:00 AM TO 9:00 AM
 INTERSECTION: N/S BROADWAY
 E/W GRAND AVENUE
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-715 | 11 | 21 | 7 | 4 | 81 | 11 | 10 | 49 | 20 | 5 | 72 | 11 | 302 |
| 715-730 | 12 | 33 | 5 | 7 | 89 | 13 | 17 | 58 | 13 | 7 | 69 | 11 | 334 |
| 730-745 | 14 | 41 | 6 | 9 | 97 | 15 | 14 | 73 | 17 | 18 | 94 | 13 | 411 |
| 745-800 | 12 | 55 | 8 | 6 | 97 | 24 | 12 | 97 | 24 | 15 | 109 | 20 | 479 |
| 800-815 | 17 | 72 | 23 | 17 | 100 | 24 | 10 | 93 | 23 | 9 | 140 | 12 | 540 |
| 815-830 | 20 | 74 | 10 | 13 | 114 | 21 | 17 | 83 | 14 | 17 | 151 | 26 | 560 |
| 830-845 | 13 | 87 | 9 | 14 | 102 | 21 | 20 | 96 | 14 | 9 | 133 | 16 | 534 |
| 845-900 | 16 | 72 | 9 | 17 | 95 | 14 | 29 | 80 | 34 | 18 | 131 | 20 | 535 |
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-800 | 49 | 150 | 26 | 26 | 364 | 63 | 53 | 277 | 74 | 45 | 344 | 55 | 1526 |
| 715-815 | 55 | 201 | 42 | 39 | 383 | 76 | 53 | 321 | 77 | 49 | 412 | 56 | 1764 |
| 730-830 | 63 | 242 | 47 | 45 | 408 | 84 | 53 | 346 | 78 | 59 | 494 | 71 | 1990 |
| 745-845 | 62 | 288 | 50 | 50 | 413 | 90 | 59 | 369 | 75 | 50 | 533 | 74 | 2113 |
| 800-900 | 66 | 305 | 51 | 61 | 411 | 80 | 76 | 352 | 85 | 53 | 555 | 74 | 2169 |



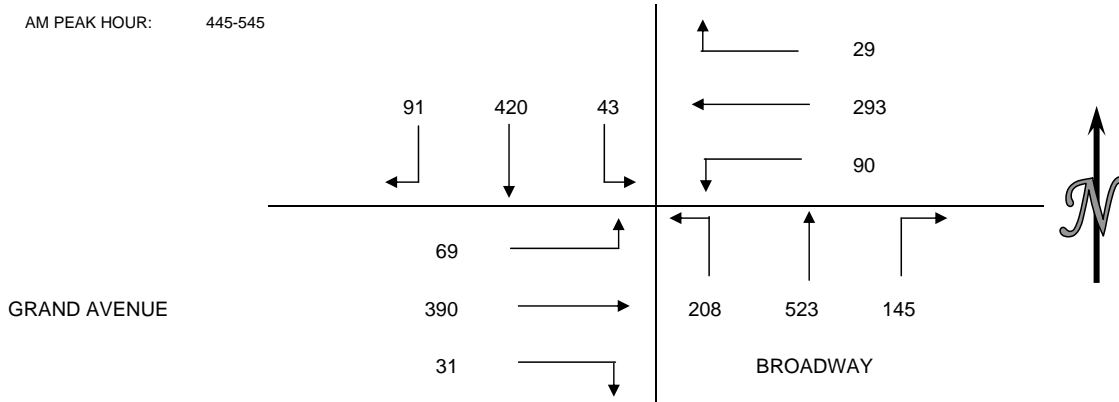
| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 5 | 6 | 6 | 8 | 25 |
| 715-730 | 5 | 14 | 8 | 20 | 47 |
| 730-745 | 9 | 19 | 19 | 16 | 63 |
| 745-800 | 7 | 13 | 11 | 14 | 45 |
| 800-815 | 16 | 14 | 9 | 7 | 46 |
| 815-830 | 12 | 14 | 10 | 20 | 56 |
| 830-845 | 8 | 10 | 13 | 15 | 46 |
| 845-900 | 10 | 27 | 15 | 15 | 67 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 26 | 52 | 44 | 58 | 180 |
| 715-815 | 37 | 60 | 47 | 57 | 201 |
| 730-830 | 44 | 60 | 49 | 57 | 210 |
| 745-845 | 43 | 51 | 43 | 56 | 193 |
| 800-900 | 46 | 65 | 47 | 57 | 215 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 1 | 0 | 1 | 1 | 3 |
| 715-730 | 0 | 2 | 2 | 1 | 5 |
| 730-745 | 1 | 0 | 0 | 3 | 4 |
| 745-800 | 4 | 3 | 2 | 5 | 14 |
| 800-815 | 8 | 4 | 1 | 6 | 19 |
| 815-830 | 5 | 6 | 2 | 6 | 19 |
| 830-845 | 4 | 4 | 2 | 4 | 14 |
| 845-900 | 4 | 1 | 4 | 6 | 15 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 6 | 5 | 5 | 10 | 26 |
| 715-815 | 13 | 9 | 5 | 15 | 42 |
| 730-830 | 18 | 13 | 5 | 20 | 56 |
| 745-845 | 21 | 17 | 7 | 21 | 66 |
| 800-900 | 21 | 15 | 9 | 22 | 67 |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: TUESDAY OCTOBER 21, 2008
 PERIOD: 4:00 PM TO 6:00 PM
 INTERSECTION: N/S BROADWAY
 E/W GRAND AVENUE
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-415 | 22 | 94 | 9 | 16 | 50 | 19 | 15 | 138 | 50 | 7 | 90 | 29 | 539 |
| 415-430 | 21 | 94 | 5 | 8 | 71 | 11 | 27 | 125 | 65 | 13 | 81 | 20 | 541 |
| 430-445 | 19 | 83 | 7 | 6 | 60 | 23 | 34 | 135 | 54 | 8 | 97 | 15 | 541 |
| 445-500 | 19 | 97 | 8 | 3 | 71 | 19 | 46 | 137 | 50 | 7 | 91 | 11 | 559 |
| 500-515 | 21 | 98 | 8 | 14 | 69 | 16 | 31 | 120 | 60 | 12 | 107 | 17 | 573 |
| 515-530 | 24 | 108 | 19 | 4 | 81 | 19 | 33 | 135 | 53 | 7 | 93 | 17 | 593 |
| 530-545 | 27 | 117 | 8 | 8 | 72 | 36 | 35 | 131 | 45 | 5 | 99 | 24 | 607 |
| 545-600 | 21 | 100 | 11 | 5 | 65 | 11 | 14 | 124 | 43 | 6 | 96 | 20 | 516 |
| HOUR TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-500 | 81 | 368 | 29 | 33 | 252 | 72 | 122 | 535 | 219 | 35 | 359 | 75 | 2180 |
| 415-515 | 80 | 372 | 28 | 31 | 271 | 69 | 138 | 517 | 229 | 40 | 376 | 63 | 2214 |
| 430-530 | 83 | 386 | 42 | 27 | 281 | 77 | 144 | 527 | 217 | 34 | 388 | 60 | 2266 |
| 445-545 | 91 | 420 | 43 | 29 | 293 | 90 | 145 | 523 | 208 | 31 | 390 | 69 | 2332 |
| 500-600 | 93 | 423 | 46 | 31 | 287 | 82 | 113 | 510 | 201 | 30 | 395 | 78 | 2289 |



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 7 | 28 | 17 | 6 | 58 |
| 415-430 | 9 | 26 | 12 | 12 | 59 |
| 430-445 | 5 | 40 | 18 | 6 | 69 |
| 445-500 | 8 | 44 | 22 | 9 | 83 |
| 500-515 | 7 | 37 | 37 | 7 | 88 |
| 515-530 | 5 | 15 | 6 | 5 | 31 |
| 530-545 | 7 | 45 | 16 | 14 | 82 |
| 545-600 | 4 | 11 | 9 | 6 | 30 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 29 | 138 | 69 | 33 | 269 |
| 415-515 | 29 | 147 | 89 | 34 | 299 |
| 430-530 | 25 | 136 | 83 | 27 | 271 |
| 445-545 | 27 | 141 | 81 | 35 | 284 |
| 500-600 | 23 | 108 | 68 | 32 | 231 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 4 | 5 | 3 | 4 | 16 |
| 415-430 | 5 | 6 | 3 | 7 | 21 |
| 430-445 | 4 | 9 | 3 | 5 | 21 |
| 445-500 | 4 | 10 | 2 | 4 | 20 |
| 500-515 | 4 | 8 | 5 | 6 | 23 |
| 515-530 | 4 | 16 | 5 | 3 | 28 |
| 530-545 | 3 | 18 | 9 | 4 | 34 |
| 545-600 | 3 | 31 | 6 | 4 | 44 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 17 | 30 | 11 | 20 | 78 |
| 415-515 | 17 | 33 | 13 | 22 | 85 |
| 430-530 | 16 | 43 | 15 | 18 | 92 |
| 445-545 | 15 | 52 | 21 | 17 | 105 |
| 500-600 | 14 | 73 | 25 | 17 | 129 |

All Traffic Data

(916) 771-8700

F (916) 786-2879

OAKLAND

File Name : 08-7458-004 WEBSTER-GRAND-F

Site Code : 00000000

Start Date : 08/06/2008

Page No : 1

Groups Printed- Unshifted

| | WEB Southbound | | | | | GRAND DS Westbound | | | | | WEB Northbound | | | | | GRAND DS Eastbound | | | | | | | |
|------------|----------------|------|-------|------|------------|--------------------|------|-------|------|------------|----------------|------|-------|------|------------|--------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 4 | 11 | 2 | 6 | 17 | 10 | 29 | 2 | 7 | 41 | 0 | 0 | 0 | 4 | 0 | 1 | 21 | 23 | 6 | 45 | 23 | 103 | 126 |
| 07:15 | 3 | 10 | 2 | 10 | 15 | 10 | 37 | 0 | 10 | 47 | 0 | 0 | 0 | 1 | 0 | 0 | 27 | 24 | 7 | 51 | 28 | 113 | 141 |
| 07:30 | 8 | 13 | 4 | 14 | 25 | 21 | 76 | 0 | 6 | 97 | 0 | 0 | 0 | 4 | 0 | 2 | 58 | 39 | 14 | 99 | 38 | 221 | 259 |
| 07:45 | 2 | 30 | 5 | 43 | 37 | 20 | 81 | 1 | 20 | 102 | 0 | 0 | 0 | 5 | 0 | 0 | 64 | 69 | 23 | 133 | 91 | 272 | 363 |
| Total | 17 | 64 | 13 | 73 | 94 | 61 | 223 | 3 | 43 | 287 | 0 | 0 | 0 | 14 | 0 | 3 | 170 | 155 | 50 | 328 | 180 | 709 | 889 |
| 08:00 | 2 | 31 | 2 | 44 | 35 | 23 | 92 | 0 | 12 | 115 | 0 | 0 | 0 | 6 | 0 | 0 | 84 | 68 | 4 | 152 | 66 | 302 | 368 |
| 08:15 | 1 | 35 | 2 | 52 | 38 | 23 | 103 | 0 | 27 | 126 | 0 | 0 | 0 | 15 | 0 | 0 | 75 | 72 | 24 | 147 | 118 | 311 | 429 |
| 08:30 | 4 | 31 | 5 | 54 | 40 | 30 | 94 | 0 | 8 | 124 | 0 | 0 | 0 | 8 | 0 | 0 | 88 | 65 | 14 | 153 | 84 | 317 | 401 |
| 08:45 | 1 | 30 | 6 | 52 | 37 | 25 | 84 | 0 | 9 | 109 | 0 | 0 | 0 | 13 | 0 | 0 | 81 | 60 | 10 | 141 | 84 | 287 | 371 |
| Total | 8 | 127 | 15 | 202 | 150 | 101 | 373 | 0 | 56 | 474 | 0 | 0 | 0 | 42 | 0 | 0 | 328 | 265 | 52 | 593 | 352 | 1217 | 1569 |

*** BREAK ***

| | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|------|------|------|-----|------|-----|------|-----|-----|------|---|---|---|-----|---|-----|------|------|-----|------|------|------|------|
| 16:00 | 6 | 45 | 9 | 7 | 60 | 28 | 49 | 0 | 3 | 77 | 0 | 0 | 0 | 11 | 0 | 0 | 96 | 47 | 33 | 143 | 54 | 280 | 334 |
| 16:15 | 10 | 37 | 7 | 12 | 54 | 25 | 69 | 0 | 8 | 94 | 0 | 0 | 0 | 30 | 0 | 1 | 111 | 41 | 43 | 153 | 93 | 301 | 394 |
| 16:30 | 5 | 55 | 12 | 11 | 72 | 25 | 68 | 0 | 3 | 93 | 0 | 0 | 0 | 25 | 0 | 0 | 107 | 33 | 39 | 140 | 78 | 305 | 383 |
| 16:45 | 9 | 42 | 6 | 8 | 57 | 32 | 68 | 1 | 2 | 101 | 0 | 0 | 0 | 16 | 0 | 1 | 125 | 53 | 28 | 179 | 54 | 337 | 391 |
| Total | 30 | 179 | 34 | 38 | 243 | 110 | 254 | 1 | 16 | 365 | 0 | 0 | 0 | 82 | 0 | 2 | 439 | 174 | 143 | 615 | 279 | 1223 | 1502 |
| 17:00 | 12 | 44 | 18 | 6 | 74 | 25 | 70 | 0 | 6 | 95 | 0 | 0 | 0 | 24 | 0 | 3 | 144 | 47 | 71 | 194 | 107 | 363 | 470 |
| 17:15 | 21 | 49 | 20 | 3 | 90 | 23 | 91 | 2 | 4 | 116 | 0 | 0 | 0 | 10 | 0 | 1 | 142 | 41 | 44 | 184 | 61 | 390 | 451 |
| 17:30 | 18 | 51 | 5 | 4 | 74 | 27 | 88 | 0 | 3 | 115 | 0 | 0 | 0 | 16 | 0 | 1 | 142 | 35 | 45 | 178 | 68 | 367 | 435 |
| 17:45 | 11 | 48 | 12 | 9 | 71 | 25 | 70 | 0 | 2 | 95 | 0 | 0 | 0 | 23 | 0 | 0 | 142 | 40 | 53 | 182 | 87 | 348 | 435 |
| Total | 62 | 192 | 55 | 22 | 309 | 100 | 319 | 2 | 15 | 421 | 0 | 0 | 0 | 73 | 0 | 5 | 570 | 163 | 213 | 738 | 323 | 1468 | 1791 |
| Grand Total | 117 | 562 | 117 | 335 | 796 | 372 | 1169 | 6 | 130 | 1547 | 0 | 0 | 0 | 211 | 0 | 10 | 1507 | 757 | 458 | 2274 | 1134 | 4617 | 5751 |
| Apprch % | 14.7 | 70.6 | 14.7 | | | 24 | 75.6 | 0.4 | | | 0 | 0 | 0 | | | 0.4 | 66.3 | 33.3 | | | | | |
| Total % | 2.5 | 12.2 | 2.5 | | 17.2 | 8.1 | 25.3 | 0.1 | | 33.5 | 0 | 0 | 0 | | 0 | 0.2 | 32.6 | 16.4 | | 49.3 | 19.7 | 80.3 | |

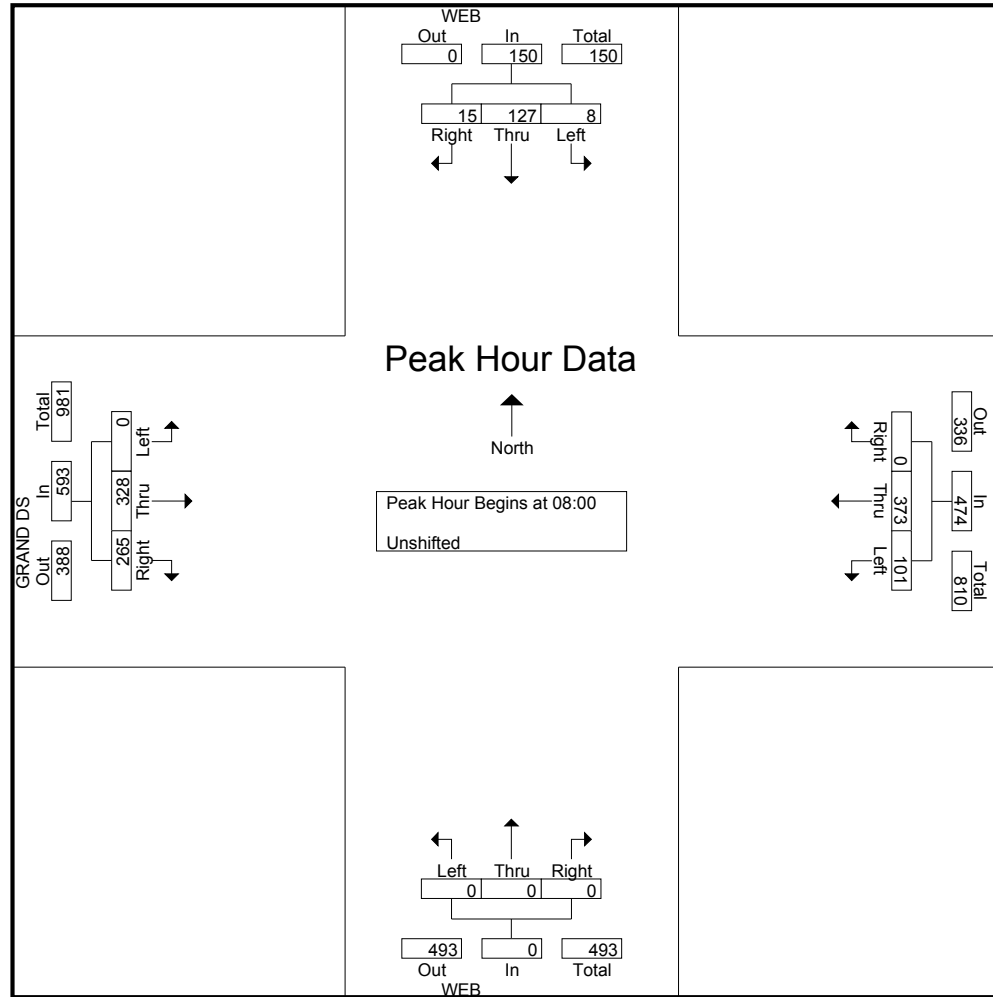
| | WEB Southbound | | | | GRAND DS Westbound | | | | WEB Northbound | | | | GRAND DS Eastbound | | | | |
|--|----------------|-----------|----------|------------|--------------------|------------|-------|------------|----------------|------|-------|------------|--------------------|-----------|-----------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 2 | 31 | 2 | 35 | 23 | 92 | 0 | 115 | 0 | 0 | 0 | 0 | 0 | 84 | 68 | 152 | 302 |
| 08:15 | 1 | 35 | 2 | 38 | 23 | 103 | 0 | 126 | 0 | 0 | 0 | 0 | 0 | 75 | 72 | 147 | 311 |
| 08:30 | 4 | 31 | 5 | 40 | 30 | 94 | 0 | 124 | 0 | 0 | 0 | 0 | 0 | 88 | 65 | 153 | 317 |
| 08:45 | 1 | 30 | 6 | 37 | 25 | 84 | 0 | 109 | 0 | 0 | 0 | 0 | 0 | 81 | 60 | 141 | 287 |
| Total Volume | 8 | 127 | 15 | 150 | 101 | 373 | 0 | 474 | 0 | 0 | 0 | 0 | 0 | 328 | 265 | 593 | 1217 |
| % App. Total | 5.3 | 84.7 | 10 | | 21.3 | 78.7 | 0 | | 0 | 0 | 0 | | 0 | 55.3 | 44.7 | | |
| PHF | .500 | .907 | .625 | .938 | .842 | .905 | .000 | .940 | .000 | .000 | .000 | .000 | .000 | .932 | .920 | .969 | .960 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-004 WEBSTER-GRAND-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

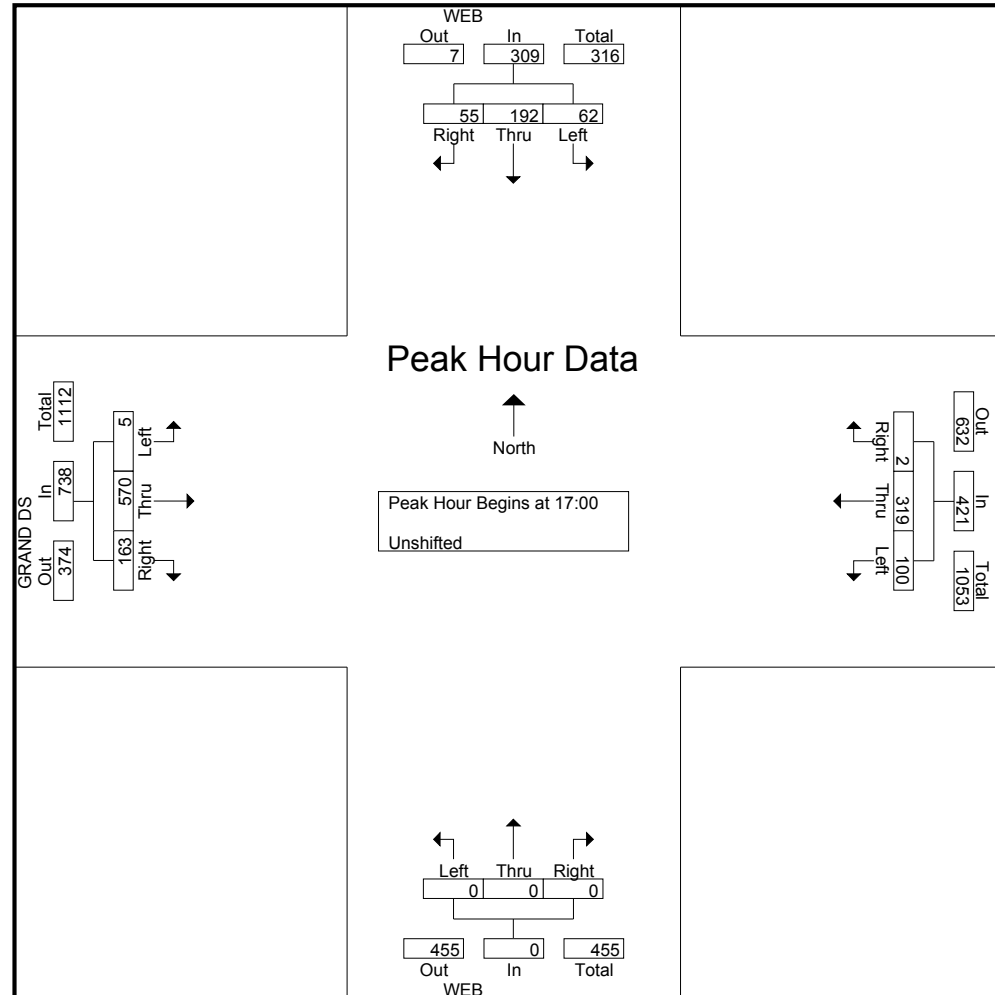
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 12 | 44 | 18 | 74 | 25 | 70 | 0 | 95 | 0 | 0 | 0 | 0 | 3 | 144 | 47 | 194 | 363 |
| 17:15 | 21 | 49 | 20 | 90 | 23 | 91 | 2 | 116 | 0 | 0 | 0 | 0 | 1 | 142 | 41 | 184 | 390 |
| 17:30 | 18 | 51 | 5 | 74 | 27 | 88 | 0 | 115 | 0 | 0 | 0 | 0 | 1 | 142 | 35 | 178 | 367 |
| 17:45 | 11 | 48 | 12 | 71 | 25 | 70 | 0 | 95 | 0 | 0 | 0 | 0 | 0 | 142 | 40 | 182 | 348 |
| Total Volume | 62 | 192 | 55 | 309 | 100 | 319 | 2 | 421 | 0 | 0 | 0 | 0 | 5 | 570 | 163 | 738 | 1468 |
| % App. Total | 20.1 | 62.1 | 17.8 | | 23.8 | 75.8 | 0.5 | | 0 | 0 | 0 | | 0.7 | 77.2 | 22.1 | | |
| PHF | .738 | .941 | .688 | .858 | .926 | .876 | .250 | .907 | .000 | .000 | .000 | .000 | .417 | .990 | .867 | .951 | .941 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-004 WEBSTER-GRAND-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Harrison St & Grand Ave

Date: 5/22/2008

| | Harrison St Southbound | | | | Grand Ave Westbound | | | | Harrison St Northbound | | | | Grand Ave Eastbound | | | | |
|------------|------------------------|------|-------|------------|---------------------|------|-------|------------|------------------------|------|-------|------------|---------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 1 | 82 | 10 | 93 | 37 | 50 | 8 | 95 | 8 | 74 | 40 | 122 | 5 | 26 | 6 | 37 | 347 |
| 7:15 | 1 | 107 | 17 | 125 | 47 | 63 | 2 | 112 | 15 | 83 | 35 | 133 | 2 | 22 | 11 | 35 | 405 |
| 7:30 | 1 | 126 | 25 | 152 | 61 | 95 | 4 | 160 | 26 | 124 | 43 | 193 | 10 | 29 | 11 | 50 | 555 |
| 7:45 | 0 | 157 | 19 | 176 | 81 | 96 | 7 | 184 | 22 | 133 | 58 | 213 | 9 | 31 | 25 | 65 | 638 |
| Total | 3 | 472 | 71 | 546 | 226 | 304 | 21 | 551 | 71 | 414 | 176 | 661 | 26 | 108 | 53 | 187 | 1945 |
| 8:00 | 7 | 146 | 12 | 165 | 81 | 105 | 24 | 210 | 25 | 142 | 73 | 240 | 16 | 39 | 15 | 70 | 685 |
| 8:15 | 7 | 138 | 24 | 169 | 97 | 145 | 49 | 291 | 25 | 180 | 70 | 275 | 18 | 29 | 13 | 60 | 795 |
| 8:30 | 14 | 142 | 21 | 177 | 86 | 119 | 21 | 226 | 31 | 175 | 89 | 295 | 10 | 27 | 12 | 49 | 747 |
| 8:45 | 11 | 130 | 18 | 159 | 76 | 84 | 16 | 176 | 28 | 165 | 58 | 251 | 7 | 19 | 10 | 36 | 622 |
| Total | 39 | 556 | 75 | 670 | 340 | 453 | 110 | 903 | 109 | 662 | 290 | 1061 | 51 | 114 | 50 | 215 | 2849 |
| 16:00 | 1 | 75 | 18 | 94 | 56 | 65 | 9 | 130 | 2 | 238 | 95 | 335 | 22 | 80 | 25 | 127 | 686 |
| 16:15 | 1 | 88 | 14 | 103 | 64 | 70 | 13 | 147 | 2 | 217 | 146 | 365 | 32 | 80 | 30 | 142 | 757 |
| 16:30 | 0 | 129 | 9 | 138 | 54 | 62 | 11 | 127 | 2 | 236 | 169 | 407 | 16 | 109 | 36 | 161 | 833 |
| 16:45 | 0 | 120 | 4 | 124 | 68 | 60 | 12 | 140 | 2 | 224 | 193 | 419 | 21 | 122 | 33 | 176 | 859 |
| Total | 2 | 412 | 45 | 459 | 242 | 257 | 45 | 544 | 8 | 915 | 603 | 1526 | 91 | 391 | 124 | 606 | 3135 |
| 17:00 | 1 | 132 | 10 | 143 | 71 | 65 | 11 | 147 | 3 | 290 | 196 | 489 | 30 | 135 | 27 | 192 | 971 |
| 17:15 | 0 | 126 | 25 | 151 | 71 | 64 | 8 | 143 | 4 | 274 | 206 | 484 | 45 | 147 | 22 | 214 | 992 |
| 17:30 | 1 | 126 | 11 | 138 | 69 | 70 | 5 | 144 | 0 | 280 | 112 | 392 | 18 | 134 | 28 | 180 | 854 |
| 17:45 | 1 | 124 | 16 | 141 | 68 | 69 | 9 | 146 | 2 | 258 | 119 | 379 | 23 | 139 | 25 | 187 | 853 |
| Total | 3 | 508 | 62 | 573 | 279 | 268 | 33 | 580 | 9 | 1102 | 633 | 1744 | 116 | 555 | 102 | 773 | 3670 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|-------|-------|-------|-------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| Grand Total | 47 | 1948 | 253 | 2248 | 1087 | 1282 | 209 | 2578 | 197 | 3093 | 1702 | 4992 | 284 | 1168 | 329 | 1781 | 11599 |
| Apprch% | 2.1% | 86.7% | 11.3% | | 42.2% | 49.7% | 8.1% | | 3.9% | 62.0% | 34.1% | | 15.9% | 65.6% | 18.5% | | |
| Total % | 0.4% | 16.8% | 2.2% | 19.4% | 9.4% | 11.1% | 1.8% | 22.2% | 1.7% | 26.7% | 14.7% | 43.0% | 2.4% | 10.1% | 2.8% | 15.4% | |

City of Oakland

Harrison St & Grand Ave

Date: 5/22/2008

AM Peak Hr Begins at 745 AM

| | Harrison St Southbound | | | | Grand Ave Westbound | | | | Harrison St Northbound | | | | Grand Ave Eastbound | | | | |
|--------------|------------------------|-------|-------|------------|---------------------|-------|-------|------------|------------------------|-------|-------|------------|---------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 745 | 0 | 157 | 19 | 176 | 81 | 96 | 7 | 184 | 22 | 133 | 58 | 213 | 9 | 31 | 25 | 65 | 638 |
| 800 | 7 | 146 | 12 | 165 | 81 | 105 | 24 | 210 | 25 | 142 | 73 | 240 | 16 | 39 | 15 | 70 | 685 |
| 815 | 7 | 138 | 24 | 169 | 97 | 145 | 49 | 291 | 25 | 180 | 70 | 275 | 18 | 29 | 13 | 60 | 795 |
| 830 | 14 | 142 | 21 | 177 | 86 | 119 | 21 | 226 | 31 | 175 | 89 | 295 | 10 | 27 | 12 | 49 | 747 |
| Total Volume | 28 | 583 | 76 | 687 | 345 | 465 | 101 | 911 | 103 | 630 | 290 | 1023 | 53 | 126 | 65 | 244 | 2865 |
| % App Total | 4.1% | 84.9% | 11.1% | | 37.9% | 51.0% | 11.1% | | 10.1% | 61.6% | 28.3% | | 21.7% | 51.6% | 26.6% | | |
| PHF | 0.970 | | | | 0.783 | | | | 0.867 | | | | 0.871 | | | | |

PM Peak Hr Begins at 445 PM

| | Harrison St Southbound | | | | Grand Ave Westbound | | | | Harrison St Northbound | | | | Grand Ave Eastbound | | | | |
|--------------|------------------------|-------|-------|------------|---------------------|-------|-------|------------|------------------------|-------|-------|------------|---------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 445 | 0 | 120 | 4 | 124 | 68 | 60 | 12 | 140 | 2 | 224 | 193 | 419 | 21 | 122 | 33 | 176 | 859 |
| 500 | 1 | 132 | 10 | 143 | 71 | 65 | 11 | 147 | 3 | 290 | 196 | 489 | 30 | 135 | 27 | 192 | 971 |
| 515 | 0 | 126 | 25 | 151 | 71 | 64 | 8 | 143 | 4 | 274 | 206 | 484 | 45 | 147 | 22 | 214 | 992 |
| 530 | 1 | 126 | 11 | 138 | 69 | 70 | 5 | 144 | 0 | 280 | 112 | 392 | 18 | 134 | 28 | 180 | 854 |
| Total Volume | 2 | 504 | 50 | 556 | 279 | 259 | 36 | 574 | 9 | 1068 | 707 | 1784 | 114 | 538 | 110 | 762 | 3676 |
| % App Total | 0.4% | 90.6% | 9.0% | | 48.6% | 45.1% | 6.3% | | 0.5% | 59.9% | 39.6% | | 15.0% | 70.6% | 14.4% | | |
| PHF | 0.921 | | | | 0.976 | | | | 0.912 | | | | 0.890 | | | | |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-011 HARRISON-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

| | HARRISON ST.
Southbound | | | | | Westbound | | | | | HARRISON ST.
Northbound | | | | | 21ST ST.
Eastbound | | | | | | | |
|------------|----------------------------|------|-------|------|------------|-----------|------|-------|------|------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 116 | 20 | 0 | 136 | 0 | 0 | 0 | 0 | 0 | 15 | 84 | 0 | 39 | 99 | 13 | 0 | 3 | 8 | 16 | 47 | 251 | 298 |
| 07:15 | 0 | 130 | 39 | 0 | 169 | 0 | 0 | 0 | 0 | 0 | 19 | 99 | 0 | 30 | 118 | 7 | 0 | 4 | 10 | 11 | 40 | 298 | 338 |
| 07:30 | 0 | 176 | 51 | 0 | 227 | 0 | 0 | 0 | 0 | 0 | 20 | 140 | 0 | 38 | 160 | 11 | 0 | 3 | 17 | 14 | 55 | 401 | 456 |
| 07:45 | 0 | 209 | 53 | 0 | 262 | 0 | 0 | 0 | 0 | 0 | 21 | 168 | 0 | 41 | 189 | 13 | 0 | 4 | 24 | 17 | 65 | 468 | 533 |
| Total | 0 | 631 | 163 | 0 | 794 | 0 | 0 | 0 | 0 | 0 | 75 | 491 | 0 | 148 | 566 | 44 | 0 | 14 | 59 | 58 | 207 | 1418 | 1625 |
| 08:00 | 0 | 216 | 60 | 0 | 276 | 0 | 0 | 0 | 0 | 0 | 17 | 196 | 0 | 60 | 213 | 13 | 0 | 9 | 12 | 22 | 72 | 511 | 583 |
| 08:15 | 0 | 238 | 62 | 0 | 300 | 0 | 0 | 0 | 0 | 0 | 21 | 193 | 0 | 43 | 214 | 10 | 0 | 6 | 19 | 16 | 62 | 530 | 592 |
| 08:30 | 0 | 250 | 73 | 0 | 323 | 0 | 0 | 0 | 0 | 0 | 21 | 210 | 0 | 59 | 231 | 15 | 0 | 8 | 23 | 23 | 82 | 577 | 659 |
| 08:45 | 0 | 221 | 71 | 0 | 292 | 0 | 0 | 0 | 0 | 0 | 25 | 206 | 0 | 56 | 231 | 12 | 0 | 9 | 18 | 21 | 74 | 544 | 618 |
| Total | 0 | 925 | 266 | 0 | 1191 | 0 | 0 | 0 | 0 | 0 | 84 | 805 | 0 | 218 | 889 | 50 | 0 | 32 | 72 | 82 | 290 | 2162 | 2452 |

*** BREAK ***

| | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|------|------|---|------|---|---|---|---|---|-----|------|---|-----|------|------|---|------|-----|-----|------|------|------|
| 16:00 | 0 | 160 | 14 | 0 | 174 | 0 | 0 | 0 | 0 | 0 | 21 | 247 | 0 | 22 | 268 | 48 | 0 | 18 | 18 | 66 | 40 | 508 | 548 |
| 16:15 | 0 | 187 | 17 | 0 | 204 | 0 | 0 | 0 | 0 | 0 | 22 | 286 | 0 | 36 | 308 | 58 | 0 | 17 | 23 | 75 | 59 | 587 | 646 |
| 16:30 | 0 | 170 | 21 | 0 | 191 | 0 | 0 | 0 | 0 | 0 | 23 | 325 | 0 | 46 | 348 | 62 | 0 | 14 | 25 | 76 | 71 | 615 | 686 |
| 16:45 | 0 | 197 | 19 | 0 | 216 | 0 | 0 | 0 | 0 | 0 | 20 | 328 | 0 | 45 | 348 | 66 | 0 | 17 | 16 | 83 | 61 | 647 | 708 |
| Total | 0 | 714 | 71 | 0 | 785 | 0 | 0 | 0 | 0 | 0 | 86 | 1186 | 0 | 149 | 1272 | 234 | 0 | 66 | 82 | 300 | 231 | 2357 | 2588 |
| 17:00 | 0 | 212 | 17 | 0 | 229 | 0 | 0 | 0 | 0 | 0 | 19 | 324 | 0 | 37 | 343 | 72 | 0 | 21 | 15 | 93 | 52 | 665 | 717 |
| 17:15 | 0 | 182 | 18 | 0 | 200 | 0 | 0 | 0 | 0 | 0 | 11 | 281 | 0 | 40 | 292 | 65 | 0 | 19 | 18 | 84 | 58 | 576 | 634 |
| 17:30 | 0 | 179 | 14 | 0 | 193 | 0 | 0 | 0 | 0 | 0 | 14 | 283 | 0 | 55 | 297 | 70 | 0 | 15 | 12 | 85 | 67 | 575 | 642 |
| 17:45 | 0 | 200 | 23 | 0 | 223 | 0 | 0 | 0 | 0 | 0 | 13 | 322 | 0 | 79 | 335 | 76 | 0 | 19 | 15 | 95 | 94 | 653 | 747 |
| Total | 0 | 773 | 72 | 0 | 845 | 0 | 0 | 0 | 0 | 0 | 57 | 1210 | 0 | 211 | 1267 | 283 | 0 | 74 | 60 | 357 | 271 | 2469 | 2740 |
| Grand Total | 0 | 3043 | 572 | 0 | 3615 | 0 | 0 | 0 | 0 | 0 | 302 | 3692 | 0 | 726 | 3994 | 611 | 0 | 186 | 273 | 797 | 999 | 8406 | 9405 |
| Apprch % | 0 | 84.2 | 15.8 | | | 0 | 0 | 0 | | | 7.6 | 92.4 | 0 | | | 76.7 | 0 | 23.3 | | | | | |
| Total % | 0 | 36.2 | 6.8 | | 43 | 0 | 0 | 0 | | | 3.6 | 43.9 | 0 | | 47.5 | 7.3 | 0 | 2.2 | | 9.5 | 10.6 | 89.4 | |

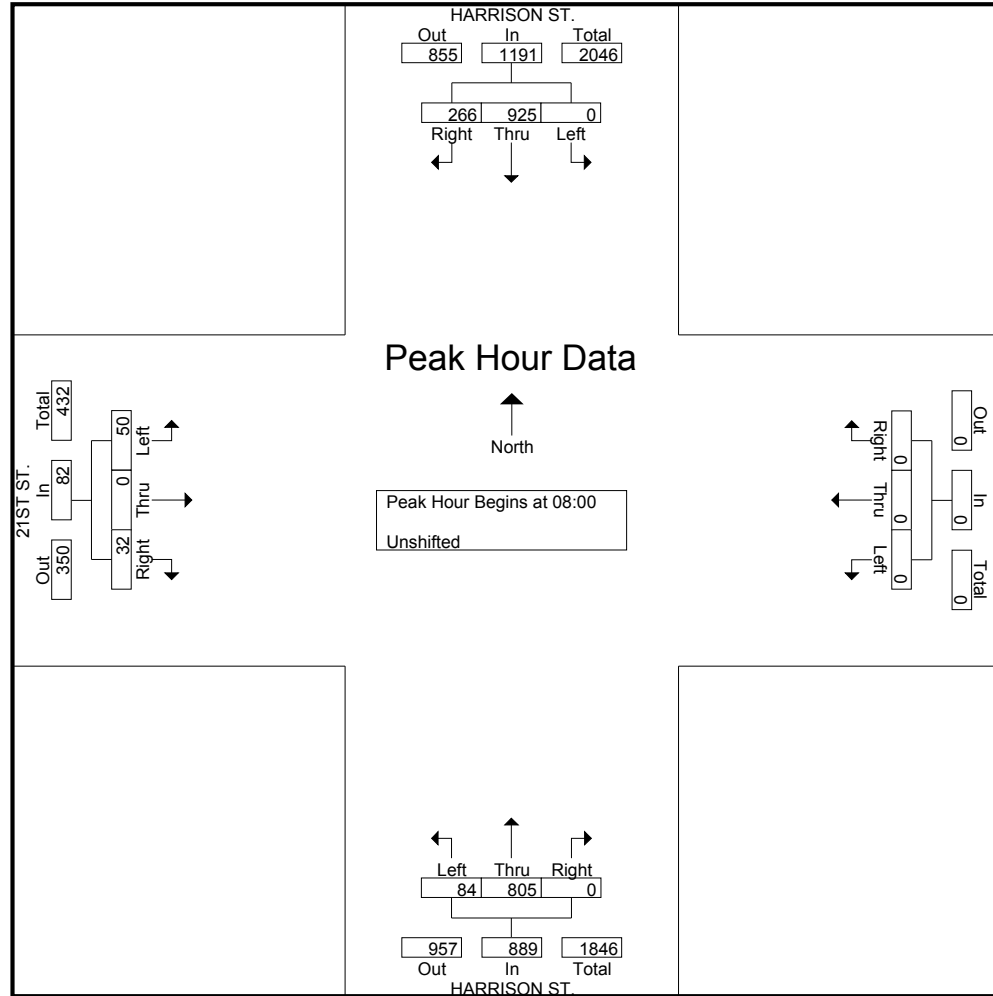
| | HARRISON ST.
Southbound | | | | Westbound | | | | HARRISON ST.
Northbound | | | | 21ST ST.
Eastbound | | | | |
|--|----------------------------|------------|-----------|------------|-----------|------|-------|------------|----------------------------|------------|-------|------------|-----------------------|------|----------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 216 | 60 | 276 | 0 | 0 | 0 | 0 | 17 | 196 | 0 | 213 | 13 | 0 | 9 | 22 | 511 |
| 08:15 | 0 | 238 | 62 | 300 | 0 | 0 | 0 | 0 | 21 | 193 | 0 | 214 | 10 | 0 | 6 | 16 | 530 |
| 08:30 | 0 | 250 | 73 | 323 | 0 | 0 | 0 | 0 | 21 | 210 | 0 | 231 | 15 | 0 | 8 | 23 | 577 |
| 08:45 | 0 | 221 | 71 | 292 | 0 | 0 | 0 | 0 | 25 | 206 | 0 | 231 | 12 | 0 | 9 | 21 | 544 |
| Total Volume | 0 | 925 | 266 | 1191 | 0 | 0 | 0 | 0 | 84 | 805 | 0 | 889 | 50 | 0 | 32 | 82 | 2162 |
| % App. Total | 0 | 77.7 | 22.3 | | 0 | 0 | 0 | | 9.4 | 90.6 | 0 | | 61 | 0 | 39 | | |
| PHF | .000 | .925 | .911 | .922 | .000 | .000 | .000 | .000 | .840 | .958 | .000 | .962 | .833 | .000 | .889 | .891 | .937 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-011 HARRISON-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:15

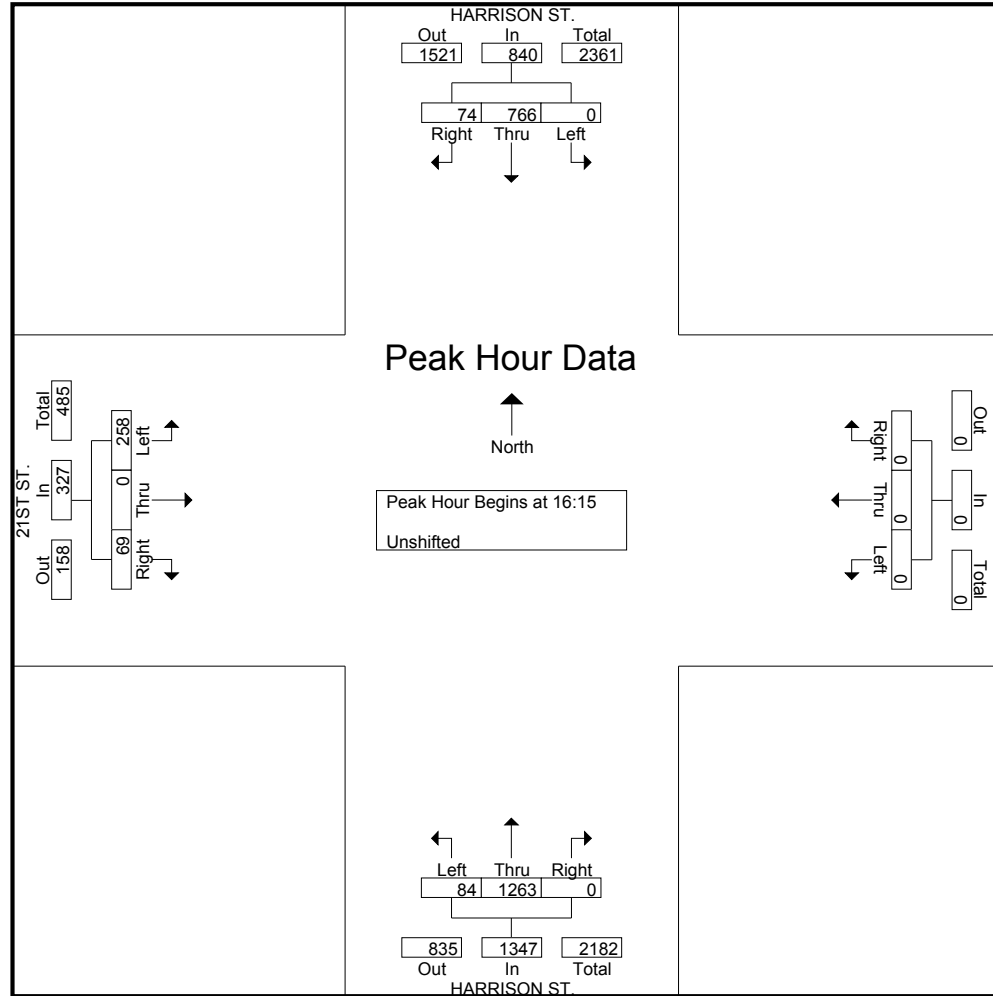
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 16:15 | 0 | 187 | 17 | 204 | 0 | 0 | 0 | 0 | 22 | 286 | 0 | 308 | 58 | 0 | 17 | 75 | 587 |
| 16:30 | 0 | 170 | 21 | 191 | 0 | 0 | 0 | 0 | 23 | 325 | 0 | 348 | 62 | 0 | 14 | 76 | 615 |
| 16:45 | 0 | 197 | 19 | 216 | 0 | 0 | 0 | 0 | 20 | 328 | 0 | 348 | 66 | 0 | 17 | 83 | 647 |
| 17:00 | 0 | 212 | 17 | 229 | 0 | 0 | 0 | 0 | 19 | 324 | 0 | 343 | 72 | 0 | 21 | 93 | 665 |
| Total Volume | 0 | 766 | 74 | 840 | 0 | 0 | 0 | 0 | 84 | 1263 | 0 | 1347 | 258 | 0 | 69 | 327 | 2514 |
| % App. Total | 0 | 91.2 | 8.8 | | 0 | 0 | 0 | | 6.2 | 93.8 | 0 | | 78.9 | 0 | 21.1 | | |
| PHF | .000 | .903 | .881 | .917 | .000 | .000 | .000 | .000 | .913 | .963 | .000 | .968 | .896 | .000 | .821 | .879 | .945 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-011 HARRISON-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700

F (916) 786-2879

OAKLAND

File Name : 08-7458-009 EAST GARAGE-21ST-F

Site Code : 00000000

Start Date : 08/07/2008

Page No : 1

Groups Printed- Unshifted

| | Southbound | | | | | 21ST ST.
Westbound | | | | | GARAGE (EAST)
Northbound | | | | | 21ST ST.
Eastbound | | | | | | | |
|------------|------------|------|-------|------|------------|-----------------------|------|-------|------|------------|-----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 2 | 33 | 0 | 0 | 35 | 0 | 0 | 0 | 3 | 0 | 0 | 15 | 1 | 0 | 16 | 3 | 51 | 54 |
| 07:15 | 0 | 0 | 0 | 0 | 0 | 5 | 49 | 0 | 2 | 54 | 1 | 0 | 0 | 17 | 1 | 0 | 10 | 1 | 4 | 11 | 23 | 66 | 89 |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 7 | 52 | 0 | 1 | 59 | 0 | 0 | 1 | 7 | 1 | 0 | 13 | 1 | 3 | 14 | 11 | 74 | 85 |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 10 | 52 | 0 | 1 | 62 | 0 | 0 | 0 | 11 | 0 | 0 | 14 | 3 | 2 | 17 | 14 | 79 | 93 |
| Total | 0 | 0 | 0 | 0 | 0 | 24 | 186 | 0 | 4 | 210 | 1 | 0 | 1 | 38 | 2 | 0 | 52 | 6 | 9 | 58 | 51 | 270 | 321 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 22 | 58 | 0 | 1 | 80 | 0 | 0 | 1 | 13 | 1 | 0 | 22 | 8 | 3 | 30 | 17 | 111 | 128 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 14 | 60 | 0 | 0 | 74 | 0 | 0 | 0 | 10 | 0 | 0 | 14 | 2 | 0 | 16 | 10 | 90 | 100 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 23 | 79 | 0 | 0 | 102 | 1 | 0 | 0 | 9 | 1 | 0 | 24 | 8 | 0 | 32 | 9 | 135 | 144 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 26 | 66 | 0 | 0 | 92 | 0 | 0 | 0 | 17 | 0 | 0 | 21 | 11 | 0 | 32 | 17 | 124 | 141 |
| Total | 0 | 0 | 0 | 0 | 0 | 85 | 263 | 0 | 1 | 348 | 1 | 0 | 1 | 49 | 2 | 0 | 81 | 29 | 3 | 110 | 53 | 460 | 513 |

*** BREAK ***

| | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|---|---|------|------|---|---|------|------|---|------|-----|-----|---|------|-----|----|------|------|------|------|
| 16:00 | 0 | 0 | 0 | 0 | 0 | 1 | 32 | 0 | 0 | 33 | 2 | 0 | 4 | 11 | 6 | 0 | 40 | 1 | 0 | 41 | 11 | 80 | 91 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 1 | 39 | 0 | 0 | 40 | 1 | 0 | 7 | 16 | 8 | 0 | 43 | 3 | 1 | 46 | 17 | 94 | 111 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 4 | 39 | 0 | 0 | 43 | 3 | 0 | 1 | 22 | 4 | 0 | 51 | 4 | 0 | 55 | 22 | 102 | 124 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 2 | 38 | 0 | 1 | 40 | 3 | 0 | 3 | 14 | 6 | 0 | 59 | 2 | 1 | 61 | 16 | 107 | 123 |
| Total | 0 | 0 | 0 | 0 | 0 | 8 | 148 | 0 | 1 | 156 | 9 | 0 | 15 | 63 | 24 | 0 | 193 | 10 | 2 | 203 | 66 | 383 | 449 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 4 | 36 | 0 | 0 | 40 | 1 | 0 | 16 | 9 | 17 | 0 | 57 | 4 | 0 | 61 | 9 | 118 | 127 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 8 | 36 | 0 | 1 | 44 | 4 | 0 | 16 | 13 | 20 | 0 | 58 | 1 | 0 | 59 | 14 | 123 | 137 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 5 | 38 | 0 | 0 | 43 | 3 | 0 | 14 | 19 | 17 | 0 | 55 | 2 | 0 | 57 | 19 | 117 | 136 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 4 | 29 | 0 | 0 | 33 | 3 | 0 | 8 | 13 | 11 | 0 | 62 | 3 | 0 | 65 | 13 | 109 | 122 |
| Total | 0 | 0 | 0 | 0 | 0 | 21 | 139 | 0 | 1 | 160 | 11 | 0 | 54 | 54 | 65 | 0 | 232 | 10 | 0 | 242 | 55 | 467 | 522 |
| Grand Total | 0 | 0 | 0 | 0 | 0 | 138 | 736 | 0 | 7 | 874 | 22 | 0 | 71 | 204 | 93 | 0 | 558 | 55 | 14 | 613 | 225 | 1580 | 1805 |
| Apprch % | 0 | 0 | 0 | | | 15.8 | 84.2 | 0 | | | 23.7 | 0 | 76.3 | | | 0 | 91 | 9 | | | | | |
| Total % | 0 | 0 | 0 | | | 8.7 | 46.6 | 0 | | 55.3 | 1.4 | 0 | 4.5 | | 5.9 | 0 | 35.3 | 3.5 | | 38.8 | 12.5 | 87.5 | |

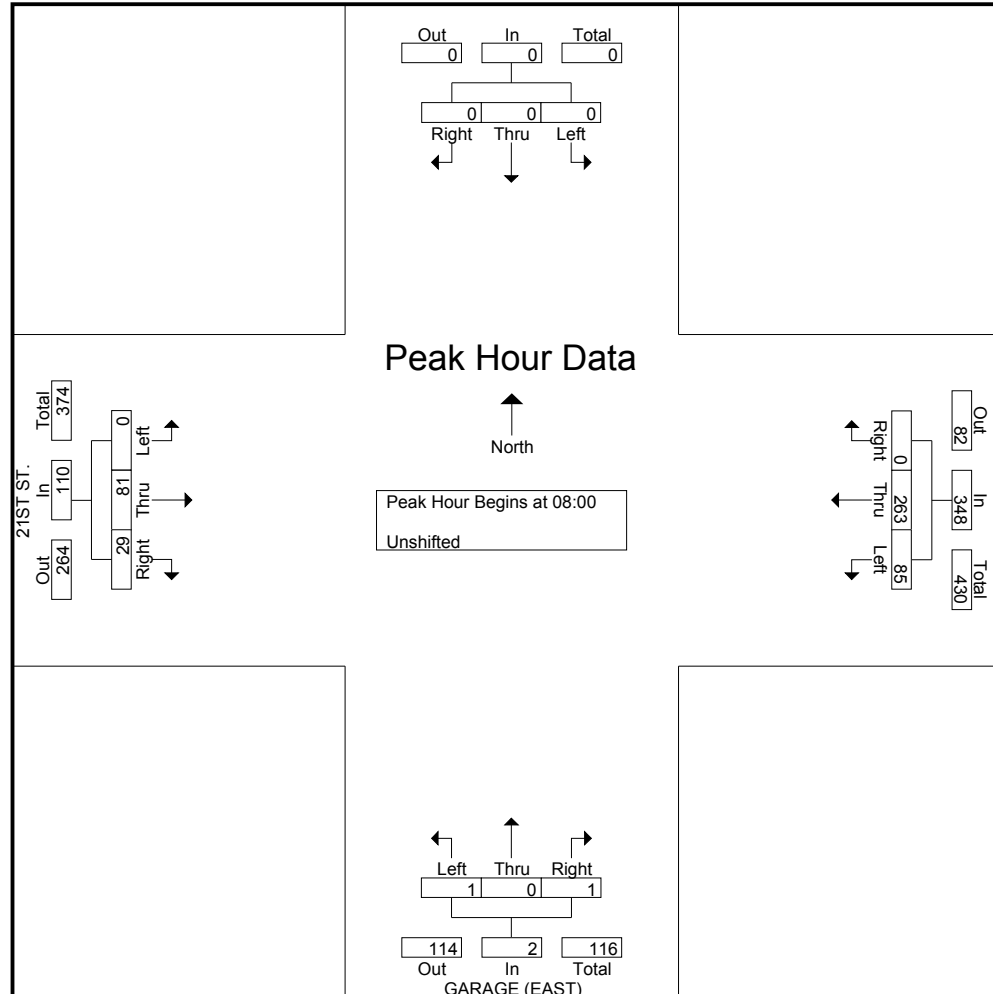
| | Southbound | | | | 21ST ST.
Westbound | | | | GARAGE (EAST)
Northbound | | | | 21ST ST.
Eastbound | | | | |
|--|------------|------|-------|------------|-----------------------|------|-------|------------|-----------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 0 | 22 | 58 | 0 | 80 | 0 | 0 | 1 | 1 | 0 | 22 | 8 | 30 | 111 |
| 08:15 | 0 | 0 | 0 | 0 | 14 | 60 | 0 | 74 | 0 | 0 | 0 | 0 | 0 | 14 | 2 | 16 | 90 |
| 08:30 | 0 | 0 | 0 | 0 | 23 | 79 | 0 | 102 | 1 | 0 | 0 | 1 | 0 | 24 | 8 | 32 | 135 |
| 08:45 | 0 | 0 | 0 | 0 | 26 | 66 | 0 | 92 | 0 | 0 | 0 | 0 | 0 | 21 | 11 | 32 | 124 |
| Total Volume | 0 | 0 | 0 | 0 | 85 | 263 | 0 | 348 | 1 | 0 | 1 | 2 | 0 | 81 | 29 | 110 | 460 |
| % App. Total | 0 | 0 | 0 | 0 | 24.4 | 75.6 | 0 | | 50 | 0 | 50 | | 0 | 73.6 | 26.4 | | |
| PHF | .000 | .000 | .000 | .000 | .817 | .832 | .000 | .853 | .250 | .000 | .250 | .500 | .000 | .844 | .659 | .859 | .852 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-009 EAST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

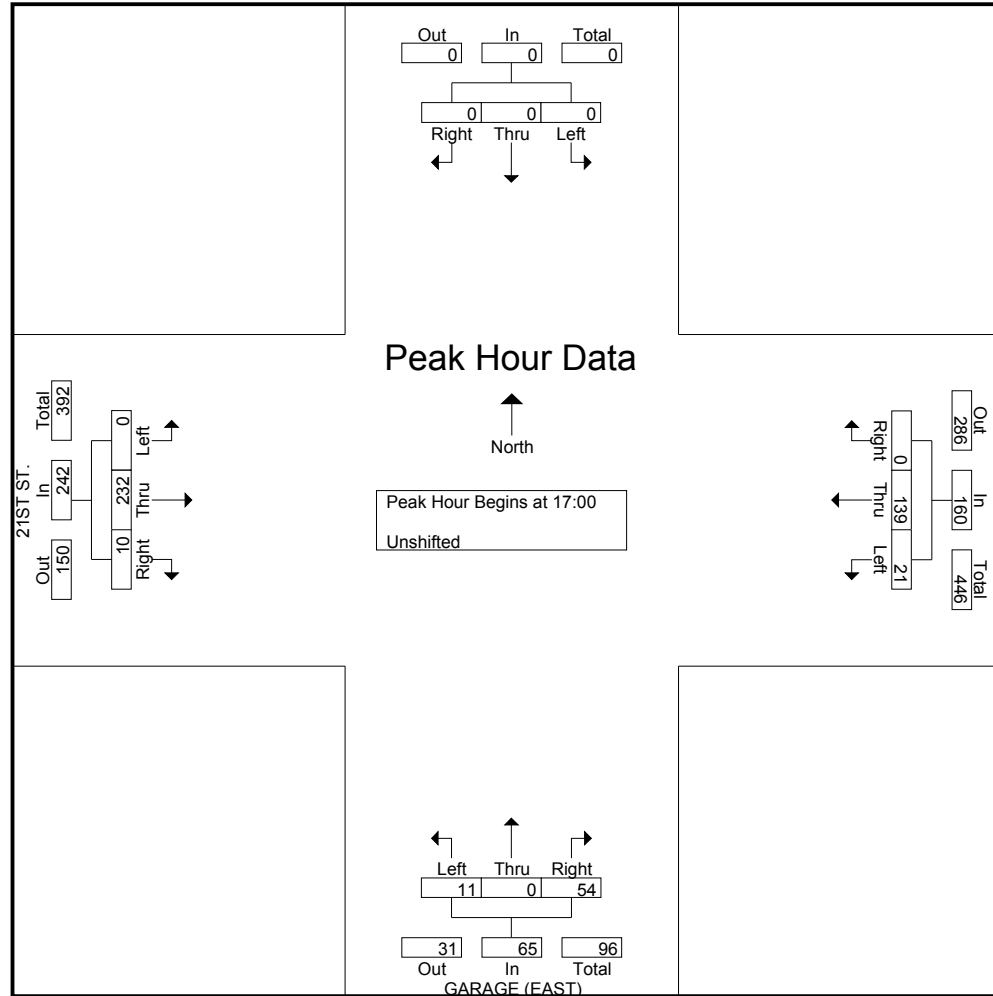
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 0 | 0 | 0 | 0 | 4 | 36 | 0 | 40 | 1 | 0 | 16 | 17 | 0 | 57 | 4 | 61 | 118 |
| 17:15 | 0 | 0 | 0 | 0 | 8 | 36 | 0 | 44 | 4 | 0 | 16 | 20 | 0 | 58 | 1 | 59 | 123 |
| 17:30 | 0 | 0 | 0 | 0 | 5 | 38 | 0 | 43 | 3 | 0 | 14 | 17 | 0 | 55 | 2 | 57 | 117 |
| 17:45 | 0 | 0 | 0 | 0 | 4 | 29 | 0 | 33 | 3 | 0 | 8 | 11 | 0 | 62 | 3 | 65 | 109 |
| Total Volume | 0 | 0 | 0 | 0 | 21 | 139 | 0 | 160 | 11 | 0 | 54 | 65 | 0 | 232 | 10 | 242 | 467 |
| % App. Total | 0 | 0 | 0 | 0 | 13.1 | 86.9 | 0 | | 16.9 | 0 | 83.1 | | 0 | 95.9 | 4.1 | | |
| PHF | .000 | .000 | .000 | .000 | .656 | .914 | .000 | .909 | .688 | .000 | .844 | .813 | .000 | .935 | .625 | .931 | .949 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-009 EAST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-008 WEST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

| | Southbound | | | | | 21ST ST.
Westbound | | | | | GARAGE (WEST)
Northbound | | | | | 21ST ST.
Eastbound | | | | | Exclu. Total | Inclu. Total | Int. Total |
|---------------|------------|------|-------|------|------------|-----------------------|------|-------|------|------------|-----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | | | |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 10 | 18 | 0 | 0 | 28 | 0 | 0 | 0 | 2 | 0 | 0 | 16 | 6 | 1 | 22 | 3 | 50 | 53 |
| 07:15 | 0 | 0 | 0 | 0 | 0 | 15 | 17 | 0 | 0 | 32 | 0 | 0 | 0 | 8 | 0 | 0 | 12 | 8 | 0 | 20 | 8 | 52 | 60 |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 14 | 28 | 0 | 1 | 42 | 1 | 0 | 0 | 6 | 1 | 0 | 11 | 8 | 0 | 19 | 7 | 62 | 69 |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 10 | 28 | 0 | 0 | 38 | 0 | 0 | 1 | 10 | 1 | 0 | 17 | 27 | 2 | 44 | 12 | 83 | 95 |
| Total | 0 | 0 | 0 | 0 | 0 | 49 | 91 | 0 | 1 | 140 | 1 | 0 | 1 | 26 | 2 | 0 | 56 | 49 | 3 | 105 | 30 | 247 | 277 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 29 | 20 | 0 | 1 | 49 | 0 | 0 | 0 | 7 | 0 | 0 | 31 | 26 | 1 | 57 | 9 | 106 | 115 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 22 | 27 | 0 | 0 | 49 | 1 | 0 | 0 | 6 | 1 | 0 | 17 | 26 | 1 | 43 | 7 | 93 | 100 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 24 | 38 | 0 | 1 | 62 | 0 | 0 | 1 | 9 | 1 | 0 | 20 | 18 | 0 | 38 | 10 | 101 | 111 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 27 | 31 | 0 | 2 | 58 | 1 | 0 | 1 | 10 | 2 | 0 | 25 | 30 | 2 | 55 | 14 | 115 | 129 |
| Total | 0 | 0 | 0 | 0 | 0 | 102 | 116 | 0 | 4 | 218 | 2 | 0 | 2 | 32 | 4 | 0 | 93 | 100 | 4 | 193 | 40 | 415 | 455 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 1 | 23 | 0 | 0 | 24 | 3 | 0 | 6 | 5 | 9 | 0 | 34 | 1 | 1 | 35 | 6 | 68 | 74 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 2 | 28 | 0 | 0 | 30 | 4 | 0 | 10 | 15 | 14 | 0 | 30 | 1 | 0 | 31 | 15 | 75 | 90 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 6 | 27 | 0 | 0 | 33 | 6 | 0 | 3 | 13 | 9 | 0 | 41 | 1 | 0 | 42 | 13 | 84 | 97 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 3 | 22 | 0 | 1 | 25 | 7 | 0 | 9 | 8 | 16 | 0 | 42 | 2 | 0 | 44 | 9 | 85 | 94 |
| Total | 0 | 0 | 0 | 0 | 0 | 12 | 100 | 0 | 1 | 112 | 20 | 0 | 28 | 41 | 48 | 0 | 147 | 5 | 1 | 152 | 43 | 312 | 355 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 25 | 6 | 0 | 13 | 7 | 19 | 0 | 45 | 2 | 0 | 47 | 7 | 91 | 98 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 4 | 21 | 0 | 1 | 25 | 6 | 0 | 10 | 8 | 16 | 0 | 48 | 2 | 0 | 50 | 9 | 91 | 100 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 1 | 20 | 0 | 0 | 21 | 10 | 0 | 20 | 11 | 30 | 0 | 36 | 3 | 0 | 39 | 11 | 90 | 101 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 17 | 7 | 0 | 17 | 14 | 24 | 0 | 43 | 2 | 0 | 45 | 14 | 86 | 100 |
| Total | 0 | 0 | 0 | 0 | 0 | 5 | 83 | 0 | 1 | 88 | 29 | 0 | 60 | 40 | 89 | 0 | 172 | 9 | 0 | 181 | 41 | 358 | 399 |
| Grand Total | 0 | 0 | 0 | 0 | 0 | 168 | 390 | 0 | 7 | 558 | 52 | 0 | 91 | 139 | 143 | 0 | 468 | 163 | 8 | 631 | 154 | 1332 | 1486 |
| Apprch % | 0 | 0 | 0 | | | 30.1 | 69.9 | 0 | | | 36.4 | 0 | 63.6 | | | 0 | 74.2 | 25.8 | | | | | |
| Total % | 0 | 0 | 0 | | | 12.6 | 29.3 | 0 | | 41.9 | 3.9 | 0 | 6.8 | | 10.7 | 0 | 35.1 | 12.2 | | 47.4 | 10.4 | 89.6 | |

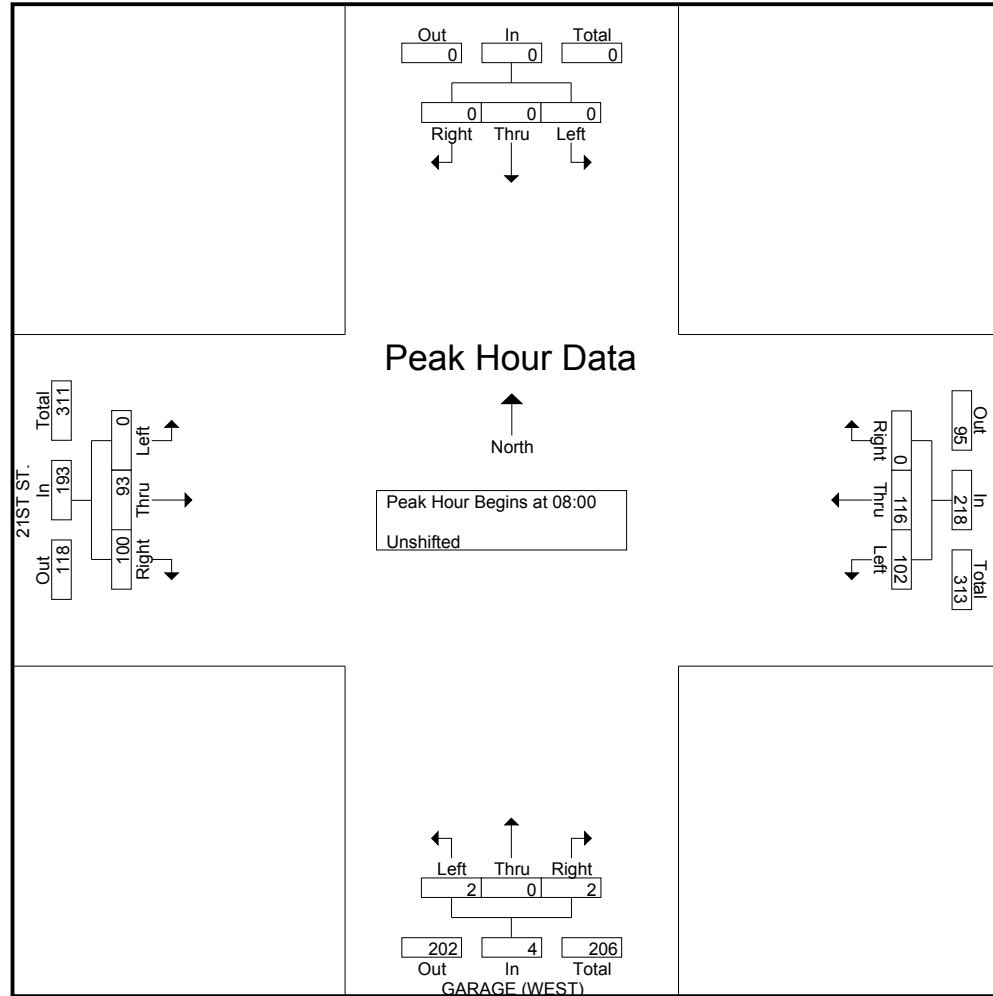
| | Southbound | | | | 21ST ST.
Westbound | | | | GARAGE (WEST)
Northbound | | | | 21ST ST.
Eastbound | | | | |
|--|------------|------|-------|------------|-----------------------|------|-------|------------|-----------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 0 | 29 | 20 | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 31 | 26 | 57 | 106 |
| 08:15 | 0 | 0 | 0 | 0 | 22 | 27 | 0 | 49 | 1 | 0 | 0 | 1 | 0 | 17 | 26 | 43 | 93 |
| 08:30 | 0 | 0 | 0 | 0 | 24 | 38 | 0 | 62 | 0 | 0 | 1 | 1 | 0 | 20 | 18 | 38 | 101 |
| 08:45 | 0 | 0 | 0 | 0 | 27 | 31 | 0 | 58 | 1 | 0 | 1 | 2 | 0 | 25 | 30 | 55 | 115 |
| Total Volume | 0 | 0 | 0 | 0 | 102 | 116 | 0 | 218 | 2 | 0 | 2 | 4 | 0 | 93 | 100 | 193 | 415 |
| % App. Total | 0 | 0 | 0 | 0 | 46.8 | 53.2 | 0 | | 50 | 0 | 50 | | 0 | 48.2 | 51.8 | | |
| PHF | .000 | .000 | .000 | .000 | .879 | .763 | .000 | .879 | .500 | .000 | .500 | .500 | .000 | .750 | .833 | .846 | .902 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-008 WEST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 17:00

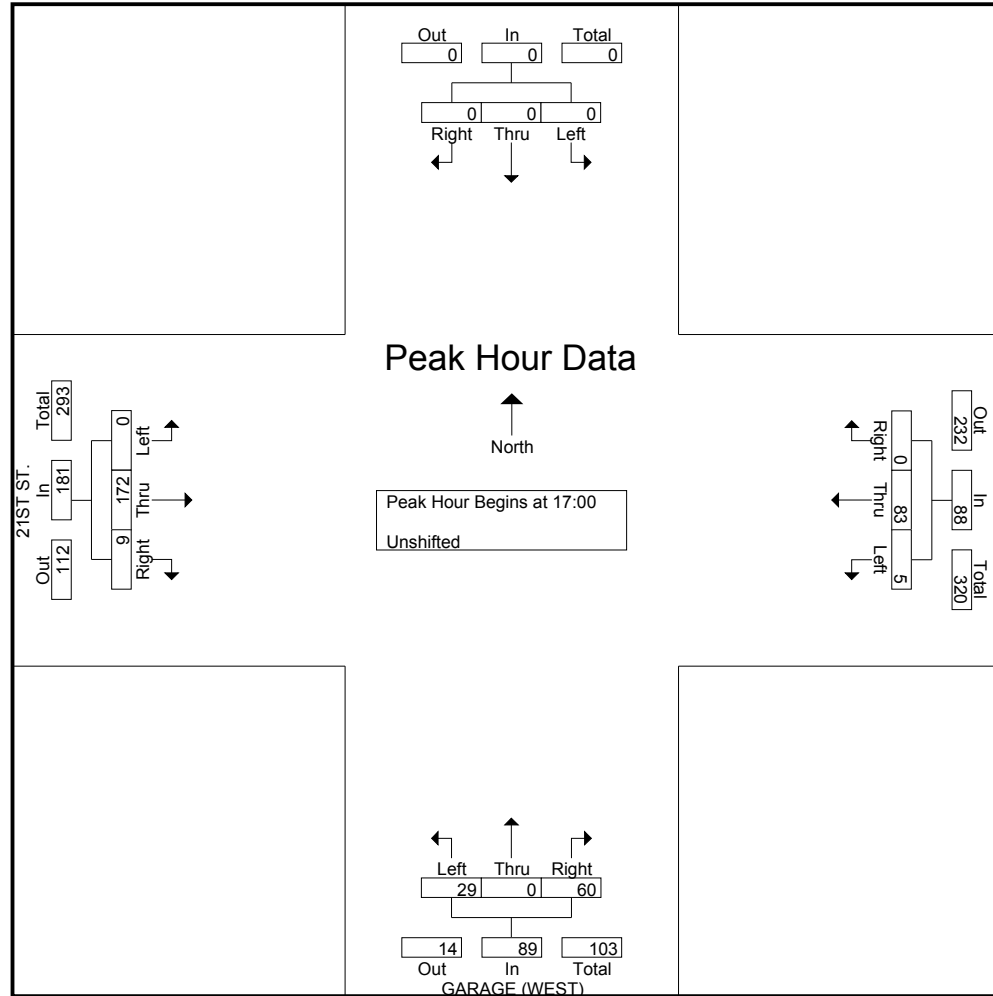
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 25 | 6 | 0 | 13 | 19 | 0 | 45 | 2 | 47 | 91 |
| 17:15 | 0 | 0 | 0 | 0 | 4 | 21 | 0 | 25 | 6 | 0 | 10 | 16 | 0 | 48 | 2 | 50 | 91 |
| 17:30 | 0 | 0 | 0 | 0 | 1 | 20 | 0 | 21 | 10 | 0 | 20 | 30 | 0 | 36 | 3 | 39 | 90 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 17 | 7 | 0 | 17 | 24 | 0 | 43 | 2 | 45 | 86 |
| Total Volume | 0 | 0 | 0 | 0 | 5 | 83 | 0 | 88 | 29 | 0 | 60 | 89 | 0 | 172 | 9 | 181 | 358 |
| % App. Total | 0 | 0 | 0 | 0 | 5.7 | 94.3 | 0 | | 32.6 | 0 | 67.4 | | 0 | 95 | 5 | | |
| PHF | .000 | .000 | .000 | .000 | .313 | .830 | .000 | .880 | .725 | .000 | .750 | .742 | .000 | .896 | .750 | .905 | .984 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-008 WEST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-010 INTERNAL-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

| | Southbound | | | | | 21ST ST.
Westbound | | | | | INTERNAL DRIVEWAY
Northbound | | | | | 21ST ST.
Eastbound | | | | | Exclu. Total | Inclu. Total | Int. Total |
|---------------|------------|------|-------|------|------------|-----------------------|------|-------|------|------------|---------------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | | | |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 3 | 32 | 0 | 0 | 35 | 2 | 0 | 2 | 1 | 4 | 0 | 15 | 0 | 0 | 15 | 1 | 54 | 55 |
| 07:15 | 0 | 0 | 0 | 0 | 0 | 3 | 51 | 0 | 0 | 54 | 3 | 0 | 3 | 2 | 6 | 0 | 9 | 1 | 1 | 10 | 3 | 70 | 73 |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 12 | 61 | 0 | 1 | 73 | 1 | 0 | 6 | 1 | 7 | 0 | 10 | 2 | 0 | 12 | 2 | 92 | 94 |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 11 | 53 | 0 | 0 | 64 | 7 | 0 | 4 | 3 | 11 | 0 | 13 | 1 | 0 | 14 | 3 | 89 | 92 |
| Total | 0 | 0 | 0 | 0 | 0 | 29 | 197 | 0 | 1 | 226 | 13 | 0 | 15 | 7 | 28 | 0 | 47 | 4 | 1 | 51 | 9 | 305 | 314 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 8 | 69 | 0 | 0 | 77 | 7 | 0 | 4 | 5 | 11 | 0 | 20 | 2 | 1 | 22 | 6 | 110 | 116 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 13 | 68 | 0 | 0 | 81 | 5 | 0 | 2 | 2 | 7 | 0 | 13 | 2 | 1 | 15 | 3 | 103 | 106 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 8 | 94 | 0 | 0 | 102 | 7 | 0 | 4 | 5 | 11 | 0 | 22 | 2 | 2 | 24 | 7 | 137 | 144 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 9 | 88 | 0 | 0 | 97 | 5 | 0 | 5 | 3 | 10 | 0 | 20 | 2 | 0 | 22 | 3 | 129 | 132 |
| Total | 0 | 0 | 0 | 0 | 0 | 38 | 319 | 0 | 0 | 357 | 24 | 0 | 15 | 15 | 39 | 0 | 75 | 8 | 4 | 83 | 19 | 479 | 498 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 3 | 30 | 0 | 0 | 33 | 5 | 0 | 28 | 5 | 33 | 0 | 42 | 2 | 0 | 44 | 5 | 110 | 115 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 4 | 32 | 0 | 0 | 36 | 8 | 0 | 25 | 8 | 33 | 0 | 50 | 0 | 0 | 50 | 8 | 119 | 127 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 3 | 37 | 0 | 1 | 40 | 6 | 0 | 23 | 12 | 29 | 0 | 51 | 2 | 0 | 53 | 13 | 122 | 135 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 2 | 35 | 0 | 0 | 37 | 6 | 0 | 24 | 8 | 30 | 0 | 58 | 3 | 0 | 61 | 8 | 128 | 136 |
| Total | 0 | 0 | 0 | 0 | 0 | 12 | 134 | 0 | 1 | 146 | 25 | 0 | 100 | 33 | 125 | 0 | 201 | 7 | 0 | 208 | 34 | 479 | 513 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 2 | 31 | 0 | 0 | 33 | 9 | 0 | 21 | 7 | 30 | 0 | 73 | 0 | 0 | 73 | 7 | 136 | 143 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 4 | 30 | 0 | 1 | 34 | 14 | 0 | 17 | 9 | 31 | 0 | 71 | 1 | 0 | 72 | 10 | 137 | 147 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 3 | 27 | 0 | 0 | 30 | 14 | 0 | 19 | 15 | 33 | 0 | 70 | 0 | 0 | 70 | 15 | 133 | 148 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 6 | 28 | 0 | 0 | 34 | 8 | 0 | 25 | 6 | 33 | 0 | 68 | 2 | 0 | 70 | 6 | 137 | 143 |
| Total | 0 | 0 | 0 | 0 | 0 | 15 | 116 | 0 | 1 | 131 | 45 | 0 | 82 | 37 | 127 | 0 | 282 | 3 | 0 | 285 | 38 | 543 | 581 |
| Grand Total | 0 | 0 | 0 | 0 | 0 | 94 | 766 | 0 | 3 | 860 | 107 | 0 | 212 | 92 | 319 | 0 | 605 | 22 | 5 | 627 | 100 | 1806 | 1906 |
| Apprch % | 0 | 0 | 0 | | | 10.9 | 89.1 | 0 | | | 33.5 | 0 | 66.5 | | | 0 | 96.5 | 3.5 | | | | | |
| Total % | 0 | 0 | 0 | | | 5.2 | 42.4 | 0 | | 47.6 | 5.9 | 0 | 11.7 | | 17.7 | 0 | 33.5 | 1.2 | | 34.7 | 5.2 | 94.8 | |

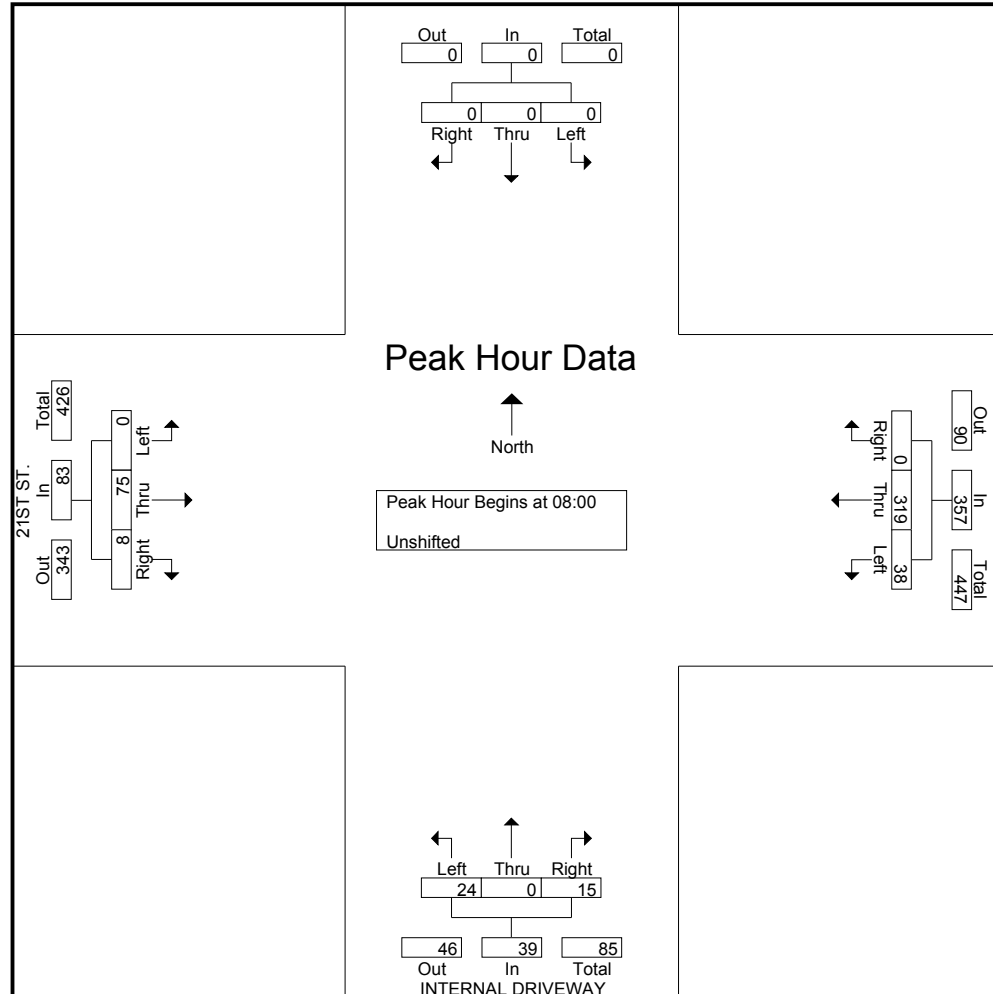
| | Southbound | | | | 21ST ST.
Westbound | | | | INTERNAL DRIVEWAY
Northbound | | | | 21ST ST.
Eastbound | | | | |
|--|------------|------|-------|------------|-----------------------|------|-------|------------|---------------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 0 | 8 | 69 | 0 | 77 | 7 | 0 | 4 | 11 | 0 | 20 | 2 | 22 | 110 |
| 08:15 | 0 | 0 | 0 | 0 | 13 | 68 | 0 | 81 | 5 | 0 | 2 | 7 | 0 | 13 | 2 | 15 | 103 |
| 08:30 | 0 | 0 | 0 | 0 | 8 | 94 | 0 | 102 | 7 | 0 | 4 | 11 | 0 | 22 | 2 | 24 | 137 |
| 08:45 | 0 | 0 | 0 | 0 | 9 | 88 | 0 | 97 | 5 | 0 | 5 | 10 | 0 | 20 | 2 | 22 | 129 |
| Total Volume | 0 | 0 | 0 | 0 | 38 | 319 | 0 | 357 | 24 | 0 | 15 | 39 | 0 | 75 | 8 | 83 | 479 |
| % App. Total | 0 | 0 | 0 | 0 | 10.6 | 89.4 | 0 | | 61.5 | 0 | 38.5 | | 0 | 90.4 | 9.6 | | |
| PHF | .000 | .000 | .000 | .000 | .731 | .848 | .000 | .875 | .857 | .000 | .750 | .886 | .000 | .852 | 1.000 | .865 | .874 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-010 INTERNAL-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 17:00

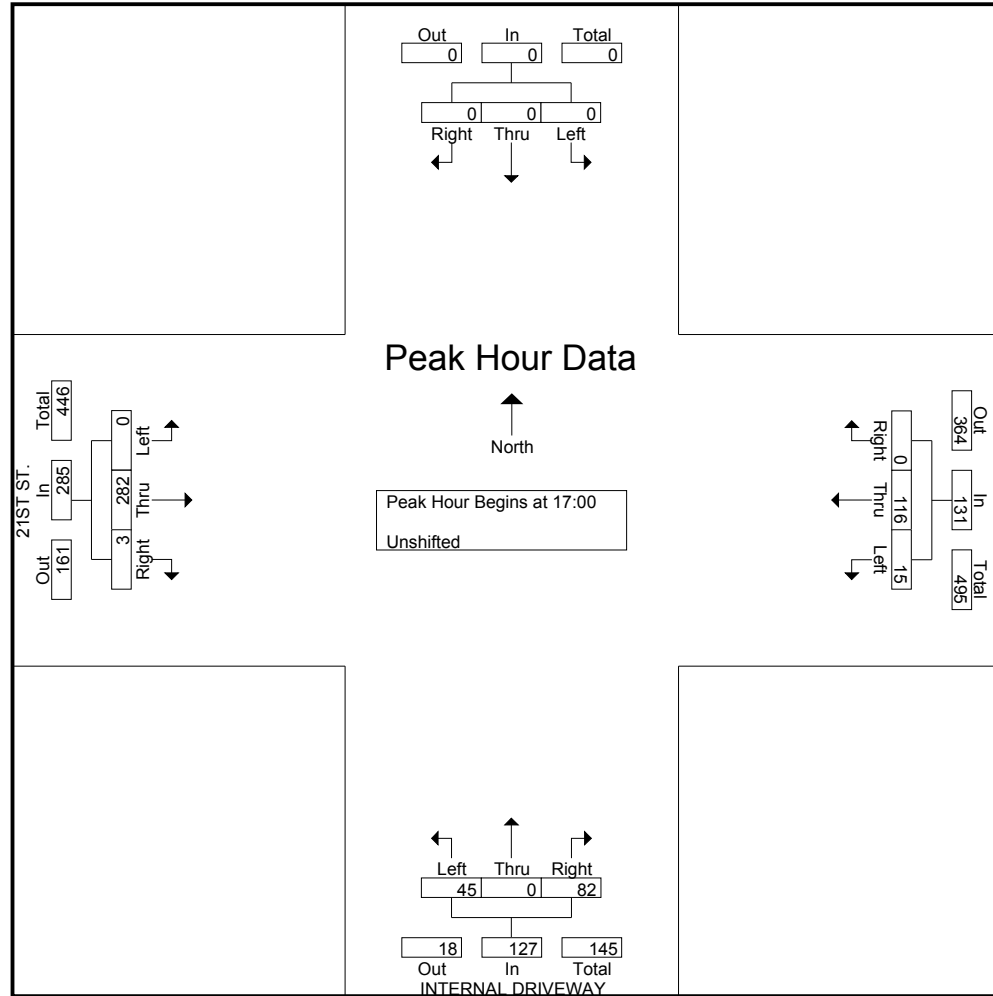
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 0 | 0 | 0 | 0 | 2 | 31 | 0 | 33 | 9 | 0 | 21 | 30 | 0 | 73 | 0 | 73 | 136 |
| 17:15 | 0 | 0 | 0 | 0 | 4 | 30 | 0 | 34 | 14 | 0 | 17 | 31 | 0 | 71 | 1 | 72 | 137 |
| 17:30 | 0 | 0 | 0 | 0 | 3 | 27 | 0 | 30 | 14 | 0 | 19 | 33 | 0 | 70 | 0 | 70 | 133 |
| 17:45 | 0 | 0 | 0 | 0 | 6 | 28 | 0 | 34 | 8 | 0 | 25 | 33 | 0 | 68 | 2 | 70 | 137 |
| Total Volume | 0 | 0 | 0 | 0 | 15 | 116 | 0 | 131 | 45 | 0 | 82 | 127 | 0 | 282 | 3 | 285 | 543 |
| % App. Total | 0 | 0 | 0 | 0 | 11.5 | 88.5 | 0 | | 35.4 | 0 | 64.6 | | 0 | 98.9 | 1.1 | | |
| PHF | .000 | .000 | .000 | .000 | .625 | .935 | .000 | .963 | .804 | .000 | .820 | .962 | .000 | .966 | .375 | .976 | .991 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-010 INTERNAL-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700

F (916) 786-2879

OAKLAND

File Name : 08-7458-007 WEBSTER-21ST-F

Site Code : 00000000

Start Date : 08/06/2008

Page No : 1

Groups Printed- Unshifted

| | WEBSTER ST.
Southbound | | | | | 21ST ST.
Westbound | | | | | WEBSTER ST.
Northbound | | | | | 21ST ST.
Eastbound | | | | | | | |
|------------|---------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|---------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 10 | 32 | 5 | 8 | 47 | 12 | 10 | 0 | 12 | 22 | 0 | 0 | 0 | 15 | 0 | 0 | 20 | 5 | 16 | 25 | 51 | 94 | 145 |
| 07:15 | 7 | 35 | 2 | 15 | 44 | 11 | 8 | 0 | 17 | 19 | 0 | 0 | 0 | 28 | 0 | 0 | 22 | 2 | 35 | 24 | 95 | 87 | 182 |
| 07:30 | 5 | 55 | 11 | 23 | 71 | 7 | 12 | 0 | 22 | 19 | 0 | 0 | 0 | 30 | 0 | 0 | 22 | 7 | 40 | 29 | 115 | 119 | 234 |
| 07:45 | 21 | 78 | 11 | 28 | 110 | 12 | 14 | 0 | 35 | 26 | 0 | 0 | 0 | 40 | 0 | 0 | 28 | 6 | 38 | 34 | 141 | 170 | 311 |
| Total | 43 | 200 | 29 | 74 | 272 | 42 | 44 | 0 | 86 | 86 | 0 | 0 | 0 | 113 | 0 | 0 | 92 | 20 | 129 | 112 | 402 | 470 | 872 |
| 08:00 | 30 | 80 | 7 | 38 | 117 | 11 | 11 | 0 | 29 | 22 | 0 | 0 | 0 | 34 | 0 | 0 | 44 | 6 | 53 | 50 | 154 | 189 | 343 |
| 08:15 | 34 | 77 | 3 | 23 | 114 | 8 | 11 | 0 | 27 | 19 | 0 | 0 | 0 | 32 | 0 | 0 | 32 | 13 | 52 | 45 | 134 | 178 | 312 |
| 08:30 | 33 | 89 | 8 | 22 | 130 | 8 | 7 | 0 | 53 | 15 | 0 | 0 | 0 | 39 | 0 | 0 | 34 | 12 | 65 | 46 | 179 | 191 | 370 |
| 08:45 | 27 | 76 | 6 | 22 | 109 | 13 | 12 | 0 | 37 | 25 | 0 | 0 | 0 | 42 | 0 | 0 | 43 | 14 | 43 | 57 | 144 | 191 | 335 |
| Total | 124 | 322 | 24 | 105 | 470 | 40 | 41 | 0 | 146 | 81 | 0 | 0 | 0 | 147 | 0 | 0 | 153 | 45 | 213 | 198 | 611 | 749 | 1360 |

*** BREAK ***

| | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|------|------|-----|-----|------|-----|------|---|-----|------|---|---|---|-----|---|---|------|------|-----|------|------|------|------|
| 16:00 | 5 | 96 | 7 | 40 | 108 | 10 | 21 | 0 | 34 | 31 | 0 | 0 | 0 | 27 | 0 | 0 | 26 | 19 | 22 | 45 | 123 | 184 | 307 |
| 16:15 | 12 | 94 | 2 | 59 | 108 | 12 | 20 | 0 | 39 | 32 | 0 | 0 | 0 | 22 | 0 | 0 | 24 | 26 | 18 | 50 | 138 | 190 | 328 |
| 16:30 | 10 | 87 | 4 | 70 | 101 | 12 | 25 | 0 | 51 | 37 | 0 | 0 | 0 | 23 | 0 | 0 | 26 | 29 | 28 | 55 | 172 | 193 | 365 |
| 16:45 | 7 | 102 | 7 | 39 | 116 | 12 | 21 | 0 | 37 | 33 | 0 | 0 | 0 | 11 | 0 | 0 | 23 | 21 | 15 | 44 | 102 | 193 | 295 |
| Total | 34 | 379 | 20 | 208 | 433 | 46 | 87 | 0 | 161 | 133 | 0 | 0 | 0 | 83 | 0 | 0 | 99 | 95 | 83 | 194 | 535 | 760 | 1295 |
| 17:00 | 13 | 95 | 8 | 71 | 116 | 12 | 39 | 0 | 59 | 51 | 0 | 0 | 0 | 23 | 0 | 0 | 43 | 25 | 21 | 68 | 174 | 235 | 409 |
| 17:15 | 10 | 104 | 7 | 39 | 121 | 19 | 30 | 0 | 40 | 49 | 0 | 0 | 0 | 24 | 0 | 0 | 41 | 14 | 28 | 55 | 131 | 225 | 356 |
| 17:30 | 7 | 99 | 2 | 45 | 108 | 13 | 33 | 0 | 56 | 46 | 0 | 0 | 0 | 19 | 0 | 0 | 40 | 22 | 31 | 62 | 151 | 216 | 367 |
| 17:45 | 9 | 104 | 5 | 53 | 118 | 14 | 29 | 0 | 45 | 43 | 0 | 0 | 0 | 35 | 0 | 0 | 33 | 18 | 37 | 51 | 170 | 212 | 382 |
| Total | 39 | 402 | 22 | 208 | 463 | 58 | 131 | 0 | 200 | 189 | 0 | 0 | 0 | 101 | 0 | 0 | 157 | 79 | 117 | 236 | 626 | 888 | 1514 |
| Grand Total | 240 | 1303 | 95 | 595 | 1638 | 186 | 303 | 0 | 593 | 489 | 0 | 0 | 0 | 444 | 0 | 0 | 501 | 239 | 542 | 740 | 2174 | 2867 | 5041 |
| Apprch % | 14.7 | 79.5 | 5.8 | | | 38 | 62 | 0 | | | 0 | 0 | 0 | | | 0 | 67.7 | 32.3 | | | | | |
| Total % | 8.4 | 45.4 | 3.3 | | 57.1 | 6.5 | 10.6 | 0 | | 17.1 | 0 | 0 | 0 | | 0 | 0 | 17.5 | 8.3 | | 25.8 | 43.1 | 56.9 | |

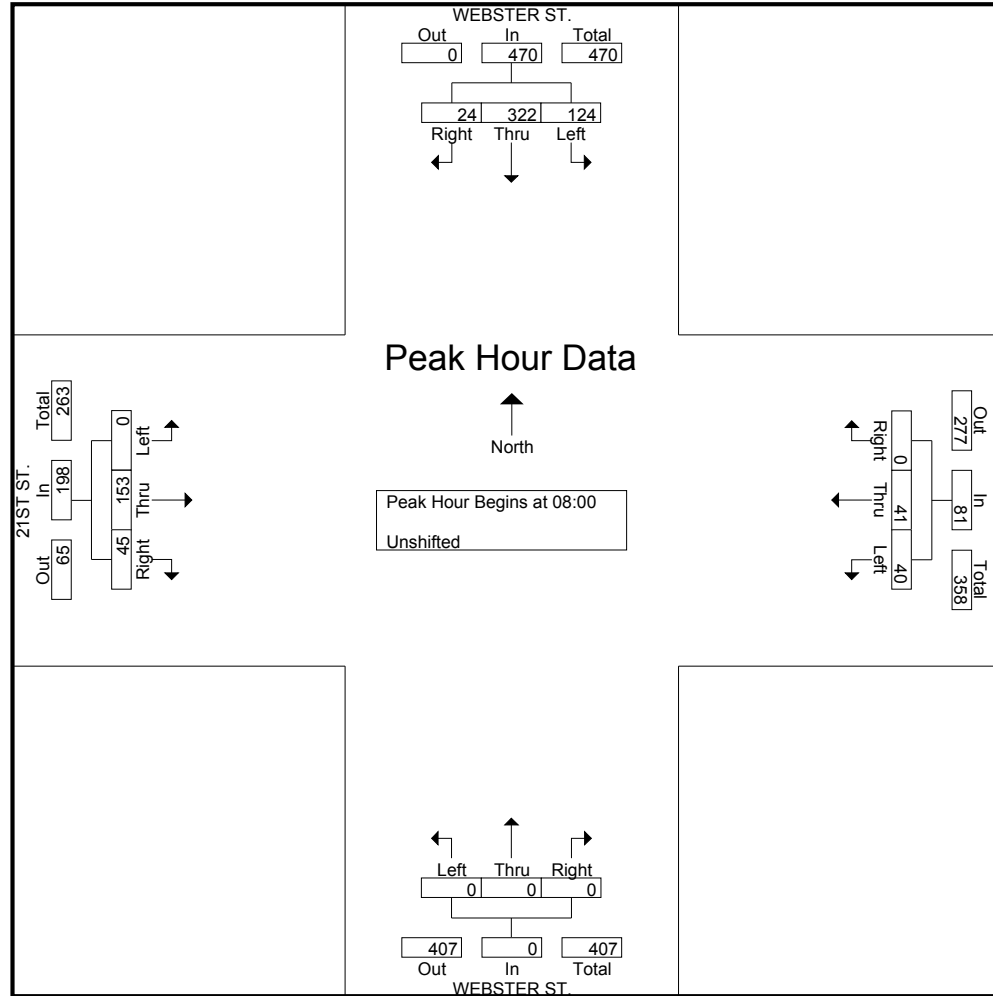
| | WEBSTER ST.
Southbound | | | | 21ST ST.
Westbound | | | | WEBSTER ST.
Northbound | | | | 21ST ST.
Eastbound | | | | |
|--|---------------------------|------|-------|------------|-----------------------|------|-------|------------|---------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 30 | 80 | 7 | 117 | 11 | 11 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 44 | 6 | 50 | 189 |
| 08:15 | 34 | 77 | 3 | 114 | 8 | 11 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 32 | 13 | 45 | 178 |
| 08:30 | 33 | 89 | 8 | 130 | 8 | 7 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 34 | 12 | 46 | 191 |
| 08:45 | 27 | 76 | 6 | 109 | 13 | 12 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 43 | 14 | 57 | 191 |
| Total Volume | 124 | 322 | 24 | 470 | 40 | 41 | 0 | 81 | 0 | 0 | 0 | 0 | 0 | 153 | 45 | 198 | 749 |
| % App. Total | 26.4 | 68.5 | 5.1 | | 49.4 | 50.6 | 0 | | 0 | 0 | 0 | | 0 | 77.3 | 22.7 | | |
| PHF | .912 | .904 | .750 | .904 | .769 | .854 | .000 | .810 | .000 | .000 | .000 | .000 | .000 | .869 | .804 | .868 | .980 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-007 WEBSTER-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

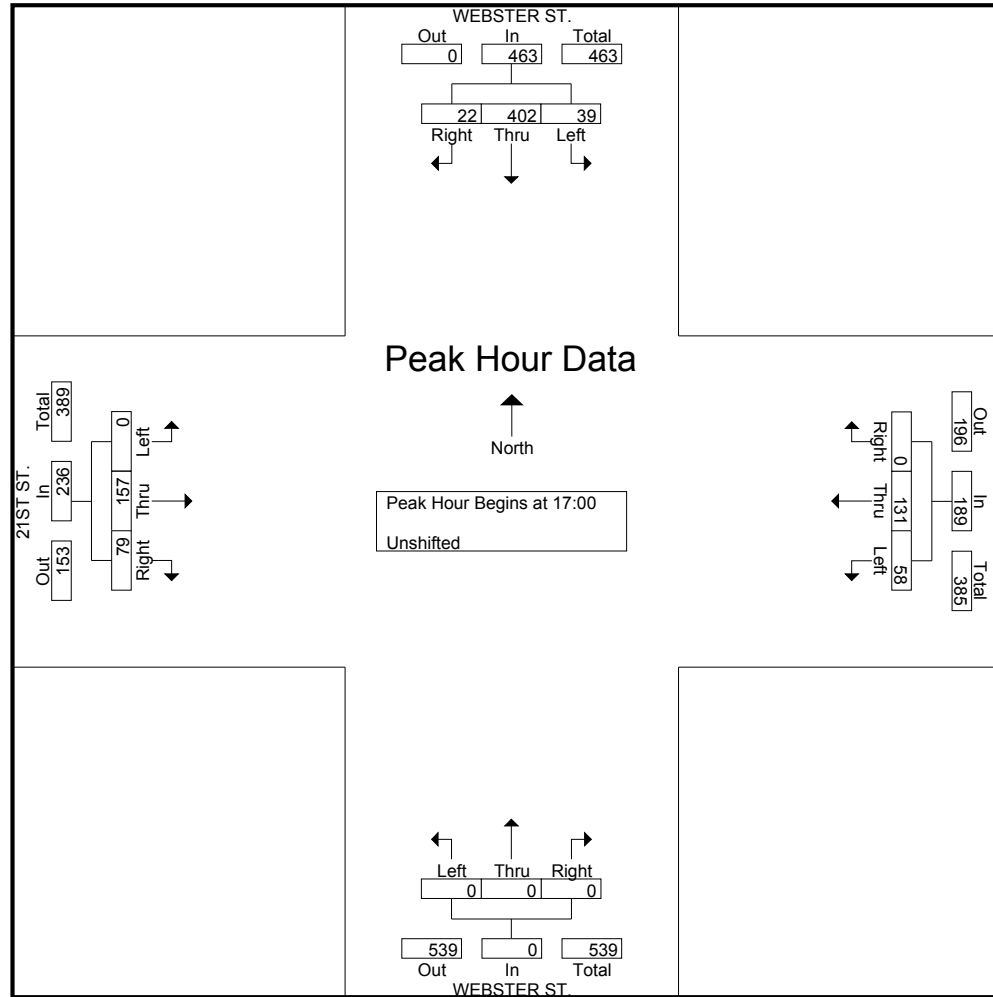
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 13 | 95 | 8 | 116 | 12 | 39 | 0 | 51 | 0 | 0 | 0 | 0 | 0 | 43 | 25 | 68 | 235 |
| 17:15 | 10 | 104 | 7 | 121 | 19 | 30 | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 41 | 14 | 55 | 225 |
| 17:30 | 7 | 99 | 2 | 108 | 13 | 33 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 40 | 22 | 62 | 216 |
| 17:45 | 9 | 104 | 5 | 118 | 14 | 29 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 33 | 18 | 51 | 212 |
| Total Volume | 39 | 402 | 22 | 463 | 58 | 131 | 0 | 189 | 0 | 0 | 0 | 0 | 0 | 157 | 79 | 236 | 888 |
| % App. Total | 8.4 | 86.8 | 4.8 | | 30.7 | 69.3 | 0 | | 0 | 0 | 0 | | 0 | 66.5 | 33.5 | | |
| PHF | .750 | .966 | .688 | .957 | .763 | .840 | .000 | .926 | .000 | .000 | .000 | .000 | .000 | .913 | .790 | .868 | .945 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-007 WEBSTER-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-006 FRANKLIN-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

| | FRANKLIN ST.
Southbound | | | | | 21ST ST.
Westbound | | | | | FRANKLIN ST.
Northbound | | | | | 21ST ST.
Eastbound | | | | | Exclu. Total | Inclu. Total | Int. Total |
|---------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | | | |
| 07:00 | 0 | 0 | 0 | 36 | 0 | 0 | 5 | 7 | 28 | 12 | 0 | 11 | 8 | 22 | 19 | 1 | 15 | 0 | 31 | 16 | 117 | 47 | 164 |
| 07:15 | 0 | 0 | 0 | 31 | 0 | 0 | 4 | 4 | 47 | 8 | 2 | 27 | 10 | 20 | 39 | 1 | 17 | 0 | 15 | 18 | 113 | 65 | 178 |
| 07:30 | 0 | 0 | 0 | 42 | 0 | 0 | 14 | 8 | 60 | 22 | 0 | 38 | 10 | 23 | 48 | 2 | 18 | 0 | 42 | 20 | 167 | 90 | 257 |
| 07:45 | 0 | 0 | 0 | 45 | 0 | 0 | 12 | 10 | 69 | 22 | 1 | 32 | 14 | 44 | 47 | 3 | 22 | 0 | 42 | 25 | 200 | 94 | 294 |
| Total | 0 | 0 | 0 | 154 | 0 | 0 | 35 | 29 | 204 | 64 | 3 | 108 | 42 | 109 | 153 | 7 | 72 | 0 | 130 | 79 | 597 | 296 | 893 |
| 08:00 | 0 | 0 | 0 | 40 | 0 | 0 | 11 | 6 | 66 | 17 | 1 | 30 | 15 | 30 | 46 | 0 | 37 | 0 | 29 | 37 | 165 | 100 | 265 |
| 08:15 | 0 | 0 | 0 | 38 | 0 | 0 | 7 | 8 | 55 | 15 | 0 | 36 | 13 | 34 | 49 | 2 | 34 | 0 | 33 | 36 | 160 | 100 | 260 |
| 08:30 | 0 | 0 | 0 | 53 | 0 | 0 | 8 | 6 | 58 | 14 | 4 | 53 | 18 | 39 | 75 | 1 | 34 | 3 | 29 | 38 | 179 | 127 | 306 |
| 08:45 | 0 | 0 | 0 | 43 | 0 | 0 | 7 | 9 | 89 | 16 | 3 | 44 | 19 | 43 | 66 | 3 | 41 | 0 | 25 | 44 | 200 | 126 | 326 |
| Total | 0 | 0 | 0 | 174 | 0 | 0 | 33 | 29 | 268 | 62 | 8 | 163 | 65 | 146 | 236 | 6 | 146 | 3 | 116 | 155 | 704 | 453 | 1157 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 28 | 0 | 0 | 10 | 16 | 65 | 26 | 4 | 64 | 24 | 66 | 92 | 1 | 20 | 0 | 24 | 21 | 183 | 139 | 322 |
| 16:15 | 0 | 0 | 0 | 30 | 0 | 0 | 16 | 7 | 66 | 23 | 3 | 54 | 33 | 52 | 90 | 5 | 16 | 0 | 23 | 21 | 171 | 134 | 305 |
| 16:30 | 0 | 0 | 0 | 46 | 0 | 0 | 15 | 12 | 72 | 27 | 3 | 56 | 22 | 67 | 81 | 4 | 29 | 0 | 49 | 33 | 234 | 141 | 375 |
| 16:45 | 0 | 0 | 0 | 40 | 0 | 0 | 18 | 11 | 50 | 29 | 5 | 64 | 24 | 55 | 93 | 2 | 23 | 0 | 49 | 25 | 194 | 147 | 341 |
| Total | 0 | 0 | 0 | 144 | 0 | 0 | 59 | 46 | 253 | 105 | 15 | 238 | 103 | 240 | 356 | 12 | 88 | 0 | 145 | 100 | 782 | 561 | 1343 |
| 17:00 | 0 | 0 | 0 | 44 | 0 | 0 | 25 | 18 | 51 | 43 | 5 | 62 | 40 | 62 | 107 | 3 | 27 | 0 | 47 | 30 | 204 | 180 | 384 |
| 17:15 | 0 | 0 | 0 | 43 | 0 | 0 | 19 | 19 | 48 | 38 | 5 | 66 | 33 | 50 | 104 | 2 | 21 | 0 | 33 | 23 | 174 | 165 | 339 |
| 17:30 | 0 | 0 | 0 | 38 | 0 | 0 | 22 | 12 | 41 | 34 | 2 | 71 | 37 | 32 | 110 | 2 | 25 | 1 | 37 | 28 | 148 | 172 | 320 |
| 17:45 | 0 | 0 | 0 | 25 | 0 | 0 | 21 | 13 | 25 | 34 | 4 | 65 | 30 | 31 | 99 | 4 | 18 | 0 | 25 | 22 | 106 | 155 | 261 |
| Total | 0 | 0 | 0 | 150 | 0 | 0 | 87 | 62 | 165 | 149 | 16 | 264 | 140 | 175 | 420 | 11 | 91 | 1 | 142 | 103 | 632 | 672 | 1304 |
| Grand Total | 0 | 0 | 0 | 622 | 0 | 0 | 214 | 166 | 890 | 380 | 42 | 773 | 350 | 670 | 1165 | 36 | 397 | 4 | 533 | 437 | 2715 | 1982 | 4697 |
| Apprch % | 0 | 0 | 0 | | | 0 | 56.3 | 43.7 | | | 3.6 | 66.4 | 30 | | | 8.2 | 90.8 | 0.9 | | | | | |
| Total % | 0 | 0 | 0 | | | 0 | 10.8 | 8.4 | | 19.2 | 2.1 | 39 | 17.7 | | 58.8 | 1.8 | 20 | 0.2 | | 22 | 57.8 | 42.2 | |

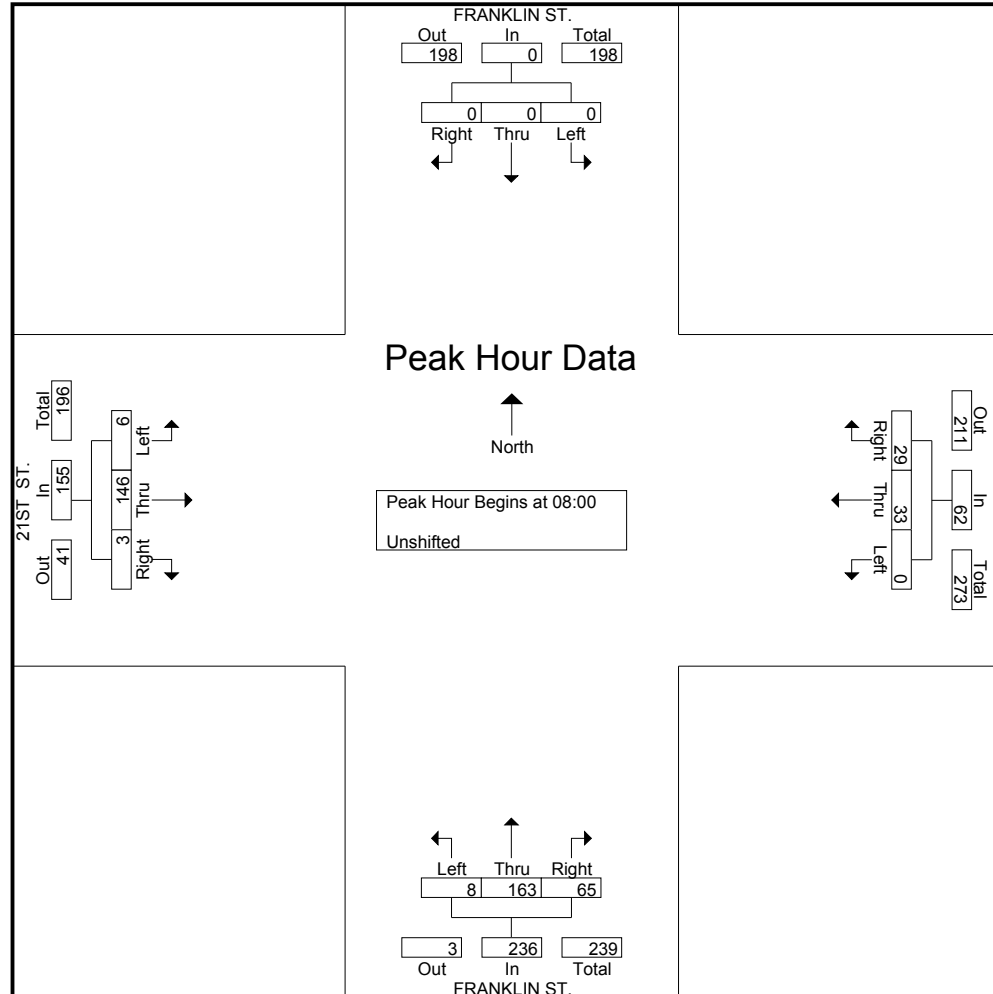
| | FRANKLIN ST.
Southbound | | | | 21ST ST.
Westbound | | | | FRANKLIN ST.
Northbound | | | | 21ST ST.
Eastbound | | | | Int. Total |
|--|----------------------------|------|-------|------------|-----------------------|------|-------|------------|----------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 11 | 6 | 17 | 1 | 30 | 15 | 46 | 0 | 37 | 0 | 37 | 100 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 7 | 8 | 15 | 0 | 36 | 13 | 49 | 2 | 34 | 0 | 36 | 100 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 8 | 6 | 14 | 4 | 53 | 18 | 75 | 1 | 34 | 3 | 38 | 127 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 7 | 9 | 16 | 3 | 44 | 19 | 66 | 3 | 41 | 0 | 44 | 126 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 33 | 29 | 62 | 8 | 163 | 65 | 236 | 6 | 146 | 3 | 155 | 453 |
| % App. Total | 0 | 0 | 0 | 0 | 0 | 53.2 | 46.8 | | 3.4 | 69.1 | 27.5 | | 3.9 | 94.2 | 1.9 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .750 | .806 | .912 | .500 | .769 | .855 | .787 | .500 | .890 | .250 | .881 | .892 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-006 FRANKLIN-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

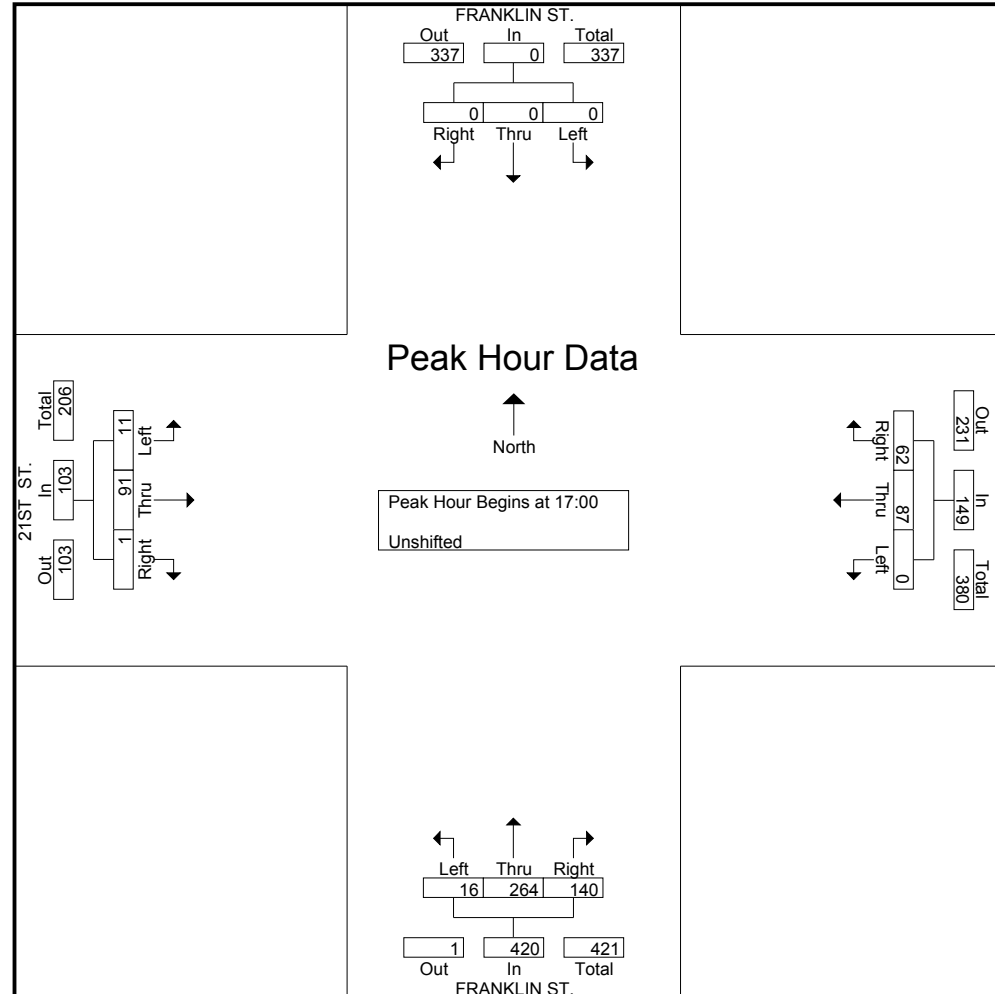
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 0 | 0 | 0 | 0 | 0 | 25 | 18 | 43 | 5 | 62 | 40 | 107 | 3 | 27 | 0 | 30 | 180 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 19 | 19 | 38 | 5 | 66 | 33 | 104 | 2 | 21 | 0 | 23 | 165 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 22 | 12 | 34 | 2 | 71 | 37 | 110 | 2 | 25 | 1 | 28 | 172 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 21 | 13 | 34 | 4 | 65 | 30 | 99 | 4 | 18 | 0 | 22 | 155 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 87 | 62 | 149 | 16 | 264 | 140 | 420 | 11 | 91 | 1 | 103 | 672 |
| % App. Total | 0 | 0 | 0 | 0 | 0 | 58.4 | 41.6 | | 3.8 | 62.9 | 33.3 | | 10.7 | 88.3 | 1 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .870 | .816 | .866 | .800 | .930 | .875 | .955 | .688 | .843 | .250 | .858 | .933 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-006 FRANKLIN-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-005 BROADWAY-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

| | BROADWAY
Southbound | | | | | 21ST ST.
Westbound | | | | | BROADWAY
Northbound | | | | | 21ST ST.
Eastbound | | | | | | | |
|---------------|------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 5 | 24 | 0 | 3 | 29 | 1 | 0 | 4 | 11 | 5 | 0 | 21 | 2 | 12 | 23 | 0 | 8 | 2 | 3 | 10 | 29 | 67 | 96 |
| 07:15 | 5 | 34 | 0 | 13 | 39 | 2 | 0 | 3 | 14 | 5 | 0 | 39 | 3 | 20 | 42 | 1 | 8 | 1 | 6 | 10 | 53 | 96 | 149 |
| 07:30 | 7 | 44 | 0 | 8 | 51 | 4 | 0 | 10 | 7 | 14 | 0 | 40 | 5 | 21 | 45 | 2 | 10 | 2 | 5 | 14 | 41 | 124 | 165 |
| 07:45 | 7 | 58 | 0 | 12 | 65 | 4 | 0 | 10 | 9 | 14 | 0 | 56 | 5 | 15 | 61 | 3 | 12 | 4 | 11 | 19 | 47 | 159 | 206 |
| Total | 24 | 160 | 0 | 36 | 184 | 11 | 0 | 27 | 41 | 38 | 0 | 156 | 15 | 68 | 171 | 6 | 38 | 9 | 25 | 53 | 170 | 446 | 616 |
| 08:00 | 8 | 59 | 0 | 19 | 67 | 3 | 0 | 6 | 6 | 9 | 0 | 76 | 7 | 17 | 83 | 1 | 20 | 3 | 5 | 24 | 47 | 183 | 230 |
| 08:15 | 8 | 75 | 0 | 29 | 83 | 5 | 0 | 9 | 8 | 14 | 0 | 60 | 7 | 28 | 67 | 4 | 24 | 4 | 9 | 32 | 74 | 196 | 270 |
| 08:30 | 8 | 80 | 0 | 26 | 88 | 6 | 0 | 8 | 9 | 14 | 0 | 59 | 7 | 21 | 66 | 2 | 23 | 3 | 7 | 28 | 63 | 196 | 259 |
| 08:45 | 10 | 71 | 0 | 25 | 81 | 5 | 0 | 5 | 11 | 10 | 0 | 62 | 10 | 20 | 72 | 2 | 25 | 4 | 11 | 31 | 67 | 194 | 261 |
| Total | 34 | 285 | 0 | 99 | 319 | 19 | 0 | 28 | 34 | 47 | 0 | 257 | 31 | 86 | 288 | 9 | 92 | 14 | 32 | 115 | 251 | 769 | 1020 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 3 | 72 | 0 | 28 | 75 | 8 | 0 | 5 | 8 | 13 | 0 | 70 | 8 | 24 | 78 | 10 | 12 | 2 | 7 | 24 | 67 | 190 | 257 |
| 16:15 | 2 | 65 | 0 | 27 | 67 | 10 | 0 | 8 | 6 | 18 | 0 | 82 | 8 | 6 | 90 | 7 | 11 | 2 | 12 | 20 | 51 | 195 | 246 |
| 16:30 | 7 | 73 | 0 | 19 | 80 | 6 | 0 | 10 | 14 | 16 | 0 | 76 | 12 | 12 | 88 | 6 | 14 | 4 | 3 | 24 | 48 | 208 | 256 |
| 16:45 | 7 | 82 | 0 | 26 | 89 | 10 | 0 | 9 | 16 | 19 | 0 | 79 | 9 | 26 | 88 | 5 | 8 | 2 | 7 | 15 | 75 | 211 | 286 |
| Total | 19 | 292 | 0 | 100 | 311 | 34 | 0 | 32 | 44 | 66 | 0 | 307 | 37 | 68 | 344 | 28 | 45 | 10 | 29 | 83 | 241 | 804 | 1045 |
| 17:00 | 7 | 92 | 0 | 40 | 99 | 14 | 0 | 16 | 23 | 30 | 0 | 97 | 7 | 22 | 104 | 3 | 11 | 4 | 17 | 18 | 102 | 251 | 353 |
| 17:15 | 5 | 93 | 0 | 26 | 98 | 10 | 0 | 12 | 1 | 22 | 0 | 92 | 8 | 17 | 100 | 3 | 7 | 5 | 7 | 15 | 51 | 235 | 286 |
| 17:30 | 7 | 91 | 0 | 17 | 98 | 13 | 0 | 9 | 18 | 22 | 0 | 119 | 10 | 25 | 129 | 1 | 10 | 4 | 11 | 15 | 71 | 264 | 335 |
| 17:45 | 6 | 92 | 0 | 13 | 98 | 12 | 0 | 12 | 7 | 24 | 0 | 115 | 10 | 17 | 125 | 4 | 8 | 4 | 10 | 16 | 47 | 263 | 310 |
| Total | 25 | 368 | 0 | 96 | 393 | 49 | 0 | 49 | 49 | 98 | 0 | 423 | 35 | 81 | 458 | 11 | 36 | 17 | 45 | 64 | 271 | 1013 | 1284 |
| Grand Total | 102 | 1105 | 0 | 331 | 1207 | 113 | 0 | 136 | 168 | 249 | 0 | 1143 | 118 | 303 | 1261 | 54 | 211 | 50 | 131 | 315 | 933 | 3032 | 3965 |
| Apprch % | 8.5 | 91.5 | 0 | | | 45.4 | 0 | 54.6 | | | 0 | 90.6 | 9.4 | | | 17.1 | 67 | 15.9 | | | | | |
| Total % | 3.4 | 36.4 | 0 | | 39.8 | 3.7 | 0 | 4.5 | | 8.2 | 0 | 37.7 | 3.9 | | 41.6 | 1.8 | 7 | 1.6 | | 10.4 | 23.5 | 76.5 | |

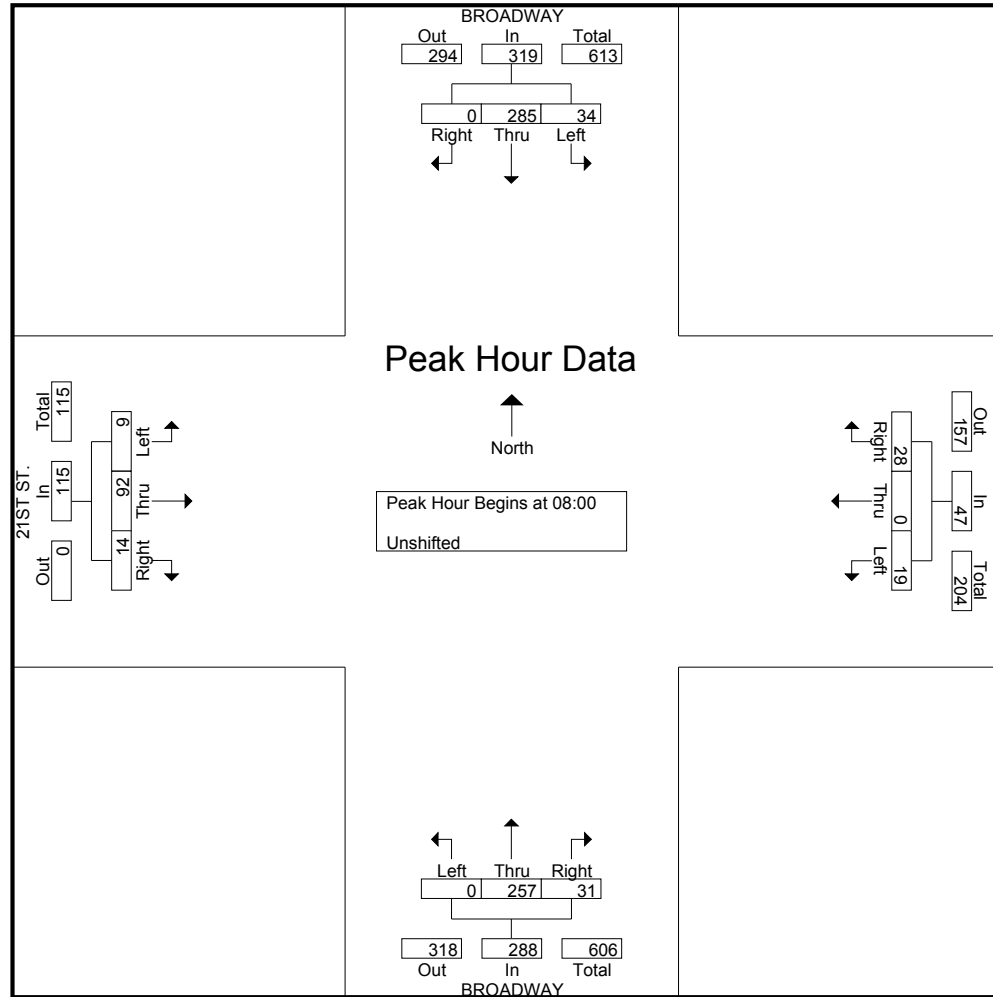
| | BROADWAY
Southbound | | | | 21ST ST.
Westbound | | | | BROADWAY
Northbound | | | | 21ST ST.
Eastbound | | | | |
|--|------------------------|-----------|-------|------------|-----------------------|------|----------|------------|------------------------|-----------|-----------|------------|-----------------------|-----------|----------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 8 | 59 | 0 | 67 | 3 | 0 | 6 | 9 | 0 | 76 | 7 | 83 | 1 | 20 | 3 | 24 | 183 |
| 08:15 | 8 | 75 | 0 | 83 | 5 | 0 | 9 | 14 | 0 | 60 | 7 | 67 | 4 | 24 | 4 | 32 | 196 |
| 08:30 | 8 | 80 | 0 | 88 | 6 | 0 | 8 | 14 | 0 | 59 | 7 | 66 | 2 | 23 | 3 | 28 | 196 |
| 08:45 | 10 | 71 | 0 | 81 | 5 | 0 | 5 | 10 | 0 | 62 | 10 | 72 | 2 | 25 | 4 | 31 | 194 |
| Total Volume | 34 | 285 | 0 | 319 | 19 | 0 | 28 | 47 | 0 | 257 | 31 | 288 | 9 | 92 | 14 | 115 | 769 |
| % App. Total | 10.7 | 89.3 | 0 | | 40.4 | 0 | 59.6 | | 0 | 89.2 | 10.8 | | 7.8 | 80 | 12.2 | | |
| PHF | .850 | .891 | .000 | .906 | .792 | .000 | .778 | .839 | .000 | .845 | .775 | .867 | .563 | .920 | .875 | .898 | .981 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-005 BROADWAY-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

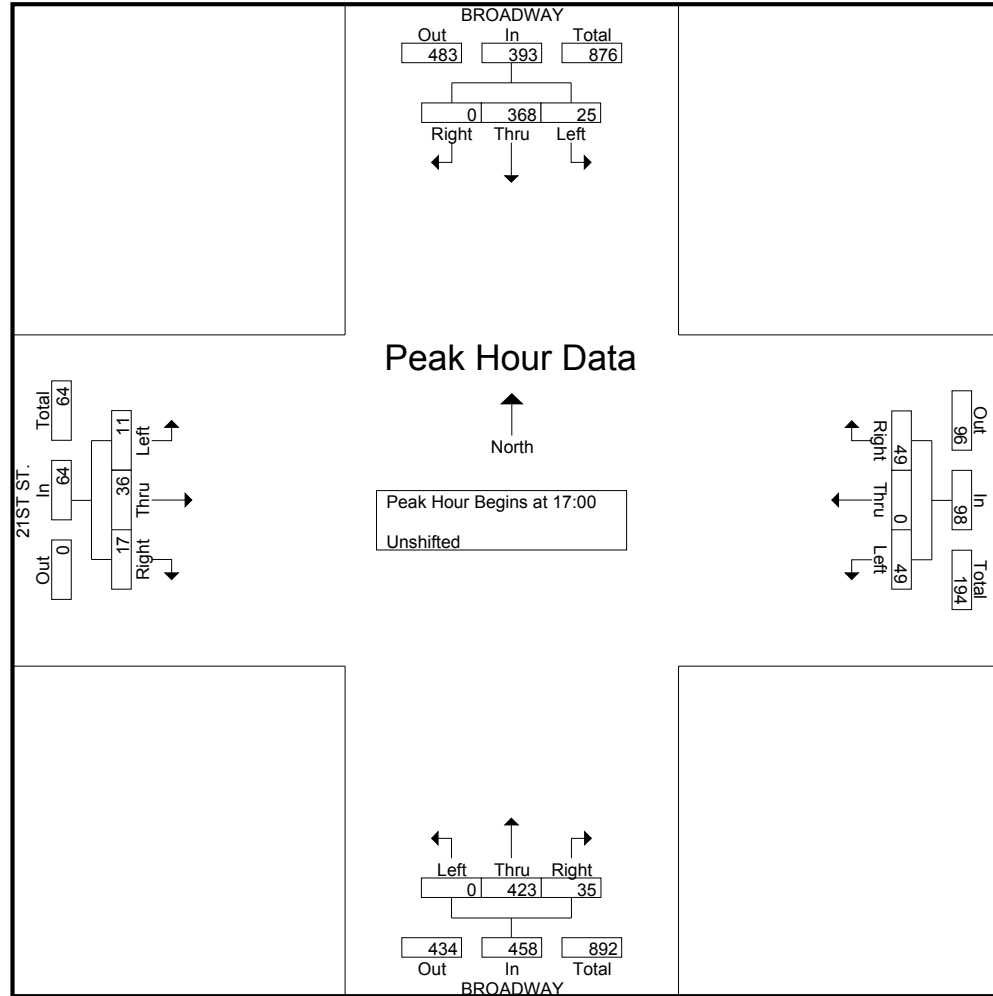
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 7 | 92 | 0 | 99 | 14 | 0 | 16 | 30 | 0 | 97 | 7 | 104 | 3 | 11 | 4 | 18 | 251 |
| 17:15 | 5 | 93 | 0 | 98 | 10 | 0 | 12 | 22 | 0 | 92 | 8 | 100 | 3 | 7 | 5 | 15 | 235 |
| 17:30 | 7 | 91 | 0 | 98 | 13 | 0 | 9 | 22 | 0 | 119 | 10 | 129 | 1 | 10 | 4 | 15 | 264 |
| 17:45 | 6 | 92 | 0 | 98 | 12 | 0 | 12 | 24 | 0 | 115 | 10 | 125 | 4 | 8 | 4 | 16 | 263 |
| Total Volume | 25 | 368 | 0 | 393 | 49 | 0 | 49 | 98 | 0 | 423 | 35 | 458 | 11 | 36 | 17 | 64 | 1013 |
| % App. Total | 6.4 | 93.6 | 0 | | 50 | 0 | 50 | | 0 | 92.4 | 7.6 | | 17.2 | 56.2 | 26.6 | | |
| PHF | .893 | .989 | .000 | .992 | .875 | .000 | .766 | .817 | .000 | .889 | .875 | .888 | .688 | .818 | .850 | .889 | .959 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

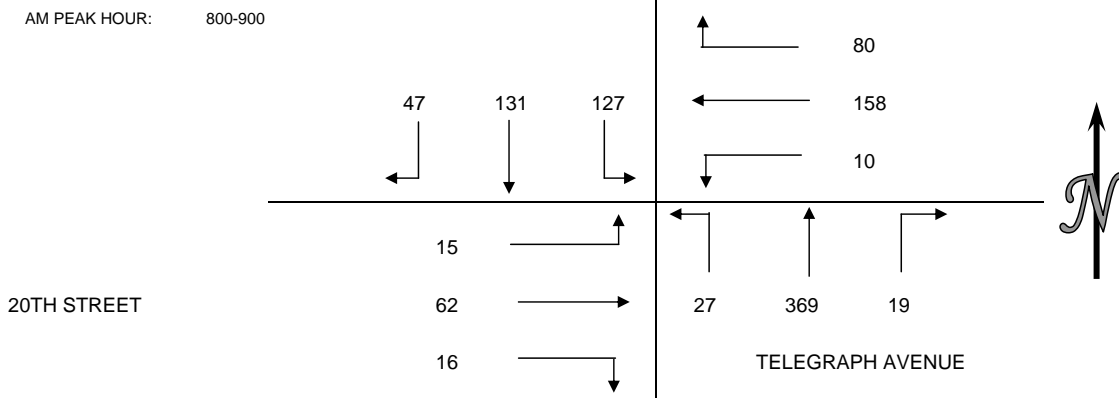
File Name : 08-7458-005 BROADWAY-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: WEDNESDAY OCTOBER 29, 2008
 PERIOD: 7:00 AM TO 9:00 AM
 INTERSECTION: N/S TELEGRAPH AVENUE
 E/W 20TH STREET
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-715 | 3 | 15 | 15 | 9 | 16 | 1 | 1 | 23 | 2 | 4 | 10 | 2 | 101 |
| 715-730 | 5 | 24 | 24 | 20 | 32 | 2 | 1 | 78 | 4 | 4 | 11 | 0 | 205 |
| 730-745 | 3 | 20 | 14 | 15 | 14 | 2 | 1 | 55 | 4 | 1 | 12 | 6 | 147 |
| 745-800 | 8 | 29 | 29 | 37 | 40 | 1 | 2 | 83 | 7 | 0 | 10 | 0 | 246 |
| 800-815 | 10 | 43 | 30 | 26 | 42 | 2 | 6 | 89 | 4 | 5 | 11 | 5 | 273 |
| 815-830 | 10 | 37 | 35 | 27 | 40 | 2 | 6 | 93 | 11 | 5 | 20 | 5 | 291 |
| 830-845 | 15 | 25 | 30 | 7 | 35 | 3 | 4 | 93 | 7 | 1 | 17 | 3 | 240 |
| 845-900 | 12 | 26 | 32 | 20 | 41 | 3 | 3 | 94 | 5 | 5 | 14 | 2 | 257 |
| HOUR TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-800 | 19 | 88 | 82 | 81 | 102 | 6 | 5 | 239 | 17 | 9 | 43 | 8 | 699 |
| 715-815 | 26 | 116 | 97 | 98 | 128 | 7 | 10 | 305 | 19 | 10 | 44 | 11 | 871 |
| 730-830 | 31 | 129 | 108 | 105 | 136 | 7 | 15 | 320 | 26 | 11 | 53 | 16 | 957 |
| 745-845 | 43 | 134 | 124 | 97 | 157 | 8 | 18 | 358 | 29 | 11 | 58 | 13 | 1050 |
| 800-900 | 47 | 131 | 127 | 80 | 158 | 10 | 19 | 369 | 27 | 16 | 62 | 15 | 1061 |



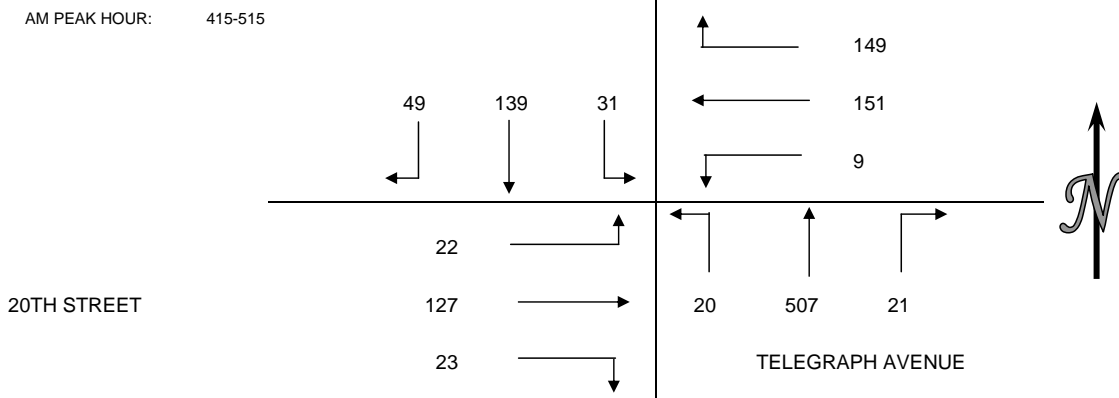
| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 6 | 6 | 2 | 0 | 14 |
| 715-730 | 10 | 12 | 6 | 1 | 29 |
| 730-745 | 2 | 22 | 5 | 1 | 30 |
| 745-800 | 14 | 32 | 4 | 9 | 59 |
| 800-815 | 17 | 29 | 15 | 0 | 61 |
| 815-830 | 14 | 26 | 23 | 2 | 65 |
| 830-845 | 6 | 18 | 14 | 1 | 39 |
| 845-900 | 13 | 21 | 13 | 4 | 51 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 32 | 72 | 17 | 11 | 132 |
| 715-815 | 43 | 95 | 30 | 11 | 179 |
| 730-830 | 47 | 109 | 47 | 12 | 215 |
| 745-845 | 51 | 105 | 56 | 12 | 224 |
| 800-900 | 50 | 94 | 65 | 7 | 216 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 4 | 2 | 0 | 0 | 6 |
| 715-730 | 0 | 3 | 1 | 0 | 4 |
| 730-745 | 0 | 1 | 2 | 0 | 3 |
| 745-800 | 2 | 7 | 2 | 2 | 13 |
| 800-815 | 2 | 2 | 3 | 1 | 8 |
| 815-830 | 2 | 3 | 3 | 0 | 8 |
| 830-845 | 2 | 4 | 4 | 1 | 11 |
| 845-900 | 1 | 4 | 2 | 2 | 9 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 6 | 13 | 5 | 2 | 26 |
| 715-815 | 4 | 13 | 8 | 3 | 28 |
| 730-830 | 6 | 13 | 10 | 3 | 32 |
| 745-845 | 8 | 16 | 12 | 4 | 40 |
| 800-900 | 7 | 13 | 12 | 4 | 36 |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: WEDNESDAY OCTOBER 29, 2008
 PERIOD: 4:00 PM TO 6:00 PM
 INTERSECTION: N/S TELEGRAPH AVENUE
 E/W 20TH STREET
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-415 | 15 | 38 | 18 | 29 | 44 | 5 | 11 | 117 | 7 | 5 | 20 | 6 | 315 |
| 415-430 | 22 | 41 | 8 | 13 | 37 | 2 | 8 | 139 | 7 | 11 | 32 | 4 | 324 |
| 430-445 | 9 | 38 | 7 | 44 | 37 | 2 | 4 | 110 | 3 | 7 | 38 | 3 | 302 |
| 445-500 | 4 | 28 | 9 | 35 | 23 | 4 | 5 | 129 | 5 | 3 | 30 | 5 | 280 |
| 500-515 | 14 | 32 | 7 | 57 | 54 | 1 | 4 | 129 | 5 | 2 | 27 | 10 | 342 |
| 515-530 | 11 | 29 | 12 | 39 | 45 | 3 | 18 | 108 | 2 | 3 | 19 | 2 | 291 |
| 530-545 | 4 | 24 | 12 | 36 | 32 | 3 | 13 | 88 | 7 | 0 | 14 | 4 | 237 |
| 545-600 | 15 | 37 | 2 | 23 | 45 | 4 | 13 | 96 | 9 | 5 | 21 | 4 | 274 |
| HOUR TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-500 | 50 | 145 | 42 | 121 | 141 | 13 | 28 | 495 | 22 | 26 | 120 | 18 | 1221 |
| 415-515 | 49 | 139 | 31 | 149 | 151 | 9 | 21 | 507 | 20 | 23 | 127 | 22 | 1248 |
| 430-530 | 38 | 127 | 35 | 175 | 159 | 10 | 31 | 476 | 15 | 15 | 114 | 20 | 1215 |
| 445-545 | 33 | 113 | 40 | 167 | 154 | 11 | 40 | 454 | 19 | 8 | 90 | 21 | 1150 |
| 500-600 | 44 | 122 | 33 | 155 | 176 | 11 | 48 | 421 | 23 | 10 | 81 | 20 | 1144 |



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 10 | 32 | 7 | 9 | 58 |
| 415-430 | 18 | 56 | 29 | 3 | 106 |
| 430-445 | 18 | 48 | 15 | 8 | 89 |
| 445-500 | 9 | 32 | 14 | 4 | 59 |
| 500-515 | 15 | 53 | 35 | 8 | 111 |
| 515-530 | 5 | 32 | 40 | 5 | 82 |
| 530-545 | 21 | 31 | 17 | 7 | 76 |
| 545-600 | 23 | 32 | 14 | 10 | 79 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 55 | 168 | 65 | 24 | 312 |
| 415-515 | 60 | 189 | 93 | 23 | 365 |
| 430-530 | 47 | 165 | 104 | 25 | 341 |
| 445-545 | 50 | 148 | 106 | 24 | 328 |
| 500-600 | 64 | 148 | 106 | 30 | 348 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 2 | 7 | 2 | 2 | 13 |
| 415-430 | 3 | 20 | 4 | 1 | 28 |
| 430-445 | 2 | 19 | 1 | 3 | 25 |
| 445-500 | 0 | 5 | 2 | 1 | 8 |
| 500-515 | 1 | 14 | 13 | 2 | 30 |
| 515-530 | 0 | 14 | 8 | 0 | 22 |
| 530-545 | 6 | 9 | 6 | 3 | 24 |
| 545-600 | 6 | 14 | 4 | 2 | 26 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 7 | 51 | 9 | 7 | 74 |
| 415-515 | 6 | 58 | 20 | 7 | 91 |
| 430-530 | 3 | 52 | 24 | 6 | 85 |
| 445-545 | 7 | 42 | 29 | 6 | 84 |
| 500-600 | 13 | 51 | 31 | 7 | 102 |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Broadway & 20th St

Date: 05/22/2008

| | Broadway Southbound | | | | 20th St Westbound | | | | Broadway Northbound | | | | 20th St Eastbound | | | | |
|------------|---------------------|------|-------|------------|-------------------|------|-------|------------|---------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 6 | 35 | 2 | 43 | 6 | 18 | 13 | 37 | 5 | 52 | 6 | 63 | 0 | 13 | 7 | 20 | 163 |
| 7:15 | 3 | 40 | 8 | 51 | 4 | 14 | 18 | 36 | 5 | 53 | 9 | 67 | 1 | 20 | 13 | 34 | 188 |
| 7:30 | 7 | 51 | 12 | 70 | 3 | 34 | 16 | 53 | 10 | 63 | 10 | 83 | 3 | 17 | 7 | 27 | 233 |
| 7:45 | 10 | 69 | 9 | 88 | 6 | 31 | 23 | 60 | 9 | 83 | 13 | 105 | 2 | 27 | 11 | 40 | 293 |
| Total | 26 | 195 | 31 | 252 | 19 | 97 | 70 | 186 | 29 | 251 | 38 | 318 | 6 | 77 | 38 | 121 | 877 |
| 8:00 | 6 | 73 | 6 | 85 | 13 | 25 | 26 | 64 | 12 | 96 | 16 | 124 | 2 | 25 | 14 | 41 | 314 |
| 8:15 | 16 | 92 | 4 | 112 | 8 | 35 | 27 | 70 | 14 | 98 | 15 | 127 | 2 | 26 | 17 | 45 | 354 |
| 8:30 | 17 | 98 | 7 | 122 | 10 | 34 | 20 | 64 | 13 | 102 | 12 | 127 | 1 | 40 | 9 | 50 | 363 |
| 8:45 | 14 | 87 | 5 | 106 | 10 | 36 | 21 | 67 | 12 | 109 | 15 | 136 | 2 | 38 | 12 | 52 | 361 |
| Total | 53 | 350 | 22 | 425 | 41 | 130 | 94 | 265 | 51 | 405 | 58 | 514 | 7 | 129 | 52 | 188 | 1392 |
| 16:00 | 7 | 79 | 13 | 99 | 5 | 45 | 9 | 59 | 14 | 144 | 23 | 181 | 1 | 36 | 22 | 59 | 398 |
| 16:15 | 8 | 100 | 14 | 122 | 9 | 45 | 19 | 73 | 17 | 146 | 25 | 188 | 2 | 39 | 25 | 66 | 449 |
| 16:30 | 10 | 101 | 10 | 121 | 10 | 43 | 14 | 67 | 21 | 156 | 21 | 198 | 5 | 35 | 22 | 62 | 448 |
| 16:45 | 8 | 107 | 8 | 123 | 13 | 47 | 14 | 74 | 23 | 152 | 24 | 199 | 6 | 39 | 17 | 62 | 458 |
| Total | 33 | 387 | 45 | 465 | 37 | 180 | 56 | 273 | 75 | 598 | 93 | 766 | 14 | 149 | 86 | 249 | 1753 |
| 17:00 | 6 | 108 | 13 | 127 | 13 | 56 | 21 | 90 | 23 | 174 | 25 | 222 | 5 | 34 | 18 | 57 | 496 |
| 17:15 | 10 | 133 | 4 | 147 | 14 | 51 | 24 | 89 | 21 | 165 | 21 | 207 | 2 | 29 | 21 | 52 | 495 |
| 17:30 | 13 | 118 | 8 | 139 | 11 | 45 | 27 | 83 | 25 | 184 | 25 | 234 | 6 | 26 | 24 | 56 | 512 |
| 17:45 | 10 | 124 | 5 | 139 | 12 | 43 | 20 | 75 | 17 | 152 | 19 | 188 | 7 | 27 | 15 | 49 | 451 |
| Total | 39 | 483 | 30 | 552 | 50 | 195 | 92 | 337 | 86 | 675 | 90 | 851 | 20 | 116 | 78 | 214 | 1954 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|
| Grand Total | 151 | 1415 | 128 | 1694 | 147 | 602 | 312 | 1061 | 241 | 1929 | 279 | 2449 | 47 | 471 | 254 | 772 | 5976 |
| Apprch% | 8.9% | 83.5% | 7.6% | | 13.9% | 56.7% | 29.4% | | 9.8% | 78.8% | 11.4% | | 6.1% | 61.0% | 32.9% | | |
| Total % | 2.5% | 23.7% | 2.1% | 28.3% | 2.5% | 10.1% | 5.2% | 17.8% | 4.0% | 32.3% | 4.7% | 41.0% | 0.8% | 7.9% | 4.3% | 12.9% | |

City of Oakland

Broadway & 20th St

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| | Broadway Southbound | | | | 20th St Westbound | | | | Broadway Northbound | | | | 20th St Eastbound | | | | |
|--------------|---------------------|-------|-------|------------|-------------------|-------|-------|------------|---------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 6 | 73 | 6 | 85 | 13 | 25 | 26 | 64 | 12 | 96 | 16 | 124 | 2 | 25 | 14 | 41 | 314 |
| 815 | 16 | 92 | 4 | 112 | 8 | 35 | 27 | 70 | 14 | 98 | 15 | 127 | 2 | 26 | 17 | 45 | 354 |
| 830 | 17 | 98 | 7 | 122 | 10 | 34 | 20 | 64 | 13 | 102 | 12 | 127 | 1 | 40 | 9 | 50 | 363 |
| 845 | 14 | 87 | 5 | 106 | 10 | 36 | 21 | 67 | 12 | 109 | 15 | 136 | 2 | 38 | 12 | 52 | 361 |
| Total Volume | 53 | 350 | 22 | 425 | 41 | 130 | 94 | 265 | 51 | 405 | 58 | 514 | 7 | 129 | 52 | 188 | 1392 |
| % App Total. | ### | 82.4% | 5.2% | | 15.5% | 49.1% | 35.5% | | 9.9% | 78.8% | 11.3% | | 3.7% | 68.6% | 27.7% | | |
| PHF | 0.871 | | | | 0.946 | | | | 0.945 | | | | 0.904 | | | | |

PM Peak Hr Begins at 445 PM

| | Broadway Southbound | | | | 20th St Westbound | | | | Broadway Northbound | | | | 20th St Eastbound | | | | |
|--------------|---------------------|-------|-------|------------|-------------------|-------|-------|------------|---------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 445 | 8 | 107 | 8 | 123 | 13 | 47 | 14 | 74 | 23 | 152 | 24 | 199 | 6 | 39 | 17 | 62 | 458 |
| 500 | 6 | 108 | 13 | 127 | 13 | 56 | 21 | 90 | 23 | 174 | 25 | 222 | 5 | 34 | 18 | 57 | 496 |
| 515 | 10 | 133 | 4 | 147 | 14 | 51 | 24 | 89 | 21 | 165 | 21 | 207 | 2 | 29 | 21 | 52 | 495 |
| 530 | 13 | 118 | 8 | 139 | 11 | 45 | 27 | 83 | 25 | 184 | 25 | 234 | 6 | 26 | 24 | 56 | 512 |
| Total Volume | 37 | 466 | 33 | 536 | 51 | 199 | 86 | 336 | 92 | 675 | 95 | 862 | 19 | 128 | 80 | 227 | 1961 |
| % App Total. | 6.9% | 86.9% | 6.2% | | 15.2% | 59.2% | 25.6% | | 10.7% | 78.3% | 11.0% | | 8.4% | 56.4% | 35.2% | | |
| PHF | 0.912 | | | | 0.933 | | | | 0.921 | | | | 0.915 | | | | |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKALND

File Name : 08-7458-013 FRANKLIN-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

| | FRANKLIN ST.
Southbound | | | | | 20TH ST.
Westbound | | | | | FRANKLIN ST.
Northbound | | | | | 20TH ST.
Eastbound | | | | | Exclu. Total | Inclu. Total | Int. Total |
|---------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | | | |
| 07:00 | 0 | 0 | 0 | 52 | 0 | 0 | 27 | 10 | 23 | 37 | 4 | 10 | 6 | 15 | 20 | 2 | 20 | 0 | 21 | 22 | 111 | 79 | 190 |
| 07:15 | 0 | 0 | 0 | 61 | 0 | 0 | 28 | 19 | 25 | 47 | 3 | 21 | 8 | 21 | 32 | 3 | 28 | 0 | 14 | 31 | 121 | 110 | 231 |
| 07:30 | 0 | 0 | 0 | 83 | 0 | 0 | 47 | 15 | 15 | 62 | 8 | 31 | 14 | 17 | 53 | 5 | 24 | 0 | 19 | 29 | 134 | 144 | 278 |
| 07:45 | 0 | 0 | 0 | 102 | 0 | 0 | 56 | 11 | 29 | 67 | 4 | 35 | 23 | 19 | 62 | 5 | 46 | 0 | 21 | 51 | 171 | 180 | 351 |
| Total | 0 | 0 | 0 | 298 | 0 | 0 | 158 | 55 | 92 | 213 | 19 | 97 | 51 | 72 | 167 | 15 | 118 | 0 | 75 | 133 | 537 | 513 | 1050 |
| 08:00 | 0 | 0 | 0 | 107 | 0 | 0 | 47 | 15 | 21 | 62 | 7 | 29 | 21 | 24 | 57 | 6 | 50 | 0 | 11 | 56 | 163 | 175 | 338 |
| 08:15 | 0 | 0 | 0 | 98 | 0 | 0 | 51 | 16 | 19 | 67 | 9 | 30 | 21 | 27 | 60 | 5 | 61 | 0 | 23 | 66 | 167 | 193 | 360 |
| 08:30 | 0 | 0 | 0 | 112 | 0 | 0 | 55 | 19 | 26 | 74 | 4 | 52 | 19 | 31 | 75 | 6 | 58 | 0 | 26 | 64 | 195 | 213 | 408 |
| 08:45 | 0 | 0 | 0 | 97 | 0 | 0 | 50 | 19 | 24 | 69 | 6 | 42 | 15 | 21 | 63 | 6 | 54 | 0 | 21 | 60 | 163 | 192 | 355 |
| Total | 0 | 0 | 0 | 414 | 0 | 0 | 203 | 69 | 90 | 272 | 26 | 153 | 76 | 103 | 255 | 23 | 223 | 0 | 81 | 246 | 688 | 773 | 1461 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 92 | 0 | 0 | 66 | 18 | 33 | 84 | 10 | 60 | 29 | 39 | 99 | 10 | 33 | 0 | 18 | 43 | 182 | 226 | 408 |
| 16:15 | 0 | 0 | 0 | 102 | 0 | 0 | 61 | 14 | 21 | 75 | 9 | 60 | 40 | 24 | 109 | 7 | 57 | 0 | 19 | 64 | 166 | 248 | 414 |
| 16:30 | 0 | 0 | 0 | 112 | 0 | 0 | 53 | 8 | 29 | 61 | 11 | 62 | 47 | 26 | 120 | 11 | 58 | 0 | 12 | 69 | 179 | 250 | 429 |
| 16:45 | 0 | 0 | 0 | 96 | 0 | 0 | 70 | 20 | 35 | 90 | 15 | 64 | 46 | 19 | 125 | 11 | 60 | 0 | 24 | 71 | 174 | 286 | 460 |
| Total | 0 | 0 | 0 | 402 | 0 | 0 | 250 | 60 | 118 | 310 | 45 | 246 | 162 | 108 | 453 | 39 | 208 | 0 | 73 | 247 | 701 | 1010 | 1711 |
| 17:00 | 0 | 0 | 0 | 107 | 0 | 0 | 78 | 19 | 37 | 97 | 14 | 75 | 50 | 28 | 139 | 7 | 60 | 0 | 21 | 67 | 193 | 303 | 496 |
| 17:15 | 0 | 0 | 0 | 88 | 0 | 0 | 82 | 16 | 25 | 98 | 13 | 80 | 49 | 35 | 142 | 4 | 62 | 0 | 17 | 66 | 165 | 306 | 471 |
| 17:30 | 0 | 0 | 0 | 101 | 0 | 0 | 70 | 20 | 29 | 90 | 8 | 83 | 53 | 25 | 144 | 7 | 73 | 0 | 23 | 80 | 178 | 314 | 492 |
| 17:45 | 0 | 0 | 0 | 91 | 0 | 0 | 64 | 20 | 17 | 84 | 13 | 75 | 43 | 29 | 131 | 3 | 64 | 0 | 23 | 67 | 160 | 282 | 442 |
| Total | 0 | 0 | 0 | 387 | 0 | 0 | 294 | 75 | 108 | 369 | 48 | 313 | 195 | 117 | 556 | 21 | 259 | 0 | 84 | 280 | 696 | 1205 | 1901 |
| Grand Total | 0 | 0 | 0 | 1501 | 0 | 0 | 905 | 259 | 408 | 1164 | 138 | 809 | 484 | 400 | 1431 | 98 | 808 | 0 | 313 | 906 | 2622 | 3501 | 6123 |
| Apprch % | 0 | 0 | 0 | | | 0 | 77.7 | 22.3 | | | 9.6 | 56.5 | 33.8 | | | 10.8 | 89.2 | 0 | | | | | |
| Total % | 0 | 0 | 0 | | 0 | 0 | 25.8 | 7.4 | | 33.2 | 3.9 | 23.1 | 13.8 | | 40.9 | 2.8 | 23.1 | 0 | | 25.9 | 42.8 | 57.2 | |

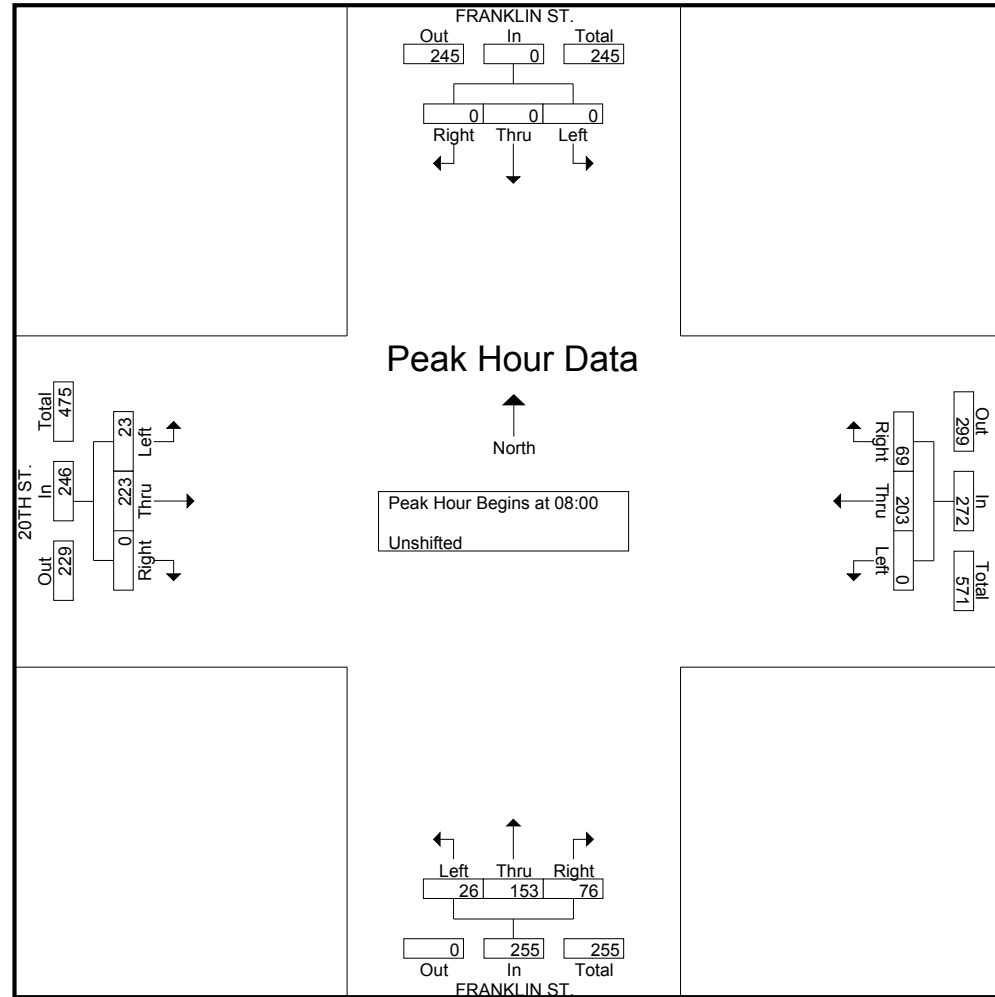
| | FRANKLIN ST.
Southbound | | | | 20TH ST.
Westbound | | | | FRANKLIN ST.
Northbound | | | | 20TH ST.
Eastbound | | | | Int. Total |
|--|----------------------------|------|-------|------------|-----------------------|------|-------|------------|----------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 47 | 15 | 62 | 7 | 29 | 21 | 57 | 6 | 50 | 0 | 56 | 175 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 51 | 16 | 67 | 9 | 30 | 21 | 60 | 5 | 61 | 0 | 66 | 193 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 55 | 19 | 74 | 4 | 52 | 19 | 75 | 6 | 58 | 0 | 64 | 213 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 50 | 19 | 69 | 6 | 42 | 15 | 63 | 6 | 54 | 0 | 60 | 192 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 203 | 69 | 272 | 26 | 153 | 76 | 255 | 23 | 223 | 0 | 246 | 773 |
| % App. Total | 0 | 0 | 0 | | 0 | 74.6 | 25.4 | | 10.2 | 60 | 29.8 | | 9.3 | 90.7 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .923 | .908 | .919 | .722 | .736 | .905 | .850 | .958 | .914 | .000 | .932 | .907 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKALND

File Name : 08-7458-013 FRANKLIN-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

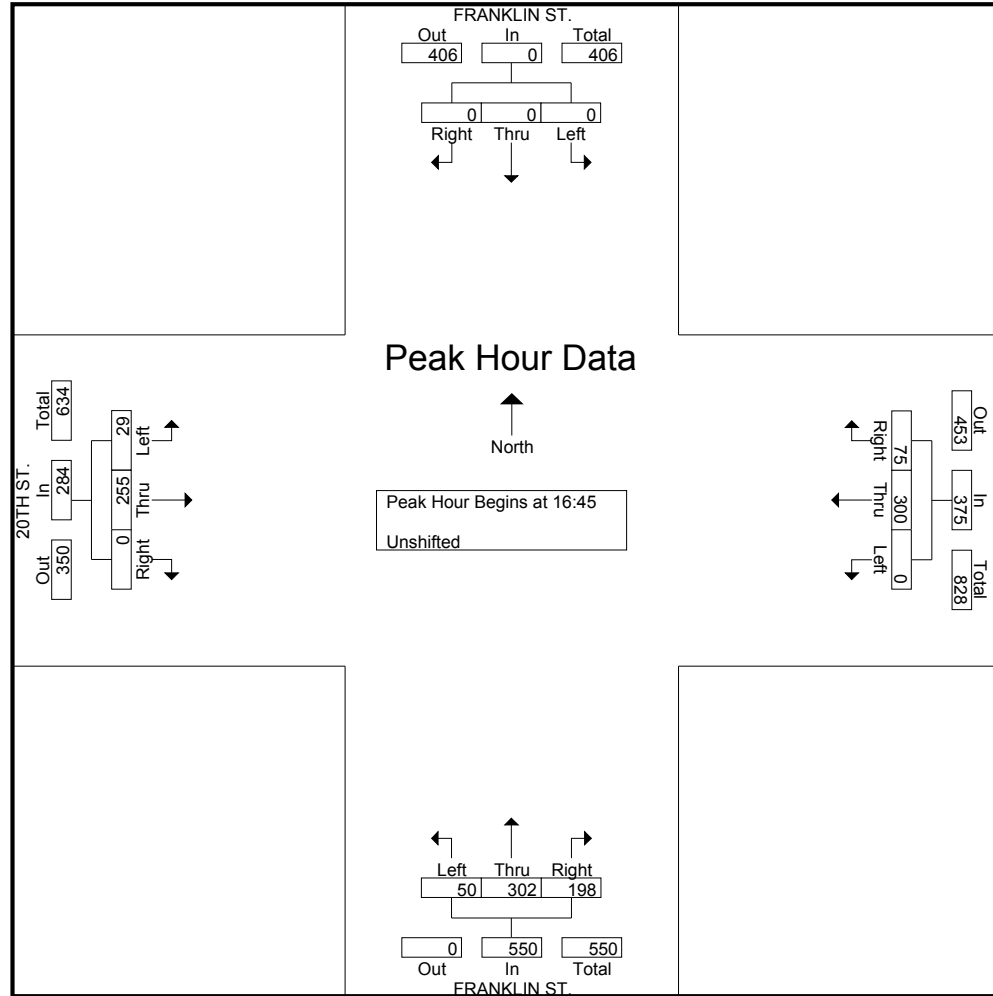
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 16:45 | 0 | 0 | 0 | 0 | 0 | 70 | 20 | 90 | 15 | 64 | 46 | 125 | 11 | 60 | 0 | 71 | 286 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 78 | 19 | 97 | 14 | 75 | 50 | 139 | 7 | 60 | 0 | 67 | 303 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 82 | 16 | 98 | 13 | 80 | 49 | 142 | 4 | 62 | 0 | 66 | 306 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 70 | 20 | 90 | 8 | 83 | 53 | 144 | 7 | 73 | 0 | 80 | 314 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 300 | 75 | 375 | 50 | 302 | 198 | 550 | 29 | 255 | 0 | 284 | 1209 |
| % App. Total | 0 | 0 | 0 | 0 | 0 | 80 | 20 | | 9.1 | 54.9 | 36 | | 10.2 | 89.8 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .915 | .938 | .957 | .833 | .910 | .934 | .955 | .659 | .873 | .000 | .888 | .963 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKALND

File Name : 08-7458-013 FRANKLIN-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



All Traffic Data

(916) 771-8700

F (916) 786-2879

OAKLAND

File Name : 08-7458-014 WEBSTER-20TH-F

Site Code : 00000000

Start Date : 08/06/2008

Page No : 1

Groups Printed- Unshifted

| | WEBSTER ST.
Southbound | | | | | 20TH ST.
Westbound | | | | | WEBSTER ST.
Northbound | | | | | 20TH ST.
Eastbound | | | | | | | |
|---------------|---------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|---------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 9 | 20 | 8 | 72 | 37 | 12 | 31 | 0 | 33 | 43 | 0 | 0 | 0 | 19 | 0 | 0 | 12 | 11 | 13 | 23 | 137 | 103 | 240 |
| 07:15 | 5 | 35 | 10 | 101 | 50 | 18 | 37 | 0 | 21 | 55 | 0 | 0 | 0 | 19 | 0 | 0 | 19 | 18 | 5 | 37 | 146 | 142 | 288 |
| 07:30 | 11 | 40 | 9 | 149 | 60 | 22 | 48 | 0 | 21 | 70 | 0 | 0 | 0 | 26 | 0 | 0 | 30 | 12 | 14 | 42 | 210 | 172 | 382 |
| 07:45 | 19 | 64 | 13 | 160 | 96 | 30 | 57 | 0 | 33 | 87 | 0 | 0 | 0 | 52 | 0 | 0 | 38 | 31 | 17 | 69 | 262 | 252 | 514 |
| Total | 44 | 159 | 40 | 482 | 243 | 82 | 173 | 0 | 108 | 255 | 0 | 0 | 0 | 116 | 0 | 0 | 99 | 72 | 49 | 171 | 755 | 669 | 1424 |
| 08:00 | 14 | 66 | 14 | 167 | 94 | 26 | 43 | 0 | 29 | 69 | 0 | 0 | 0 | 52 | 0 | 0 | 34 | 32 | 15 | 66 | 263 | 229 | 492 |
| 08:15 | 16 | 62 | 15 | 178 | 93 | 35 | 57 | 0 | 50 | 92 | 0 | 0 | 0 | 56 | 0 | 0 | 55 | 30 | 23 | 85 | 307 | 270 | 577 |
| 08:30 | 13 | 75 | 23 | 176 | 111 | 34 | 52 | 0 | 47 | 86 | 0 | 0 | 0 | 62 | 0 | 0 | 51 | 31 | 40 | 82 | 325 | 279 | 604 |
| 08:45 | 11 | 71 | 20 | 142 | 102 | 32 | 49 | 0 | 46 | 81 | 0 | 0 | 0 | 41 | 0 | 0 | 42 | 28 | 29 | 70 | 258 | 253 | 511 |
| Total | 54 | 274 | 72 | 663 | 400 | 127 | 201 | 0 | 172 | 328 | 0 | 0 | 0 | 211 | 0 | 0 | 182 | 121 | 107 | 303 | 1153 | 1031 | 2184 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 11 | 105 | 15 | 151 | 131 | 17 | 73 | 0 | 61 | 90 | 0 | 0 | 0 | 61 | 0 | 0 | 40 | 24 | 24 | 64 | 297 | 285 | 582 |
| 16:15 | 14 | 98 | 19 | 100 | 131 | 24 | 51 | 0 | 41 | 75 | 0 | 0 | 0 | 35 | 0 | 0 | 64 | 31 | 24 | 95 | 200 | 301 | 501 |
| 16:30 | 17 | 98 | 16 | 153 | 131 | 20 | 45 | 0 | 53 | 65 | 0 | 0 | 0 | 48 | 0 | 0 | 77 | 32 | 33 | 109 | 287 | 305 | 592 |
| 16:45 | 18 | 93 | 19 | 102 | 130 | 21 | 68 | 0 | 20 | 89 | 0 | 0 | 0 | 28 | 0 | 0 | 64 | 31 | 25 | 95 | 175 | 314 | 489 |
| Total | 60 | 394 | 69 | 506 | 523 | 82 | 237 | 0 | 175 | 319 | 0 | 0 | 0 | 172 | 0 | 0 | 245 | 118 | 106 | 363 | 959 | 1205 | 2164 |
| 17:00 | 22 | 91 | 23 | 177 | 136 | 27 | 74 | 0 | 60 | 101 | 0 | 0 | 0 | 66 | 0 | 0 | 70 | 35 | 37 | 105 | 340 | 342 | 682 |
| 17:15 | 12 | 110 | 22 | 169 | 144 | 33 | 69 | 0 | 68 | 102 | 0 | 0 | 0 | 58 | 0 | 0 | 75 | 38 | 16 | 113 | 311 | 359 | 670 |
| 17:30 | 13 | 100 | 22 | 164 | 135 | 25 | 77 | 6 | 51 | 108 | 0 | 0 | 0 | 64 | 0 | 0 | 90 | 35 | 28 | 125 | 307 | 368 | 675 |
| 17:45 | 16 | 102 | 25 | 156 | 143 | 24 | 62 | 0 | 49 | 86 | 0 | 0 | 0 | 42 | 0 | 0 | 80 | 29 | 21 | 109 | 268 | 338 | 606 |
| Total | 63 | 403 | 92 | 666 | 558 | 109 | 282 | 6 | 228 | 397 | 0 | 0 | 0 | 230 | 0 | 0 | 315 | 137 | 102 | 452 | 1226 | 1407 | 2633 |
| Grand Total | 221 | 1230 | 273 | 2317 | 1724 | 400 | 893 | 6 | 683 | 1299 | 0 | 0 | 0 | 729 | 0 | 0 | 841 | 448 | 364 | 1289 | 4093 | 4312 | 8405 |
| Apprch % | 12.8 | 71.3 | 15.8 | | | 30.8 | 68.7 | 0.5 | | | 0 | 0 | 0 | | | 0 | 65.2 | 34.8 | | | | | |
| Total % | 5.1 | 28.5 | 6.3 | | 40 | 9.3 | 20.7 | 0.1 | | 30.1 | 0 | 0 | 0 | | 0 | 0 | 19.5 | 10.4 | | 29.9 | 48.7 | 51.3 | |

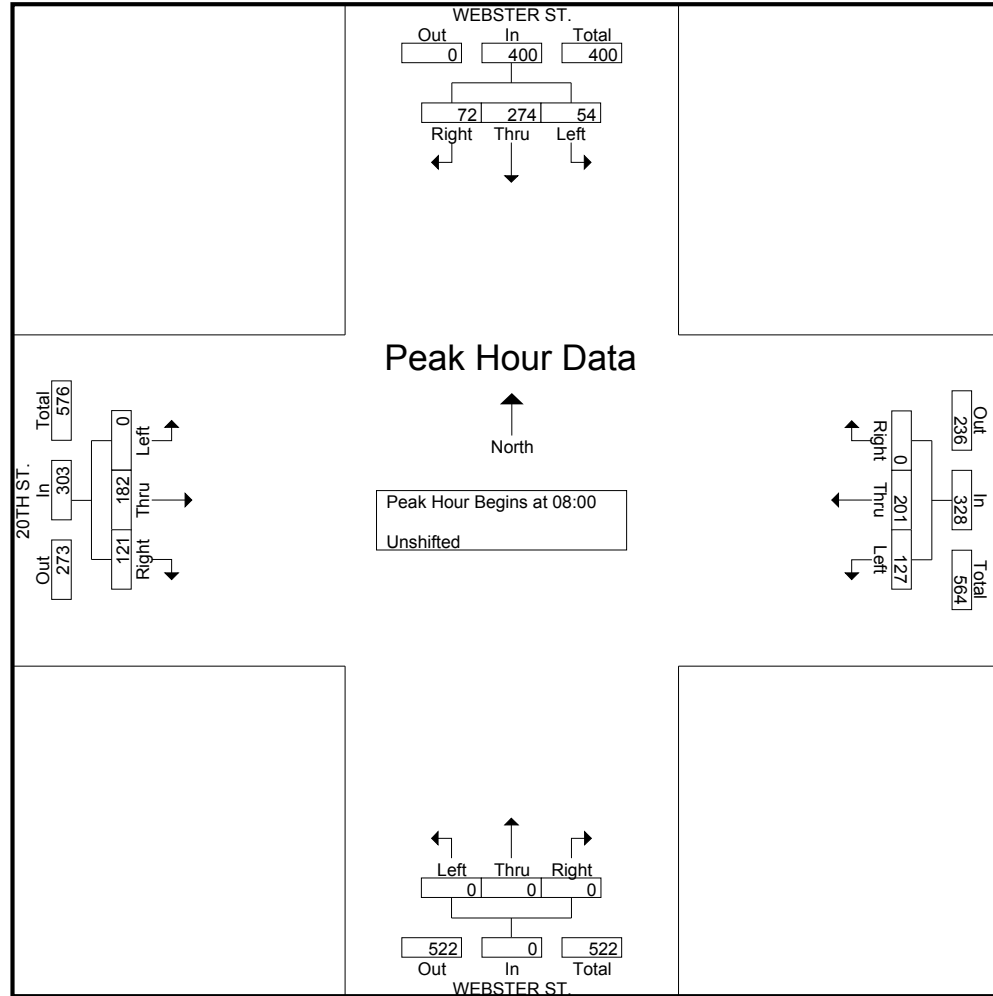
| | WEBSTER ST.
Southbound | | | | 20TH ST.
Westbound | | | | WEBSTER ST.
Northbound | | | | 20TH ST.
Eastbound | | | | |
|--|---------------------------|-----------|-----------|------------|-----------------------|-----------|-------|------------|---------------------------|------|-------|------------|-----------------------|-----------|-----------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 14 | 66 | 14 | 94 | 26 | 43 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 34 | 32 | 66 | 229 |
| 08:15 | 16 | 62 | 15 | 93 | 35 | 57 | 0 | 92 | 0 | 0 | 0 | 0 | 0 | 55 | 30 | 85 | 270 |
| 08:30 | 13 | 75 | 23 | 111 | 34 | 52 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | 51 | 31 | 82 | 279 |
| 08:45 | 11 | 71 | 20 | 102 | 32 | 49 | 0 | 81 | 0 | 0 | 0 | 0 | 0 | 42 | 28 | 70 | 253 |
| Total Volume | 54 | 274 | 72 | 400 | 127 | 201 | 0 | 328 | 0 | 0 | 0 | 0 | 0 | 182 | 121 | 303 | 1031 |
| % App. Total | 13.5 | 68.5 | 18 | | 38.7 | 61.3 | 0 | | 0 | 0 | 0 | | 0 | 60.1 | 39.9 | | |
| PHF | .844 | .913 | .783 | .901 | .907 | .882 | .000 | .891 | .000 | .000 | .000 | .000 | .000 | .827 | .945 | .891 | .924 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-014 WEBSTER-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

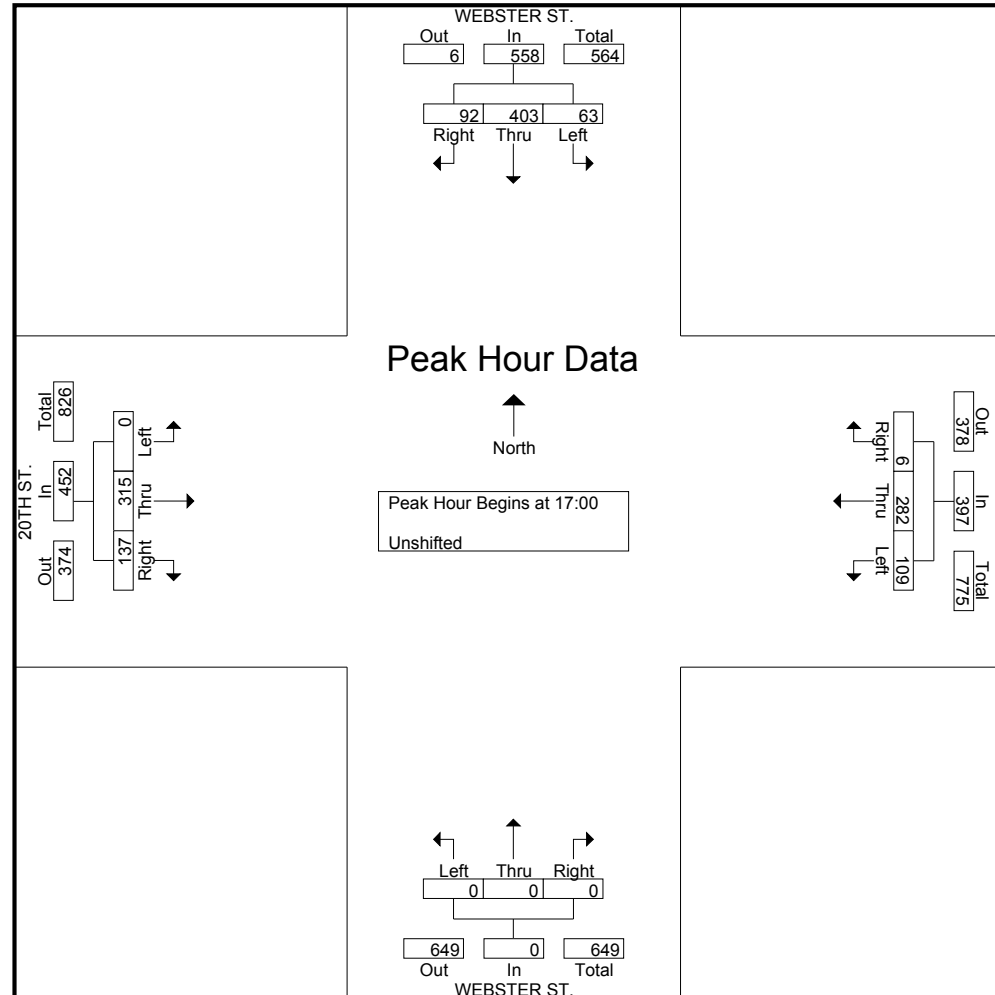
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 22 | 91 | 23 | 136 | 27 | 74 | 0 | 101 | 0 | 0 | 0 | 0 | 0 | 70 | 35 | 105 | 342 |
| 17:15 | 12 | 110 | 22 | 144 | 33 | 69 | 0 | 102 | 0 | 0 | 0 | 0 | 0 | 75 | 38 | 113 | 359 |
| 17:30 | 13 | 100 | 22 | 135 | 25 | 77 | 6 | 108 | 0 | 0 | 0 | 0 | 0 | 90 | 35 | 125 | 368 |
| 17:45 | 16 | 102 | 25 | 143 | 24 | 62 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | 80 | 29 | 109 | 338 |
| Total Volume | 63 | 403 | 92 | 558 | 109 | 282 | 6 | 397 | 0 | 0 | 0 | 0 | 0 | 315 | 137 | 452 | 1407 |
| % App. Total | 11.3 | 72.2 | 16.5 | | 27.5 | 71 | 1.5 | | 0 | 0 | 0 | | 0 | 69.7 | 30.3 | | |
| PHF | .716 | .916 | .920 | .969 | .826 | .916 | .250 | .919 | .000 | .000 | .000 | .000 | .000 | .875 | .901 | .904 | .956 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-014 WEBSTER-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Harrison St & 20th St

Date: 05/22/2008

| | Harrison St Southbound | | | | 20th St Westbound | | | | Harrison St Northbound | | | | 20th St Eastbound | | | | Int Total |
|------------|------------------------|------|-------|------------|-------------------|------|-------|------------|------------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 7:00 | 0 | 33 | 38 | 71 | 0 | 11 | 0 | 11 | 13 | 35 | 1 | 49 | 13 | 5 | 8 | 26 | 157 |
| 7:15 | 0 | 57 | 34 | 91 | 4 | 8 | 0 | 12 | 12 | 30 | 1 | 43 | 16 | 5 | 15 | 36 | 182 |
| 7:30 | 0 | 47 | 38 | 85 | 3 | 20 | 1 | 24 | 11 | 45 | 1 | 57 | 15 | 4 | 11 | 30 | 196 |
| 7:45 | 0 | 80 | 32 | 112 | 2 | 29 | 0 | 31 | 19 | 49 | 4 | 72 | 15 | 4 | 20 | 39 | 254 |
| Total | 0 | 217 | 142 | 359 | 9 | 68 | 1 | 78 | 55 | 159 | 7 | 221 | 59 | 18 | 54 | 131 | 789 |
| 8:00 | 0 | 72 | 50 | 122 | 2 | 26 | 0 | 28 | 20 | 58 | 5 | 83 | 14 | 6 | 24 | 44 | 277 |
| 8:15 | 0 | 73 | 50 | 123 | 3 | 33 | 0 | 36 | 17 | 65 | 4 | 86 | 25 | 7 | 26 | 58 | 303 |
| 8:30 | 0 | 75 | 44 | 119 | 4 | 38 | 0 | 42 | 21 | 62 | 2 | 85 | 21 | 10 | 37 | 68 | 314 |
| 8:45 | 0 | 91 | 47 | 138 | 2 | 41 | 0 | 43 | 21 | 64 | 4 | 89 | 23 | 8 | 35 | 66 | 336 |
| Total | 0 | 311 | 191 | 502 | 11 | 138 | 0 | 149 | 79 | 249 | 15 | 343 | 83 | 31 | 122 | 236 | 1230 |
| 16:00 | 0 | 52 | 24 | 76 | 2 | 20 | 0 | 22 | 16 | 103 | 6 | 125 | 60 | 17 | 6 | 83 | 306 |
| 16:15 | 0 | 37 | 36 | 73 | 1 | 19 | 0 | 20 | 15 | 113 | 3 | 131 | 58 | 20 | 7 | 85 | 309 |
| 16:30 | 0 | 39 | 33 | 72 | 2 | 14 | 0 | 16 | 17 | 119 | 3 | 139 | 69 | 16 | 10 | 95 | 322 |
| 16:45 | 0 | 38 | 29 | 67 | 2 | 23 | 0 | 25 | 20 | 127 | 5 | 152 | 70 | 23 | 10 | 103 | 347 |
| Total | 0 | 166 | 122 | 288 | 7 | 76 | 0 | 83 | 68 | 462 | 17 | 547 | 257 | 76 | 33 | 366 | 1284 |
| 17:00 | 0 | 44 | 35 | 79 | 1 | 25 | 0 | 26 | 34 | 165 | 3 | 202 | 75 | 23 | 9 | 107 | 414 |
| 17:15 | 0 | 29 | 31 | 60 | 2 | 20 | 0 | 22 | 26 | 178 | 5 | 209 | 60 | 26 | 12 | 98 | 389 |
| 17:30 | 0 | 27 | 37 | 64 | 0 | 18 | 0 | 18 | 16 | 159 | 7 | 182 | 51 | 17 | 4 | 72 | 336 |
| 17:45 | 0 | 32 | 28 | 60 | 0 | 19 | 1 | 20 | 15 | 146 | 8 | 169 | 67 | 21 | 7 | 95 | 344 |
| Total | 0 | 132 | 131 | 263 | 3 | 82 | 1 | 86 | 91 | 648 | 23 | 762 | 253 | 87 | 32 | 372 | 1483 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|-------|-------|------|-------|------|------|-------|-------|------|-------|-------|-------|-------|-------|------|
| Grand Total | 0 | 826 | 586 | 1412 | 30 | 364 | 2 | 396 | 293 | 1518 | 62 | 1873 | 652 | 212 | 241 | 1105 | 4786 |
| Apprch% | 0.0% | 58.5% | 41.5% | | 7.6% | 91.9% | 0.5% | | 15.6% | 81.0% | 3.3% | | 59.0% | 19.2% | 21.8% | | |
| Total % | 0.0% | 17.3% | 12.2% | 29.5% | 0.6% | 7.6% | 0.0% | 8.3% | 6.1% | 31.7% | 1.3% | 39.1% | 13.6% | 4.4% | 5.0% | 23.1% | |

City of Oakland

Harrison St & 20th St

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| | Harrison St Southbound | | | | 20th St Westbound | | | | Harrison St Northbound | | | | 20th St Eastbound | | | | Int Total |
|--------------|------------------------|-------|-------|------------|-------------------|-------|-------|------------|------------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 800 | 0 | 72 | 50 | 122 | 2 | 26 | 0 | 28 | 20 | 58 | 5 | 83 | 14 | 6 | 24 | 44 | 277 |
| 815 | 0 | 73 | 50 | 123 | 3 | 33 | 0 | 36 | 17 | 65 | 4 | 86 | 25 | 7 | 26 | 58 | 303 |
| 830 | 0 | 75 | 44 | 119 | 4 | 38 | 0 | 42 | 21 | 62 | 2 | 85 | 21 | 10 | 37 | 68 | 314 |
| 845 | 0 | 91 | 47 | 138 | 2 | 41 | 0 | 43 | 21 | 64 | 4 | 89 | 23 | 8 | 35 | 66 | 336 |
| Total Volume | 0 | 311 | 191 | 502 | 11 | 138 | 0 | 149 | 79 | 249 | 15 | 343 | 83 | 31 | 122 | 236 | 1230 |
| % App Total. | 0.0% | 62.0% | 38.0% | | 7.4% | 92.6% | 0.0% | | 23.0% | 72.6% | 4.4% | | 35.2% | 13.1% | 51.7% | | |
| PHF | 0.909 | | | | 0.866 | | | | 0.963 | | | | 0.868 | | | | |

PM Peak Hr Begins at 445 PM

| | Harrison St Southbound | | | | 20th St Westbound | | | | Harrison St Northbound | | | | 20th St Eastbound | | | | Int Total |
|--------------|------------------------|-------|-------|------------|-------------------|-------|-------|------------|------------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 445 | 0 | 38 | 29 | 67 | 2 | 23 | 0 | 25 | 20 | 127 | 5 | 152 | 70 | 23 | 10 | 103 | 347 |
| 500 | 0 | 44 | 35 | 79 | 1 | 25 | 0 | 26 | 34 | 165 | 3 | 202 | 75 | 23 | 9 | 107 | 414 |
| 515 | 0 | 29 | 31 | 60 | 2 | 20 | 0 | 22 | 26 | 178 | 5 | 209 | 60 | 26 | 12 | 98 | 389 |
| 530 | 0 | 27 | 37 | 64 | 0 | 18 | 0 | 18 | 16 | 159 | 7 | 182 | 51 | 17 | 4 | 72 | 336 |
| Total Volume | 0 | 138 | 132 | 270 | 5 | 86 | 0 | 91 | 96 | 629 | 20 | 745 | 256 | 89 | 35 | 380 | 1486 |
| % App Total. | 0.0% | 51.1% | 48.9% | | 5.5% | 94.5% | 0.0% | | 12.9% | 84.4% | 2.7% | | 67.4% | 23.4% | 9.2% | | |
| PHF | 0.854 | | | | 0.875 | | | | 0.891 | | | | 0.888 | | | | |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-015 INTERNAL-20TH ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

| | INTERNAL DRIVEWAY
Southbound | | | | | INTERNAL DRIVEWAY
Westbound | | | | | FROM 20TH AND HARRISON
Northbound | | | | | TO 20TH ST.
Eastbound | | | | | | | |
|---------------|---------------------------------|------|-------|------|------------|--------------------------------|------|-------|------|------------|--------------------------------------|------|-------|------|------------|--------------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 0 | 1 | 11 | 1 | 0 | 4 | 2 | 1 | 6 | 0 | 14 | 0 | 11 | 14 | 0 | 0 | 0 | 0 | 0 | 23 | 21 | 44 |
| 07:15 | 0 | 0 | 0 | 21 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 11 | 0 | 19 | 11 | 0 | 0 | 0 | 0 | 0 | 40 | 13 | 53 |
| 07:30 | 0 | 0 | 3 | 62 | 3 | 0 | 3 | 3 | 0 | 6 | 0 | 15 | 0 | 46 | 15 | 0 | 0 | 0 | 0 | 0 | 108 | 24 | 132 |
| 07:45 | 0 | 0 | 9 | 84 | 9 | 0 | 8 | 5 | 0 | 13 | 0 | 17 | 0 | 64 | 17 | 0 | 0 | 0 | 0 | 0 | 148 | 39 | 187 |
| Total | 0 | 0 | 13 | 178 | 13 | 0 | 16 | 11 | 1 | 27 | 0 | 57 | 0 | 140 | 57 | 0 | 0 | 0 | 0 | 0 | 319 | 97 | 416 |
| 08:00 | 0 | 0 | 2 | 96 | 2 | 0 | 3 | 5 | 0 | 8 | 0 | 22 | 0 | 79 | 22 | 0 | 0 | 0 | 0 | 0 | 175 | 32 | 207 |
| 08:15 | 0 | 0 | 2 | 92 | 2 | 0 | 4 | 9 | 0 | 13 | 0 | 15 | 0 | 60 | 15 | 0 | 0 | 0 | 0 | 0 | 152 | 30 | 182 |
| 08:30 | 0 | 0 | 4 | 64 | 4 | 0 | 4 | 10 | 0 | 14 | 0 | 26 | 0 | 54 | 26 | 0 | 0 | 0 | 0 | 0 | 118 | 44 | 162 |
| 08:45 | 0 | 0 | 0 | 84 | 0 | 0 | 6 | 8 | 0 | 14 | 0 | 18 | 0 | 65 | 18 | 0 | 0 | 0 | 0 | 0 | 149 | 32 | 181 |
| Total | 0 | 0 | 8 | 336 | 8 | 0 | 17 | 32 | 0 | 49 | 0 | 81 | 0 | 258 | 81 | 0 | 0 | 0 | 0 | 0 | 594 | 138 | 732 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 12 | 55 | 12 | 0 | 11 | 10 | 0 | 21 | 0 | 5 | 0 | 65 | 5 | 0 | 0 | 0 | 0 | 0 | 120 | 38 | 158 |
| 16:15 | 0 | 0 | 10 | 33 | 10 | 0 | 8 | 9 | 0 | 17 | 0 | 13 | 0 | 67 | 13 | 0 | 0 | 0 | 0 | 0 | 100 | 40 | 140 |
| 16:30 | 0 | 0 | 14 | 53 | 14 | 0 | 7 | 11 | 0 | 18 | 0 | 11 | 0 | 61 | 11 | 0 | 0 | 0 | 0 | 0 | 114 | 43 | 157 |
| 16:45 | 0 | 0 | 22 | 54 | 22 | 0 | 12 | 12 | 0 | 24 | 0 | 7 | 0 | 85 | 7 | 0 | 0 | 0 | 0 | 0 | 139 | 53 | 192 |
| Total | 0 | 0 | 58 | 195 | 58 | 0 | 38 | 42 | 0 | 80 | 0 | 36 | 0 | 278 | 36 | 0 | 0 | 0 | 0 | 0 | 473 | 174 | 647 |
| 17:00 | 0 | 0 | 12 | 37 | 12 | 0 | 9 | 10 | 0 | 19 | 0 | 9 | 0 | 54 | 9 | 0 | 0 | 0 | 0 | 0 | 91 | 40 | 131 |
| 17:15 | 0 | 0 | 15 | 57 | 15 | 0 | 3 | 12 | 0 | 15 | 0 | 10 | 0 | 79 | 10 | 0 | 0 | 0 | 0 | 0 | 136 | 40 | 176 |
| 17:30 | 0 | 0 | 10 | 34 | 10 | 0 | 11 | 5 | 0 | 16 | 0 | 11 | 0 | 61 | 11 | 0 | 0 | 0 | 0 | 0 | 95 | 37 | 132 |
| 17:45 | 0 | 0 | 10 | 26 | 10 | 0 | 10 | 9 | 0 | 19 | 0 | 9 | 0 | 54 | 9 | 0 | 0 | 0 | 0 | 0 | 80 | 38 | 118 |
| Total | 0 | 0 | 47 | 154 | 47 | 0 | 33 | 36 | 0 | 69 | 0 | 39 | 0 | 248 | 39 | 0 | 0 | 0 | 0 | 0 | 402 | 155 | 557 |
| Grand Total | 0 | 0 | 126 | 863 | 126 | 0 | 104 | 121 | 1 | 225 | 0 | 213 | 0 | 924 | 213 | 0 | 0 | 0 | 0 | 0 | 1788 | 564 | 2352 |
| Apprch % | 0 | 0 | 100 | | | 0 | 46.2 | 53.8 | | | 0 | 100 | 0 | | | 0 | 0 | 0 | | | | | |
| Total % | 0 | 0 | 22.3 | | 22.3 | 0 | 18.4 | 21.5 | | 39.9 | 0 | 37.8 | 0 | | 37.8 | 0 | 0 | 0 | | 0 | 76 | 24 | |

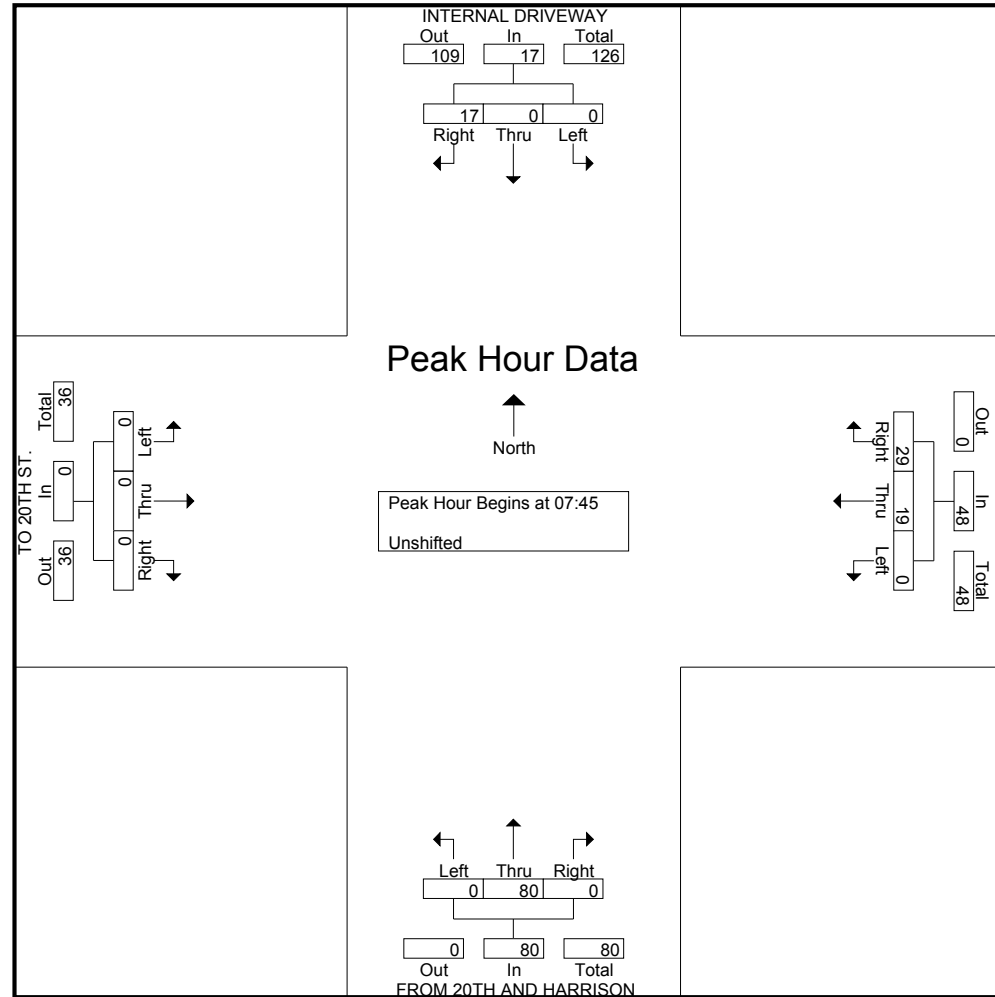
| | INTERNAL DRIVEWAY
Southbound | | | | INTERNAL DRIVEWAY
Westbound | | | | FROM 20TH AND HARRISON
Northbound | | | | TO 20TH ST.
Eastbound | | | | |
|--|---------------------------------|------|----------|------------|--------------------------------|----------|-----------|------------|--------------------------------------|-----------|-------|------------|--------------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 | | | | | | | | | | | | | | | | | |
| 07:45 | 0 | 0 | 9 | 9 | 0 | 8 | 5 | 13 | 0 | 17 | 0 | 17 | 0 | 0 | 0 | 0 | 39 |
| 08:00 | 0 | 0 | 2 | 2 | 0 | 3 | 5 | 8 | 0 | 22 | 0 | 22 | 0 | 0 | 0 | 0 | 32 |
| 08:15 | 0 | 0 | 2 | 2 | 0 | 4 | 9 | 13 | 0 | 15 | 0 | 15 | 0 | 0 | 0 | 0 | 30 |
| 08:30 | 0 | 0 | 4 | 4 | 0 | 4 | 10 | 14 | 0 | 26 | 0 | 26 | 0 | 0 | 0 | 0 | 44 |
| Total Volume | 0 | 0 | 17 | 17 | 0 | 19 | 29 | 48 | 0 | 80 | 0 | 80 | 0 | 0 | 0 | 0 | 145 |
| % App. Total | 0 | 0 | 100 | | 0 | 39.6 | 60.4 | | 0 | 100 | 0 | | 0 | 0 | 0 | | |
| PHF | .000 | .000 | .472 | .472 | .000 | .594 | .725 | .857 | .000 | .769 | .000 | .769 | .000 | .000 | .000 | .000 | .824 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-015 INTERNAL-20TH ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:15

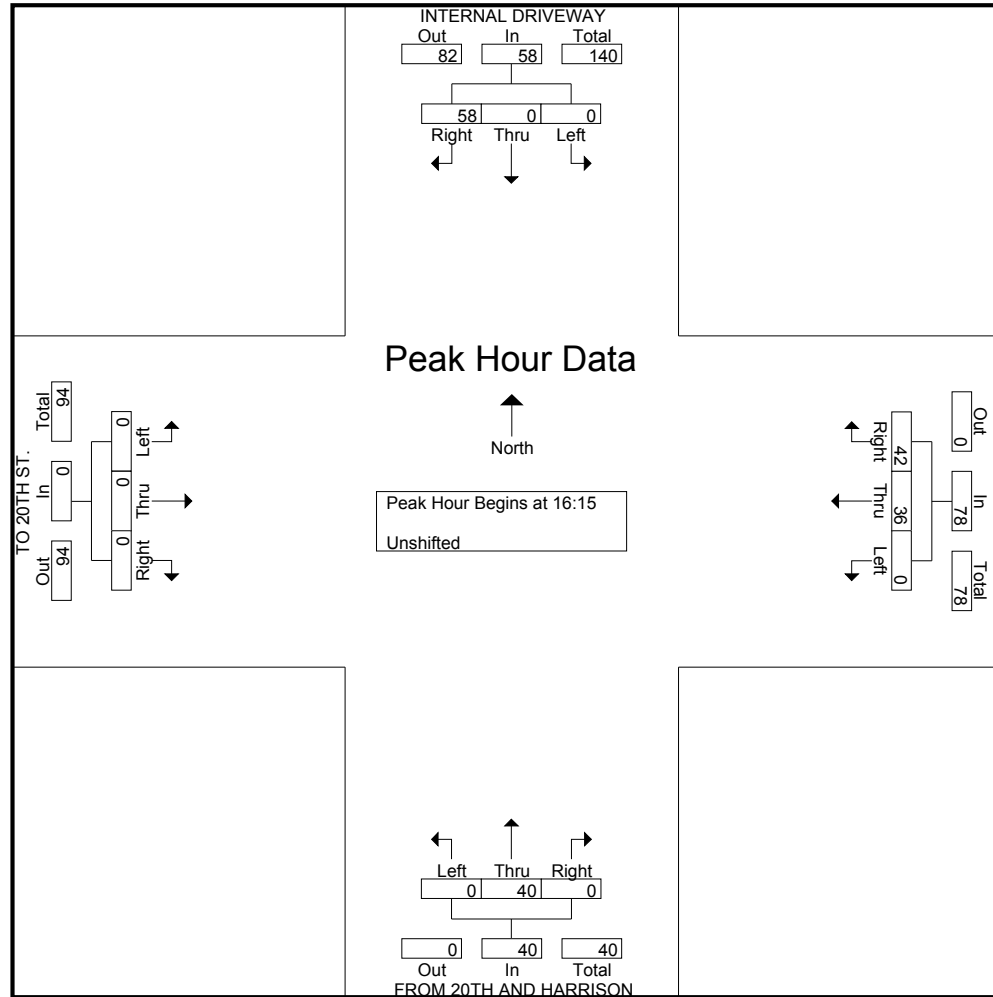
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 16:15 | 0 | 0 | 10 | 10 | 0 | 8 | 9 | 17 | 0 | 13 | 0 | 13 | 0 | 0 | 0 | 0 | 40 |
| 16:30 | 0 | 0 | 14 | 14 | 0 | 7 | 11 | 18 | 0 | 11 | 0 | 11 | 0 | 0 | 0 | 0 | 43 |
| 16:45 | 0 | 0 | 22 | 22 | 0 | 12 | 12 | 24 | 0 | 7 | 0 | 7 | 0 | 0 | 0 | 0 | 53 |
| 17:00 | 0 | 0 | 12 | 12 | 0 | 9 | 10 | 19 | 0 | 9 | 0 | 9 | 0 | 0 | 0 | 0 | 40 |
| Total Volume | 0 | 0 | 58 | 58 | 0 | 36 | 42 | 78 | 0 | 40 | 0 | 40 | 0 | 0 | 0 | 0 | 176 |
| % App. Total | 0 | 0 | 100 | | 0 | 46.2 | 53.8 | | 0 | 100 | 0 | | 0 | 0 | 0 | | |
| PHF | .000 | .000 | .659 | .659 | .000 | .750 | .875 | .813 | .000 | .769 | .000 | .769 | .000 | .000 | .000 | .000 | .830 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-015 INTERNAL-20TH ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Harrison St & Lakeside Dr

Date: 05/22/2008

| | Harrison St Southbound | | | | Lakeside Dr Westbound | | | | Harrison St Northbound | | | | Lakeside Dr Eastbound | | | | |
|------------|------------------------|------|-------|------------|-----------------------|------|-------|------------|------------------------|------|-------|------------|-----------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 0 | 42 | 76 | 118 | 0 | 0 | 0 | 0 | 0 | 96 | 0 | 96 | 0 | 50 | 0 | 50 | 264 |
| 7:15 | 0 | 48 | 85 | 133 | 0 | 0 | 0 | 0 | 0 | 103 | 0 | 103 | 0 | 42 | 0 | 42 | 278 |
| 7:30 | 0 | 63 | 85 | 148 | 0 | 0 | 0 | 0 | 0 | 131 | 0 | 131 | 0 | 66 | 0 | 66 | 345 |
| 7:45 | 0 | 77 | 115 | 192 | 0 | 0 | 0 | 0 | 0 | 152 | 0 | 152 | 0 | 65 | 0 | 65 | 409 |
| Total | 0 | 230 | 361 | 591 | 0 | 0 | 0 | 0 | 0 | 482 | 0 | 482 | 0 | 223 | 0 | 223 | 1296 |
| 8:00 | 0 | 90 | 114 | 204 | 0 | 0 | 0 | 0 | 0 | 160 | 0 | 160 | 0 | 71 | 0 | 71 | 435 |
| 8:15 | 0 | 94 | 126 | 220 | 0 | 0 | 0 | 0 | 0 | 167 | 0 | 167 | 0 | 92 | 0 | 92 | 479 |
| 8:30 | 0 | 98 | 120 | 218 | 0 | 0 | 0 | 0 | 0 | 159 | 0 | 159 | 0 | 83 | 0 | 83 | 460 |
| 8:45 | 0 | 96 | 139 | 235 | 0 | 0 | 0 | 0 | 0 | 168 | 0 | 168 | 0 | 86 | 0 | 86 | 489 |
| Total | 0 | 378 | 499 | 877 | 0 | 0 | 0 | 0 | 0 | 654 | 0 | 654 | 0 | 332 | 0 | 332 | 1863 |
| 16:00 | 0 | 88 | 70 | 158 | 0 | 0 | 0 | 0 | 0 | 176 | 0 | 176 | 0 | 165 | 0 | 165 | 499 |
| 16:15 | 0 | 115 | 75 | 190 | 0 | 0 | 0 | 0 | 0 | 164 | 0 | 164 | 0 | 165 | 0 | 165 | 519 |
| 16:30 | 0 | 154 | 70 | 224 | 0 | 0 | 0 | 0 | 0 | 173 | 0 | 173 | 0 | 184 | 0 | 184 | 581 |
| 16:45 | 0 | 151 | 70 | 221 | 0 | 0 | 0 | 0 | 0 | 158 | 0 | 158 | 0 | 195 | 0 | 195 | 574 |
| Total | 0 | 508 | 285 | 793 | 0 | 0 | 0 | 0 | 0 | 671 | 0 | 671 | 0 | 709 | 0 | 709 | 2173 |
| 17:00 | 0 | 155 | 81 | 236 | 0 | 0 | 0 | 0 | 0 | 189 | 0 | 189 | 0 | 236 | 0 | 236 | 661 |
| 17:15 | 0 | 156 | 65 | 221 | 0 | 0 | 0 | 0 | 0 | 179 | 0 | 179 | 0 | 233 | 0 | 233 | 633 |
| 17:30 | 0 | 158 | 68 | 226 | 0 | 0 | 0 | 0 | 0 | 172 | 0 | 172 | 0 | 212 | 0 | 212 | 610 |
| 17:45 | 0 | 155 | 58 | 213 | 0 | 0 | 0 | 0 | 0 | 163 | 0 | 163 | 0 | 212 | 0 | 212 | 588 |
| Total | 0 | 624 | 272 | 896 | 0 | 0 | 0 | 0 | 0 | 703 | 0 | 703 | 0 | 893 | 0 | 893 | 2492 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|-------|-------|------|------|------|------|------|--------|------|-------|------|--------|------|-------|------|
| Grand Total | 0 | 1740 | 1417 | 3157 | 0 | 0 | 0 | 0 | 0 | 2510 | 0 | 2510 | 0 | 2157 | 0 | 2157 | 7824 |
| Apprch% | 0.0% | 55.1% | 44.9% | | 0.0% | 0.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | |
| Total % | 0.0% | 22.2% | 18.1% | 40.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 32.1% | 0.0% | 32.1% | 0.0% | 27.6% | 0.0% | 27.6% | |

City of Oakland

Harrison St & Lakeside Dr

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| | Harrison St Southbound | | | | Lakeside Dr Westbound | | | | Harrison St Northbound | | | | Lakeside Dr Eastbound | | | | |
|--------------|------------------------|-------|-------|------------|-----------------------|------|-------|------------|------------------------|--------|-------|------------|-----------------------|--------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 0 | 90 | 114 | 204 | 0 | 0 | 0 | 0 | 0 | 160 | 0 | 160 | 0 | 71 | 0 | 71 | 435 |
| 815 | 0 | 94 | 126 | 220 | 0 | 0 | 0 | 0 | 0 | 167 | 0 | 167 | 0 | 92 | 0 | 92 | 479 |
| 830 | 0 | 98 | 120 | 218 | 0 | 0 | 0 | 0 | 0 | 159 | 0 | 159 | 0 | 83 | 0 | 83 | 460 |
| 845 | 0 | 96 | 139 | 235 | 0 | 0 | 0 | 0 | 0 | 168 | 0 | 168 | 0 | 86 | 0 | 86 | 489 |
| Total Volume | 0 | 378 | 499 | 877 | 0 | 0 | 0 | 0 | 0 | 654 | 0 | 654 | 0 | 332 | 0 | 332 | 1863 |
| % App Total. | 0.0% | 43.1% | 56.9% | | 0.0% | 0.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | |
| PHF | 0.933 | | | | 0.000 | | | | 0.973 | | | | 0.902 | | | | |

PM Peak Hr Begins at 500 PM

| | Harrison St Southbound | | | | Lakeside Dr Westbound | | | | Harrison St Northbound | | | | Lakeside Dr Eastbound | | | | |
|--------------|------------------------|-------|-------|------------|-----------------------|------|-------|------------|------------------------|--------|-------|------------|-----------------------|--------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 500 | 0 | 155 | 81 | 236 | 0 | 0 | 0 | 0 | 0 | 189 | 0 | 189 | 0 | 236 | 0 | 236 | 661 |
| 515 | 0 | 156 | 65 | 221 | 0 | 0 | 0 | 0 | 0 | 179 | 0 | 179 | 0 | 233 | 0 | 233 | 633 |
| 530 | 0 | 158 | 68 | 226 | 0 | 0 | 0 | 0 | 0 | 172 | 0 | 172 | 0 | 212 | 0 | 212 | 610 |
| 545 | 0 | 155 | 58 | 213 | 0 | 0 | 0 | 0 | 0 | 163 | 0 | 163 | 0 | 212 | 0 | 212 | 588 |
| Total Volume | 0 | 624 | 272 | 896 | 0 | 0 | 0 | 0 | 0 | 703 | 0 | 703 | 0 | 893 | 0 | 893 | 2492 |
| % App Total. | 0.0% | 69.6% | 30.4% | | 0.0% | 0.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | |
| PHF | 0.949 | | | | 0.000 | | | | 0.930 | | | | 0.946 | | | | |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-016 LAKESIDE-20TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

| | LAKESIDE DR.
Southbound | | | | | Westbound | | | | | LAKESIDE DR.
Northbound | | | | | 20TH ST.
Eastbound | | | | | | | |
|---------------|----------------------------|------|-------|------|------------|-----------|------|-------|------|------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 38 | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 12 | 68 | 0 | 0 | 80 | 0 | 7 | 0 | 0 | 7 | 0 | 125 | 125 |
| 07:15 | 0 | 46 | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 17 | 73 | 0 | 0 | 90 | 0 | 5 | 0 | 0 | 5 | 0 | 141 | 141 |
| 07:30 | 0 | 67 | 0 | 0 | 67 | 0 | 0 | 0 | 0 | 0 | 24 | 118 | 0 | 0 | 142 | 0 | 8 | 0 | 0 | 8 | 0 | 217 | 217 |
| 07:45 | 0 | 68 | 0 | 0 | 68 | 0 | 0 | 0 | 0 | 0 | 26 | 124 | 0 | 0 | 150 | 0 | 11 | 0 | 0 | 11 | 0 | 229 | 229 |
| Total | 0 | 219 | 0 | 0 | 219 | 0 | 0 | 0 | 0 | 0 | 79 | 383 | 0 | 0 | 462 | 0 | 31 | 0 | 0 | 31 | 0 | 712 | 712 |
| 08:00 | 0 | 77 | 0 | 0 | 77 | 0 | 0 | 0 | 0 | 0 | 26 | 142 | 0 | 0 | 168 | 0 | 14 | 0 | 0 | 14 | 0 | 259 | 259 |
| 08:15 | 0 | 86 | 0 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | 36 | 137 | 0 | 0 | 173 | 0 | 10 | 0 | 0 | 10 | 0 | 269 | 269 |
| 08:30 | 0 | 105 | 0 | 0 | 105 | 0 | 0 | 0 | 0 | 0 | 27 | 152 | 0 | 0 | 179 | 0 | 14 | 0 | 0 | 14 | 0 | 298 | 298 |
| 08:45 | 0 | 76 | 0 | 0 | 76 | 0 | 0 | 0 | 0 | 0 | 33 | 138 | 0 | 0 | 171 | 0 | 15 | 0 | 0 | 15 | 0 | 262 | 262 |
| Total | 0 | 344 | 0 | 0 | 344 | 0 | 0 | 0 | 0 | 0 | 122 | 569 | 0 | 0 | 691 | 0 | 53 | 0 | 0 | 53 | 0 | 1088 | 1088 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 112 | 0 | 0 | 112 | 0 | 0 | 0 | 0 | 0 | 24 | 158 | 0 | 0 | 182 | 0 | 21 | 0 | 0 | 21 | 0 | 315 | 315 |
| 16:15 | 0 | 90 | 0 | 0 | 90 | 0 | 0 | 0 | 0 | 0 | 21 | 129 | 0 | 0 | 150 | 0 | 13 | 0 | 0 | 13 | 0 | 253 | 253 |
| 16:30 | 0 | 103 | 0 | 0 | 103 | 0 | 0 | 0 | 0 | 0 | 19 | 169 | 0 | 0 | 188 | 0 | 20 | 0 | 0 | 20 | 0 | 311 | 311 |
| 16:45 | 0 | 123 | 0 | 0 | 123 | 0 | 0 | 0 | 0 | 0 | 25 | 168 | 0 | 0 | 193 | 0 | 20 | 0 | 0 | 20 | 0 | 336 | 336 |
| Total | 0 | 428 | 0 | 0 | 428 | 0 | 0 | 0 | 0 | 0 | 89 | 624 | 0 | 0 | 713 | 0 | 74 | 0 | 0 | 74 | 0 | 1215 | 1215 |
| 17:00 | 0 | 146 | 0 | 0 | 146 | 0 | 0 | 0 | 0 | 0 | 27 | 125 | 0 | 0 | 152 | 0 | 20 | 0 | 0 | 20 | 0 | 318 | 318 |
| 17:15 | 0 | 129 | 0 | 0 | 129 | 0 | 0 | 0 | 0 | 0 | 48 | 174 | 0 | 0 | 222 | 0 | 34 | 0 | 0 | 34 | 0 | 385 | 385 |
| 17:30 | 0 | 137 | 0 | 0 | 137 | 0 | 0 | 0 | 0 | 0 | 32 | 144 | 0 | 0 | 176 | 0 | 23 | 0 | 0 | 23 | 0 | 336 | 336 |
| 17:45 | 0 | 121 | 0 | 0 | 121 | 0 | 0 | 0 | 0 | 0 | 26 | 149 | 0 | 0 | 175 | 0 | 27 | 0 | 0 | 27 | 0 | 323 | 323 |
| Total | 0 | 533 | 0 | 0 | 533 | 0 | 0 | 0 | 0 | 0 | 133 | 592 | 0 | 0 | 725 | 0 | 104 | 0 | 0 | 104 | 0 | 1362 | 1362 |
| Grand Total | 0 | 1524 | 0 | 0 | 1524 | 0 | 0 | 0 | 0 | 0 | 423 | 2168 | 0 | 0 | 2591 | 0 | 262 | 0 | 0 | 262 | 0 | 4377 | 4377 |
| Apprch % | 0 | 100 | 0 | | | 0 | 0 | 0 | | | 16.3 | 83.7 | 0 | | | 0 | 100 | 0 | | | 0 | | |
| Total % | 0 | 34.8 | 0 | | 34.8 | 0 | 0 | 0 | | | 9.7 | 49.5 | 0 | | 59.2 | 0 | 6 | 0 | | 6 | 0 | 100 | |

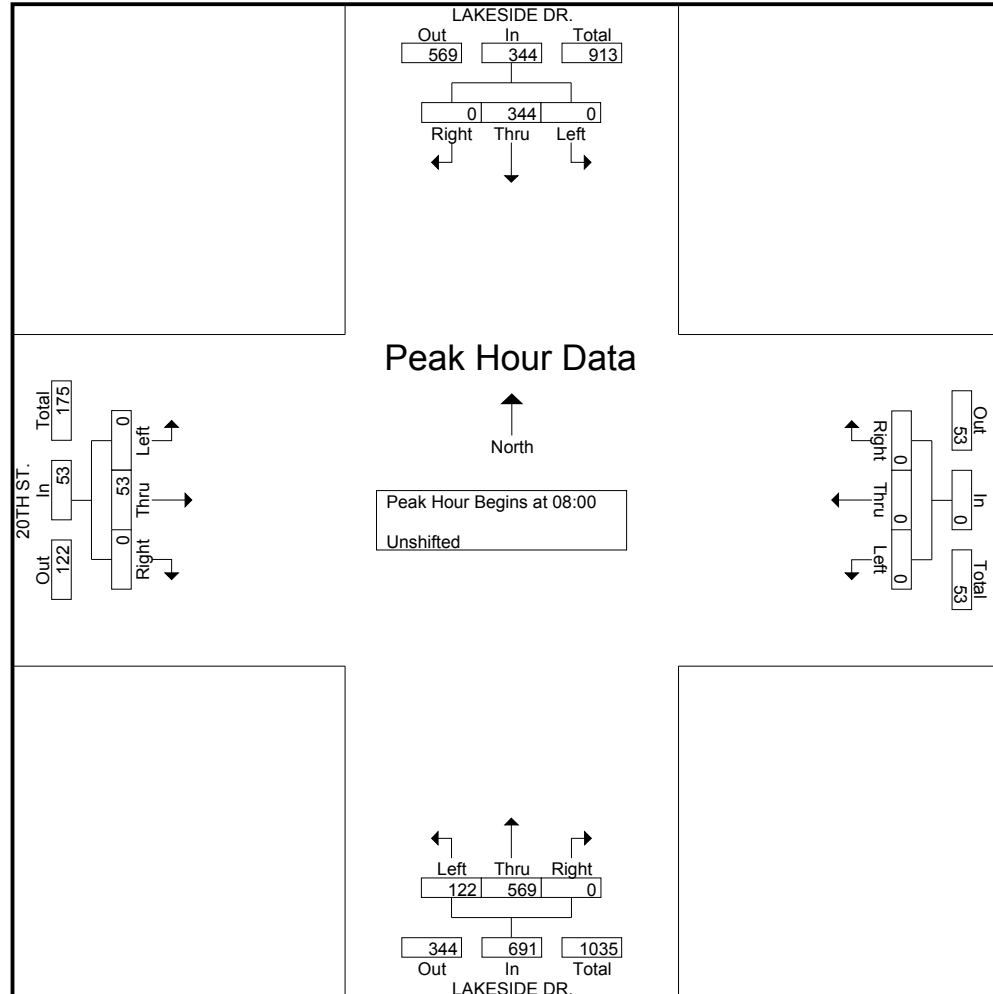
| | LAKESIDE DR.
Southbound | | | | Westbound | | | | LAKESIDE DR.
Northbound | | | | 20TH ST.
Eastbound | | | | |
|--|----------------------------|------|-------|------------|-----------|------|-------|------------|----------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 77 | 0 | 77 | 0 | 0 | 0 | 0 | 26 | 142 | 0 | 168 | 0 | 14 | 0 | 14 | 259 |
| 08:15 | 0 | 86 | 0 | 86 | 0 | 0 | 0 | 0 | 36 | 137 | 0 | 173 | 0 | 10 | 0 | 10 | 269 |
| 08:30 | 0 | 105 | 0 | 105 | 0 | 0 | 0 | 0 | 27 | 152 | 0 | 179 | 0 | 14 | 0 | 14 | 298 |
| 08:45 | 0 | 76 | 0 | 76 | 0 | 0 | 0 | 0 | 33 | 138 | 0 | 171 | 0 | 15 | 0 | 15 | 262 |
| Total Volume | 0 | 344 | 0 | 344 | 0 | 0 | 0 | 0 | 122 | 569 | 0 | 691 | 0 | 53 | 0 | 53 | 1088 |
| % App. Total | 0 | 100 | 0 | | 0 | 0 | 0 | | 17.7 | 82.3 | 0 | | 0 | 100 | 0 | | |
| PHF | .000 | .819 | .000 | .819 | .000 | .000 | .000 | .000 | .847 | .936 | .000 | .965 | .000 | .883 | .000 | .883 | .913 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

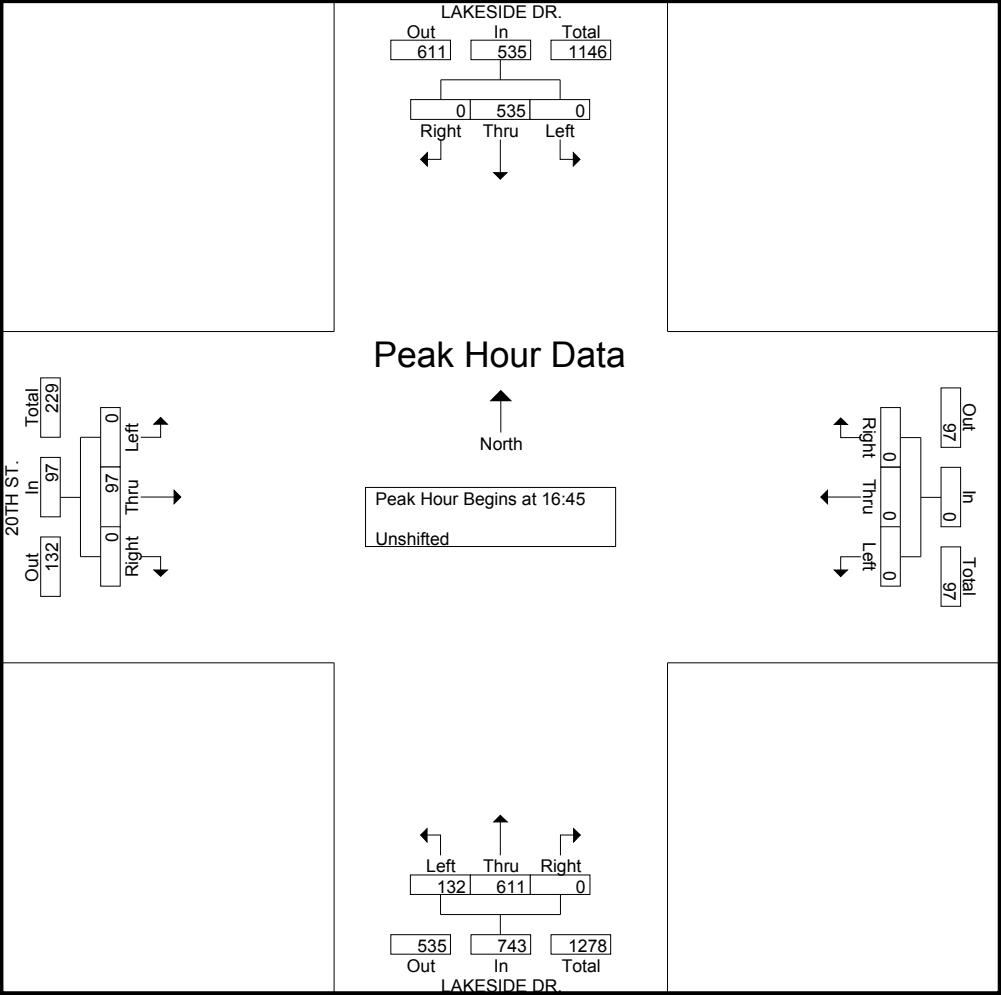
OAKLAND

File Name : 08-7458-016 LAKESIDE-20TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

| | | | | | | | | | | | | | | | | | |
|--------------|------|------------|------|------------|------|------|------|------|-----------|------------|------|------------|------|-----------|------|-----------|------------|
| 16:45 | 0 | 123 | 0 | 123 | 0 | 0 | 0 | 0 | 25 | 168 | 0 | 193 | 0 | 20 | 0 | 20 | 336 |
| 17:00 | 0 | 146 | 0 | 146 | 0 | 0 | 0 | 0 | 27 | 125 | 0 | 152 | 0 | 20 | 0 | 20 | 318 |
| 17:15 | 0 | 129 | 0 | 129 | 0 | 0 | 0 | 0 | 48 | 174 | 0 | 222 | 0 | 34 | 0 | 34 | 385 |
| 17:30 | 0 | 137 | 0 | 137 | 0 | 0 | 0 | 0 | 32 | 144 | 0 | 176 | 0 | 23 | 0 | 23 | 336 |
| Total Volume | 0 | 535 | 0 | 535 | 0 | 0 | 0 | 0 | 132 | 611 | 0 | 743 | 0 | 97 | 0 | 97 | 1375 |
| % App. Total | 0 | 100 | 0 | | 0 | 0 | 0 | | 17.8 | 82.2 | 0 | | 0 | 100 | 0 | | |
| PHF | .000 | .916 | .000 | .916 | .000 | .000 | .000 | .000 | .688 | .878 | .000 | .837 | .000 | .713 | .000 | .713 | .893 |



All Traffic Data

(916) 771-8700

Fax 786-2879

OAKLAND

File Name : 08-7065-009 BRUSH-18TH-F

Site Code : 00000000

Start Date : 06/02/2008

Page No : 1

Groups Printed- Unshifted

| | BRUSH ST.
Southbound | | | | | | SB I-980 OFF RAMP
Southwestbound | | | | | | 18TH ST.
Westbound | | | | | | BRUSH ST.
Northbound | | | | | | 18TH ST.
Eastbound | | | | | | | | |
|------------|-------------------------|------|------|-------|------|------------|-------------------------------------|-----------|------------|------------|------|------------|-----------------------|------|-------|------------|------|------------|-------------------------|------|------------|-------|------|------------|-----------------------|-----------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Hard Left | Left | Thru | Right | Peds | App. Total | Hard Left | Bear Left | Bear Right | Hard Right | Peds | App. Total | Left | Thru | Right | Hard Right | Peds | App. Total | Left | Thru | Bear Right | Right | Peds | App. Total | Left | Bear Left | Thru | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 0 | 35 | 2 | 0 | 37 | 0 | 232 | 0 | 0 | 0 | 232 | 15 | 21 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 305 | 306 |
| 07:15 | 0 | 0 | 42 | 4 | 0 | 46 | 0 | 290 | 0 | 0 | 0 | 290 | 12 | 23 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 2 | 376 | 378 |
| 07:30 | 0 | 0 | 53 | 4 | 0 | 57 | 0 | 398 | 0 | 0 | 0 | 398 | 18 | 32 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 505 | 505 |
| 07:45 | 0 | 0 | 64 | 2 | 0 | 66 | 0 | 401 | 0 | 0 | 0 | 401 | 17 | 38 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 3 | 528 | 531 |
| Total | 0 | 0 | 194 | 12 | 0 | 206 | 0 | 1321 | 0 | 0 | 0 | 1321 | 62 | 114 | 0 | 0 | 0 | 176 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 11 | 11 | 6 | 1714 | 1720 |
| 08:00 | 0 | 0 | 49 | 0 | 0 | 49 | 0 | 484 | 0 | 0 | 0 | 484 | 19 | 30 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 3 | 588 | 591 |
| 08:15 | 0 | 0 | 67 | 4 | 0 | 71 | 0 | 541 | 0 | 0 | 0 | 541 | 22 | 24 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 9 | 663 | 672 |
| 08:30 | 0 | 0 | 65 | 0 | 0 | 65 | 0 | 539 | 0 | 0 | 0 | 539 | 20 | 33 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 657 | 659 |
| 08:45 | 0 | 0 | 67 | 5 | 0 | 72 | 0 | 503 | 0 | 0 | 0 | 503 | 21 | 23 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 6 | 622 | 628 |
| Total | 0 | 0 | 248 | 9 | 0 | 257 | 0 | 2067 | 0 | 0 | 0 | 2067 | 82 | 110 | 0 | 0 | 0 | 192 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 14 | 14 | 20 | 2530 | 2550 |

*** BREAK ***

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|------|-----|---|------|---|------|-----|---|---|------|------|------|---|---|------|-----|---|---|---|---|----|---|---|---|---|---|-----|-----|----|------|------|
| 16:00 | 0 | 0 | 91 | 2 | 0 | 93 | 0 | 154 | 27 | 0 | 0 | 181 | 25 | 31 | 0 | 0 | 0 | 56 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 2 | 335 | 337 |
| 16:15 | 0 | 0 | 91 | 2 | 0 | 93 | 0 | 143 | 21 | 0 | 0 | 164 | 21 | 30 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 7 | 317 | 324 |
| 16:30 | 0 | 0 | 106 | 2 | 0 | 108 | 0 | 124 | 31 | 0 | 0 | 155 | 29 | 30 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 7 | 327 | 334 |
| 16:45 | 0 | 0 | 94 | 0 | 0 | 94 | 0 | 147 | 27 | 0 | 0 | 174 | 32 | 40 | 0 | 0 | 0 | 72 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 341 | 345 |
| Total | 0 | 0 | 382 | 6 | 0 | 388 | 0 | 568 | 106 | 0 | 0 | 674 | 107 | 131 | 0 | 0 | 0 | 238 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 20 | 20 | 20 | 1320 | 1340 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17:00 | 0 | 0 | 104 | 0 | 0 | 104 | 0 | 141 | 27 | 0 | 0 | 168 | 38 | 42 | 0 | 0 | 0 | 80 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 7 | 356 | 363 |
| 17:15 | 0 | 0 | 110 | 0 | 0 | 110 | 0 | 139 | 32 | 0 | 0 | 171 | 40 | 35 | 0 | 0 | 0 | 75 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 8 | 360 | 368 |
| 17:30 | 0 | 0 | 106 | 0 | 0 | 106 | 0 | 145 | 28 | 0 | 0 | 173 | 36 | 34 | 0 | 0 | 0 | 70 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 350 | 355 |
| 17:45 | 0 | 0 | 72 | 2 | 0 | 74 | 0 | 151 | 34 | 0 | 0 | 185 | 31 | 30 | 0 | 0 | 0 | 61 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 320 | 323 |
| Total | 0 | 0 | 392 | 2 | 0 | 394 | 0 | 576 | 121 | 0 | 0 | 697 | 145 | 141 | 0 | 0 | 0 | 286 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 23 | 1386 | 1409 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Grand Total | 0 | 0 | 1216 | 29 | 0 | 1245 | 0 | 4532 | 227 | 0 | 0 | 4759 | 396 | 496 | 0 | 0 | 0 | 892 | 0 | 0 | 0 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 54 | 54 | 69 | 6950 | 7019 |
| Apprch % | 0 | 0 | 97.7 | 2.3 | | | 0 | 95.2 | 4.8 | 0 | | | 44.4 | 55.6 | 0 | 0 | | | 0 | 0 | 0 | 0 | | | 0 | 0 | 0 | 0 | 100 | | | | |
| Total % | 0 | 0 | 17.5 | 0.4 | | 17.9 | 0 | 65.2 | 3.3 | 0 | | 68.5 | 5.7 | 7.1 | 0 | 0 | 12.8 | | 0 | 0 | 0 | 0 | | | 0 | 0 | 0 | 0 | 0.8 | 0.8 | 1 | 99 | |

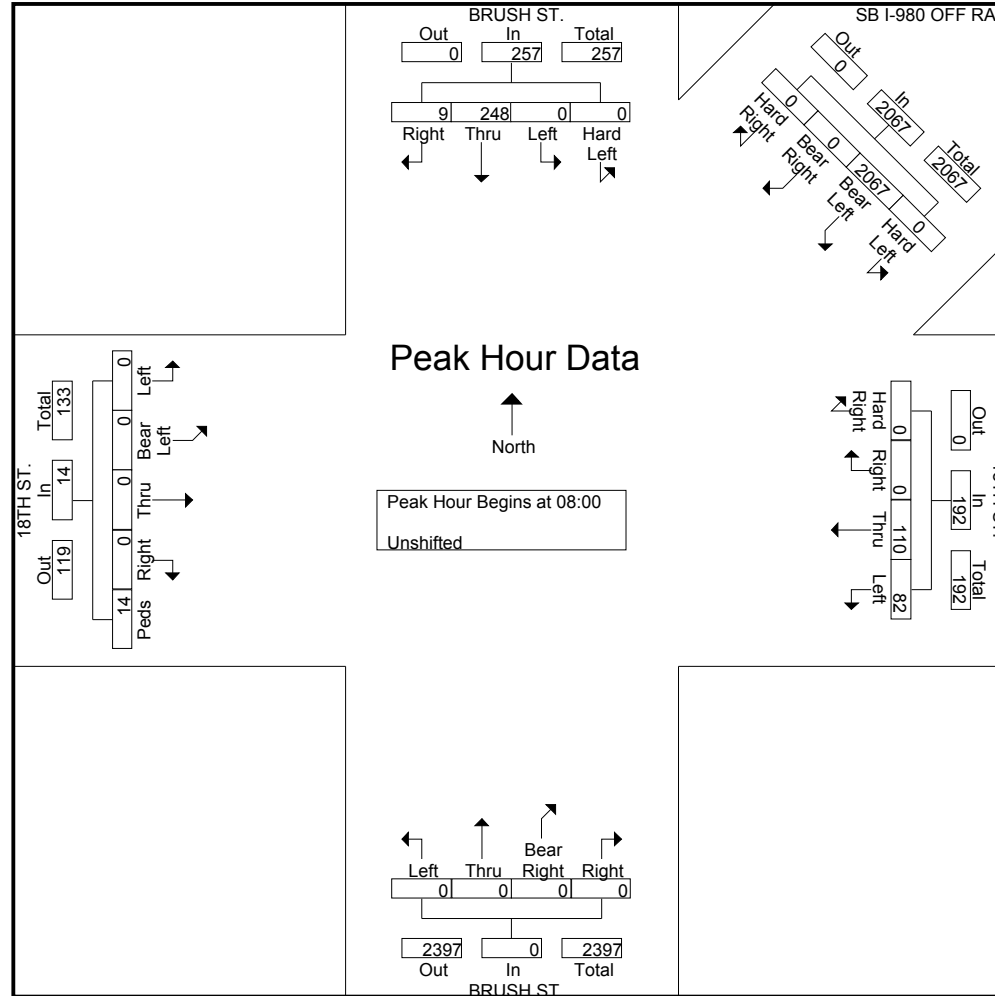
| | BRUSH ST.
Southbound | | | | | SB I-980 OFF RAMP
Southwestbound | | | | | 18TH ST.
Westbound | | | | | BRUSH ST.
Northbound | | | | | 18TH ST.
Eastbound | | | | | | | |
|--|-------------------------|------|------|-------|------------|-------------------------------------|-----------|------------|------------|------------|-----------------------|------|-------|------------|------------|-------------------------|------|------------|-------|------------|-----------------------|-----------|------|-------|------|------------|------------|-----|
| Start Time | Hard Left | Left | Thru | Right | App. Total | Hard Left | Bear Left | Bear Right | Hard Right | App. Total | Left | Thru | Right | Hard Right | App. Total | Left | Thru | Bear Right | Right | App. Total | Left | Bear Left | Thru | Right | Peds | App. Total | Int. Total | |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 49 | 0 | 49 | 0 | 484 | 0 | 0 | 484 | 19 | 30 | 0 | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 588 |
| 08:15 | 0 | 0 | 67 | 4 | 71 | 0 | 541 | 0 | 0 | 541 | 22 | 24 | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 663 | |
| 08:30 | 0 | 0 | 65 | 0 | 65 | 0 | 539 | 0 | 0 | 539 | 20 | 33 | 0 | 0 | 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 657 | |
| 08:45 | 0 | 0 | 67 | 5 | 72 | 0 | 503 | 0 | 0 | 503 | 21 | 23 | 0 | 0 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 622 | |
| Total Volume | 0 | 0 | 248 | 9 | 257 | 0 | 2067 | 0 | 0 | 2067 | 82 | 110 | 0 | 0 | 192 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 | 2530 | |
| % App. Total | 0 | 0 | 96.5 | 3.5 | | 0 | 100 | 0 | 0 | | 42.7 | 57.3 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | | | |
| PHF | .000 | .000 | .925 | .450 | .892 | .000 | .955 | .000 | .000 | .955 | .932 | .833 | .000 | .000 | .906 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .583 | .583 | .954 | |

All Traffic Data

(916) 771-8700
Fax 786-2879

OAKLAND

File Name : 08-7065-009 BRUSH-18TH-F
Site Code : 00000000
Start Date : 06/02/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

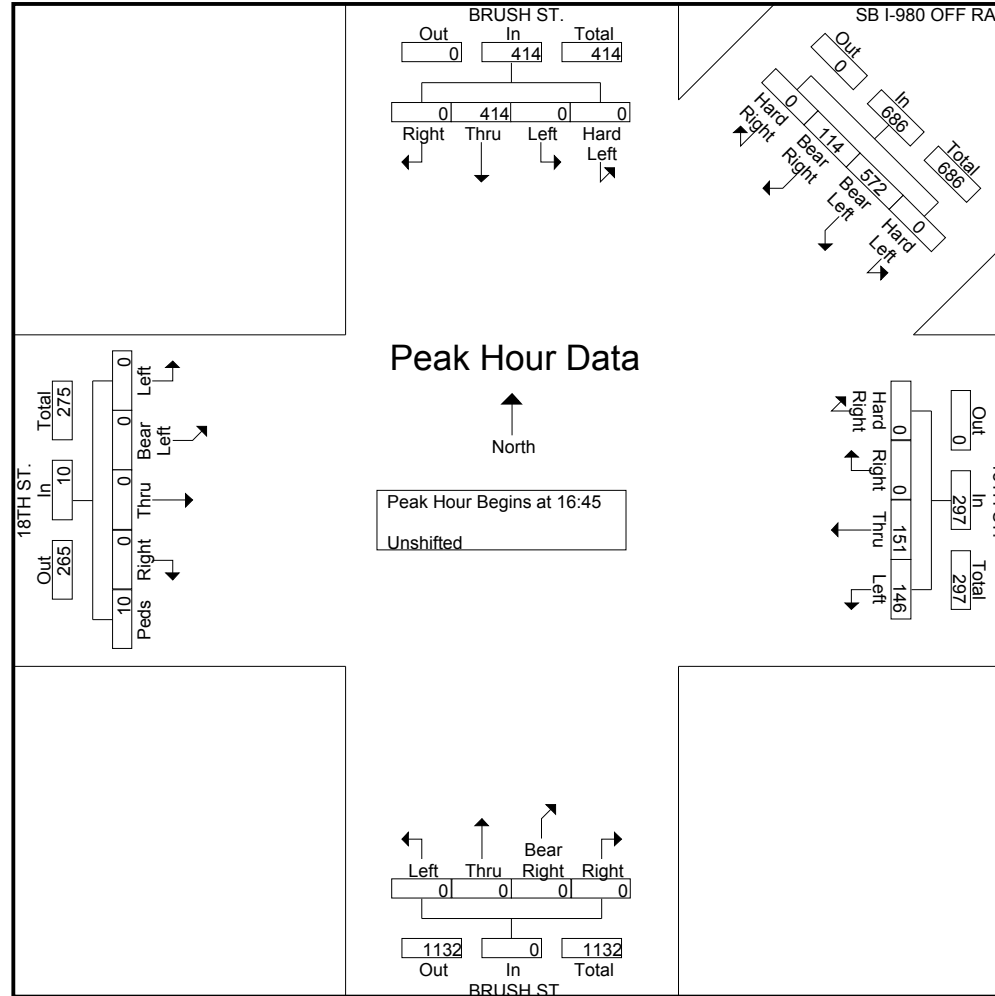
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|------|------|------------|------|------------|------|------------|-----------|------|------------|-----------|-----------|------|------|-----------|------|------|------|------|------|------|------|------|----------|----------|------------|
| Peak Hour for Entire Intersection Begins at 16:45 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16:45 | 0 | 0 | 94 | 0 | 94 | 0 | 147 | 27 | 0 | 174 | 32 | 40 | 0 | 0 | 72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 341 |
| 17:00 | 0 | 0 | 104 | 0 | 104 | 0 | 141 | 27 | 0 | 168 | 38 | 42 | 0 | 0 | 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 356 |
| 17:15 | 0 | 0 | 110 | 0 | 110 | 0 | 139 | 32 | 0 | 171 | 40 | 35 | 0 | 0 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 360 |
| 17:30 | 0 | 0 | 106 | 0 | 106 | 0 | 145 | 28 | 0 | 173 | 36 | 34 | 0 | 0 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 350 |
| Total Volume | 0 | 0 | 414 | 0 | 414 | 0 | 572 | 114 | 0 | 686 | 146 | 151 | 0 | 0 | 297 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 10 | 1407 |
| % App. Total | 0 | 0 | 100 | 0 | | 0 | 83.4 | 16.6 | 0 | | 49.2 | 50.8 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | | | |
| PHF | .000 | .000 | .941 | .000 | .941 | .000 | .973 | .891 | .000 | .986 | .913 | .899 | .000 | .000 | .928 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .625 | .625 | | .977 |

All Traffic Data

(916) 771-8700
Fax 786-2879

OAKLAND

File Name : 08-7065-009 BRUSH-18TH-F
Site Code : 00000000
Start Date : 06/02/2008
Page No : 3



All Traffic Data

(916) 771-8700

Fax 786-2879

OAKLAND

File Name : 08-7065-006 CASTRO-17TH-F

Site Code : 00000000

Start Date : 06/02/2008

Page No : 1

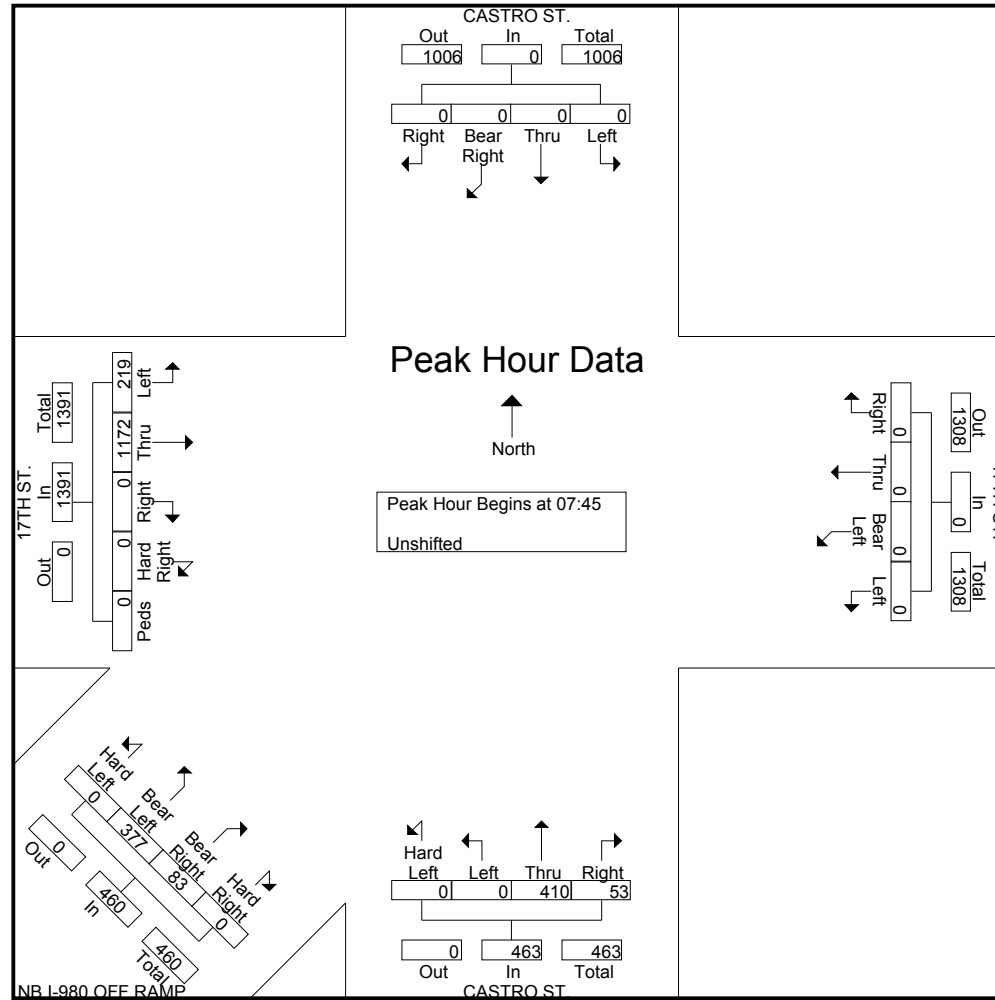
Groups Printed- Unshifted

| | CASTRO ST.
Southbound | | | | | | 17TH ST.
Westbound | | | | | | CASTRO ST.
Northbound | | | | | | NB I-980 OFF RAMP
Northeastbound | | | | | | 17TH ST.
Eastbound | | | | | | | | |
|------------|--------------------------|------|---------------|-------|------|------------|-----------------------|--------------|------|-------|------|------------|--------------------------|------|------|-------|------|------------|-------------------------------------|--------------|---------------|---------------|------|------------|-----------------------|------|-------|---------------|------|------------|-----------------|--------------|------------|
| Start Time | Left | Thru | Bear
Right | Right | Peds | App. Total | Left | Bear
Left | Thru | Right | Peds | App. Total | Hard
Left | Left | Thru | Right | Peds | App. Total | Hard
Left | Bear
Left | Bear
Right | Hard
Right | Peds | App. Total | Left | Thru | Right | Hard
Right | Peds | App. Total | Exclu.
Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 74 | 11 | 4 | 85 | 0 | 61 | 10 | 0 | 0 | 71 | 26 | 117 | 0 | 0 | 0 | 143 | 5 | 299 | 304 |
| 07:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 11 | 4 | 81 | 0 | 86 | 20 | 0 | 0 | 106 | 28 | 177 | 0 | 0 | 0 | 205 | 4 | 392 | 396 |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 118 | 14 | 8 | 132 | 0 | 100 | 25 | 0 | 0 | 125 | 41 | 221 | 0 | 0 | 0 | 262 | 11 | 519 | 530 |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 | 18 | 9 | 126 | 0 | 92 | 16 | 0 | 0 | 108 | 50 | 290 | 0 | 0 | 0 | 340 | 9 | 574 | 583 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 370 | 54 | 25 | 424 | 0 | 339 | 71 | 0 | 0 | 410 | 145 | 805 | 0 | 0 | 0 | 950 | 29 | 1784 | 1813 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 105 | 13 | 8 | 118 | 0 | 91 | 24 | 0 | 0 | 115 | 64 | 280 | 0 | 0 | 0 | 344 | 8 | 577 | 585 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 101 | 12 | 14 | 113 | 0 | 100 | 24 | 0 | 0 | 124 | 56 | 306 | 0 | 0 | 0 | 362 | 16 | 599 | 615 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 96 | 10 | 14 | 106 | 0 | 94 | 19 | 0 | 0 | 113 | 49 | 296 | 0 | 0 | 0 | 345 | 14 | 564 | 578 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 93 | 12 | 8 | 105 | 0 | 90 | 21 | 0 | 0 | 111 | 41 | 271 | 0 | 0 | 0 | 312 | 8 | 528 | 536 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 395 | 47 | 44 | 442 | 0 | 375 | 88 | 0 | 0 | 463 | 210 | 1153 | 0 | 0 | 0 | 1363 | 46 | 2268 | 2314 |

*** BREAK ***

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|------|-----|------|------|---|------|------|---|------|------|------|------|---|---|---|------|-----|------|------|
| 16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 190 | 7 | 3 | 197 | 0 | 70 | 15 | 0 | 0 | 85 | 42 | 95 | 0 | 0 | 0 | 137 | 4 | 419 | 423 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 203 | 11 | 3 | 214 | 0 | 78 | 8 | 0 | 0 | 86 | 59 | 97 | 0 | 0 | 0 | 156 | 3 | 456 | 459 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 229 | 16 | 3 | 245 | 0 | 58 | 9 | 0 | 0 | 67 | 61 | 89 | 0 | 0 | 0 | 150 | 4 | 462 | 466 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 231 | 14 | 14 | 245 | 0 | 64 | 8 | 0 | 0 | 72 | 58 | 102 | 0 | 0 | 0 | 160 | 15 | 477 | 492 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 853 | 48 | 23 | 901 | 0 | 270 | 40 | 0 | 0 | 310 | 220 | 383 | 0 | 0 | 0 | 603 | 26 | 1814 | 1840 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 256 | 18 | 5 | 274 | 0 | 74 | 7 | 0 | 0 | 81 | 45 | 106 | 0 | 0 | 0 | 151 | 5 | 506 | 511 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 231 | 11 | 10 | 242 | 0 | 73 | 8 | 0 | 0 | 81 | 36 | 99 | 0 | 0 | 0 | 135 | 11 | 458 | 469 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 215 | 8 | 11 | 223 | 0 | 71 | 3 | 0 | 0 | 74 | 37 | 99 | 0 | 0 | 0 | 136 | 17 | 433 | 450 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 188 | 11 | 8 | 199 | 0 | 65 | 4 | 0 | 0 | 69 | 33 | 98 | 0 | 0 | 0 | 131 | 11 | 399 | 410 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 890 | 48 | 34 | 938 | 0 | 283 | 22 | 0 | 0 | 305 | 151 | 402 | 0 | 0 | 0 | 553 | 44 | 1796 | 1840 |
| Grand Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 2508 | 197 | 126 | 2705 | 0 | 1267 | 221 | 0 | 0 | 1488 | 726 | 2743 | 0 | 0 | 0 | 3469 | 145 | 7662 | 7807 |
| Apprch % | 0 | 0 | 0 | 0 | | | 0 | 0 | 0 | 0 | | | 0 | 0 | 92.7 | 7.3 | | | 0 | 85.1 | 14.9 | 0 | | | 20.9 | 79.1 | 0 | 0 | 0 | | | | |
| Total % | 0 | 0 | 0 | 0 | | | 0 | 0 | 0 | 0 | | | 0 | 0 | 32.7 | 2.6 | 35.3 | | 0 | 16.5 | 2.9 | 0 | 19.4 | | 9.5 | 35.8 | 0 | 0 | 0 | 45.3 | 1.9 | 98.1 | |

| | CASTRO ST.
Southbound | | | | | 17TH ST.
Westbound | | | | | CASTRO ST.
Northbound | | | | | NB I-980 OFF RAMP
Northeastbound | | | | | 17TH ST.
Eastbound | | | | | | | |
|--|--------------------------|------|------------|-------|------------|-----------------------|-----------|------|-------|------------|--------------------------|------|------|-------|------------|-------------------------------------|-----------|------------|------------|------------|-----------------------|------|-------|------------|------|------------|------------|--|
| Start Time | Left | Thru | Bear Right | Right | App. Total | Left | Bear Left | Thru | Right | App. Total | Hard Left | Left | Thru | Right | App. Total | Hard Left | Bear Left | Bear Right | Hard Right | App. Total | Left | Thru | Right | Hard Right | Peds | App. Total | Int. Total | |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 | 18 | 126 | 0 | 92 | 16 | 0 | 108 | 50 | 290 | 0 | 0 | 0 | 340 | 574 | |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 105 | 13 | 118 | 0 | 91 | 24 | 0 | 115 | 64 | 280 | 0 | 0 | 0 | 344 | 577 | |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 101 | 12 | 113 | 0 | 100 | 24 | 0 | 124 | 56 | 306 | 0 | 0 | 0 | 362 | 599 | |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 96 | 10 | 106 | 0 | 94 | 19 | 0 | 113 | 49 | 296 | 0 | 0 | 0 | 345 | 564 | |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 410 | 53 | 463 | 0 | 377 | 83 | 0 | 460 | 219 | 1172 | 0 | 0 | 0 | 1391 | 2314 | |
| % App. Total | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 88.6 | 11.4 | | 0 | 82 | 18 | 0 | | 15.7 | 84.3 | 0 | 0 | 0 | | | |



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 16:30

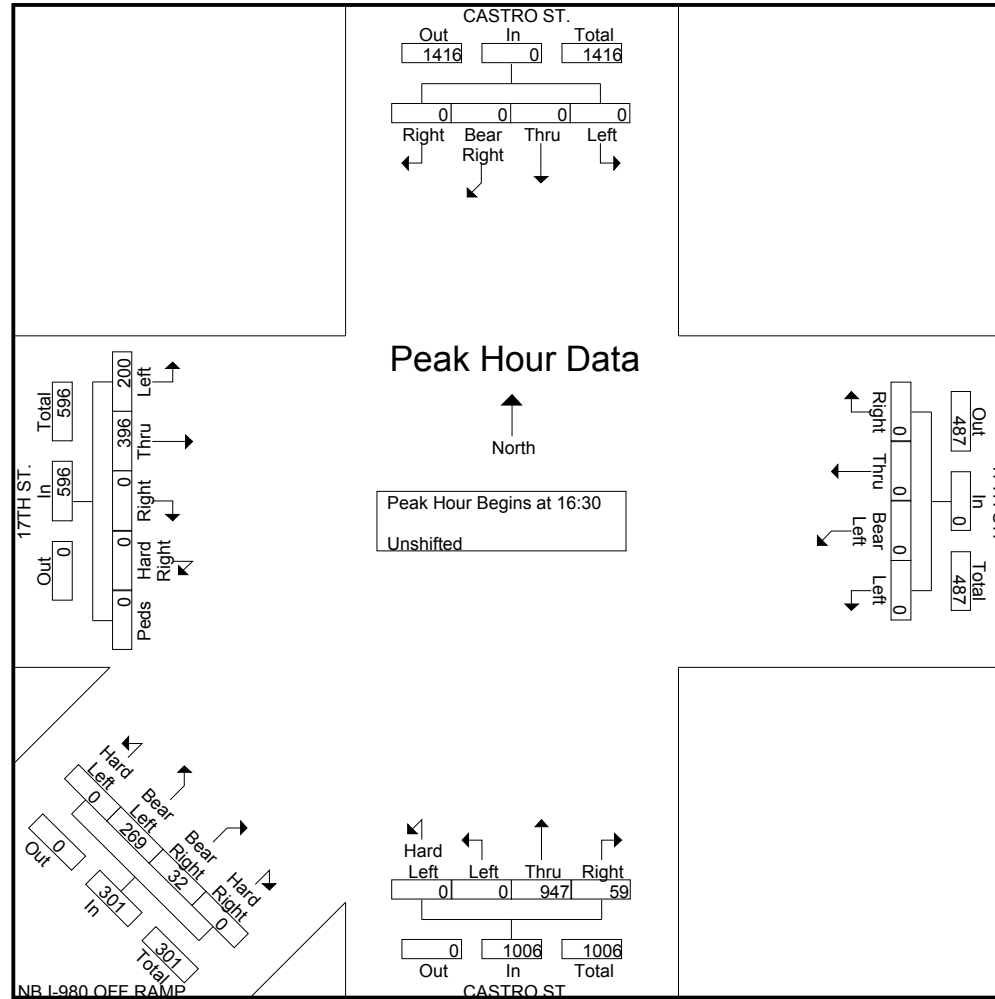
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------------|-----------|------------|------|-----------|----------|------|-----------|-----------|------------|------|------|------|------------|------------|
| 16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 229 | 16 | 245 | 0 | 58 | 9 | 0 | 67 | 61 | 89 | 0 | 0 | 0 | 150 | 462 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 231 | 14 | 245 | 0 | 64 | 8 | 0 | 72 | 58 | 102 | 0 | 0 | 0 | 160 | 477 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 256 | 18 | 274 | 0 | 74 | 7 | 0 | 81 | 45 | 106 | 0 | 0 | 0 | 151 | 506 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 231 | 11 | 242 | 0 | 73 | 8 | 0 | 81 | 36 | 99 | 0 | 0 | 0 | 135 | 458 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 947 | 59 | 1006 | 0 | 269 | 32 | 0 | 301 | 200 | 396 | 0 | 0 | 0 | 596 | 1903 |
| % App. Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94.1 | 5.9 | | 0 | 89.4 | 10.6 | 0 | | 33.6 | 66.4 | 0 | 0 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .925 | .819 | .918 | .000 | .909 | .889 | .000 | .929 | .820 | .934 | .000 | .000 | .000 | .931 | .940 |

All Traffic Data

(916) 771-8700
Fax 786-2879

OAKLAND

File Name : 08-7065-006 CASTRO-17TH-F
Site Code : 00000000
Start Date : 06/02/2008
Page No : 3



(916) 771-8700
F (916) 786-2879

File Name : 08-7458-019 CASTRO-12TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

| | CASTRO ST.
Southbound | | | | | | 12TH ST.
Westbound | | | | | | CASTRO ST.
Northbound | | | | | | 12TH ST.
Eastbound | | | | | | I-980 ON RAMP
Southeastbound | | | | | | | | |
|---------------|--------------------------|------|-------|---------------|------|------------|-----------------------|------|--------------|-------|------|------------|--------------------------|--------------|------|-------|------|------------|-----------------------|------|------|-------|------|------------|---------------------------------|--------------|---------------|---------------|------|------------|-----------------|--------------|------------|
| Start Time | Left | Thru | Right | Hard
Right | Peds | App. Total | Left | Thru | Bear
Left | Right | Peds | App. Total | Left | Bear
Left | Thru | Right | Peds | App. Total | Hard
Left | Left | Thru | Right | Peds | App. Total | Hard
Left | Bear
Left | Bear
Right | Hard
Right | Peds | App. Total | Exclu.
Total | Inclu. Total | Int. Total |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 16 | 21 | 2 | 56 | 7 | 26 | 42 | 0 | 1 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 131 | 134 |
| 07:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 12 | 31 | 0 | 64 | 6 | 29 | 41 | 0 | 2 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 140 | 142 | |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 18 | 26 | 1 | 73 | 11 | 35 | 44 | 0 | 0 | 90 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 163 | 165 | |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 19 | 30 | 1 | 75 | 9 | 60 | 61 | 0 | 2 | 130 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 205 | 208 | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 95 | 65 | 108 | 4 | 268 | 33 | 150 | 188 | 0 | 5 | 371 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 639 | 649 | |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 16 | 36 | 0 | 83 | 6 | 51 | 61 | 0 | 4 | 118 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 201 | 205 | |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 17 | 40 | 1 | 91 | 10 | 68 | 76 | 0 | 2 | 154 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 245 | 248 | |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 14 | 32 | 0 | 75 | 7 | 62 | 65 | 0 | 1 | 134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 209 | 210 | |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 21 | 26 | 0 | 81 | 12 | 56 | 71 | 0 | 3 | 139 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 220 | 223 | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128 | 68 | 134 | 1 | 330 | 35 | 237 | 273 | 0 | 10 | 545 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 875 | 886 | |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 69 | 50 | 8 | 171 | 12 | 160 | 92 | 0 | 11 | 264 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 435 | 454 | |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 75 | 51 | 0 | 174 | 8 | 171 | 98 | 0 | 4 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 449 | 454 | |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 89 | 71 | 4 | 212 | 14 | 168 | 105 | 0 | 8 | 287 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 499 | 511 | |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 73 | 72 | 76 | 3 | 221 | 10 | 184 | 114 | 0 | 7 | 308 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 529 | 540 | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 225 | 305 | 248 | 15 | 778 | 42 | 683 | 409 | 0 | 30 | 1134 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 1912 | 1959 | |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45 | 105 | 81 | 3 | 231 | 10 | 234 | 121 | 0 | 12 | 365 | 0 | 0 | 0 | 0 | | | | | | | | | | | |

[illegible]

(916) 771-8700
F (916) 786-2879

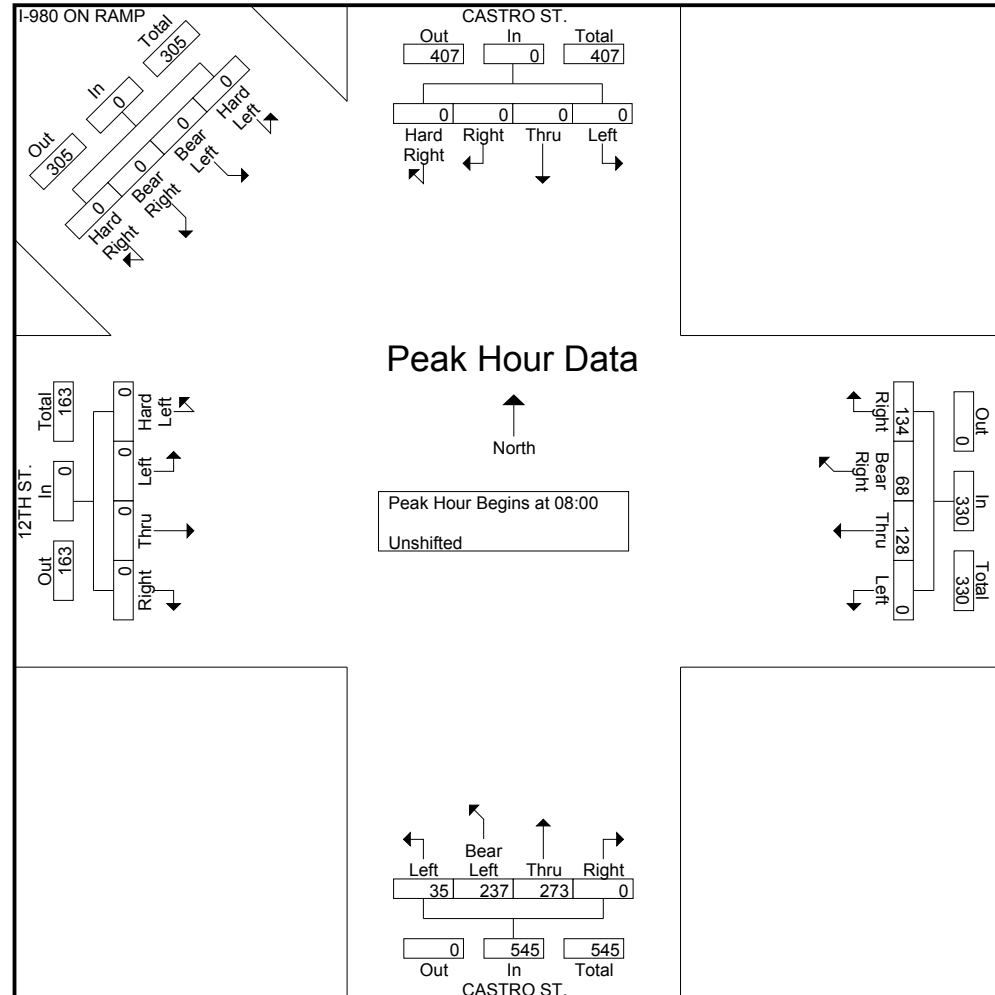
OAKLAND

File Name : 08-7458-019 CASTRO-12TH-F

Site Code : 00000000

Start Date : 08/05/2008

Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

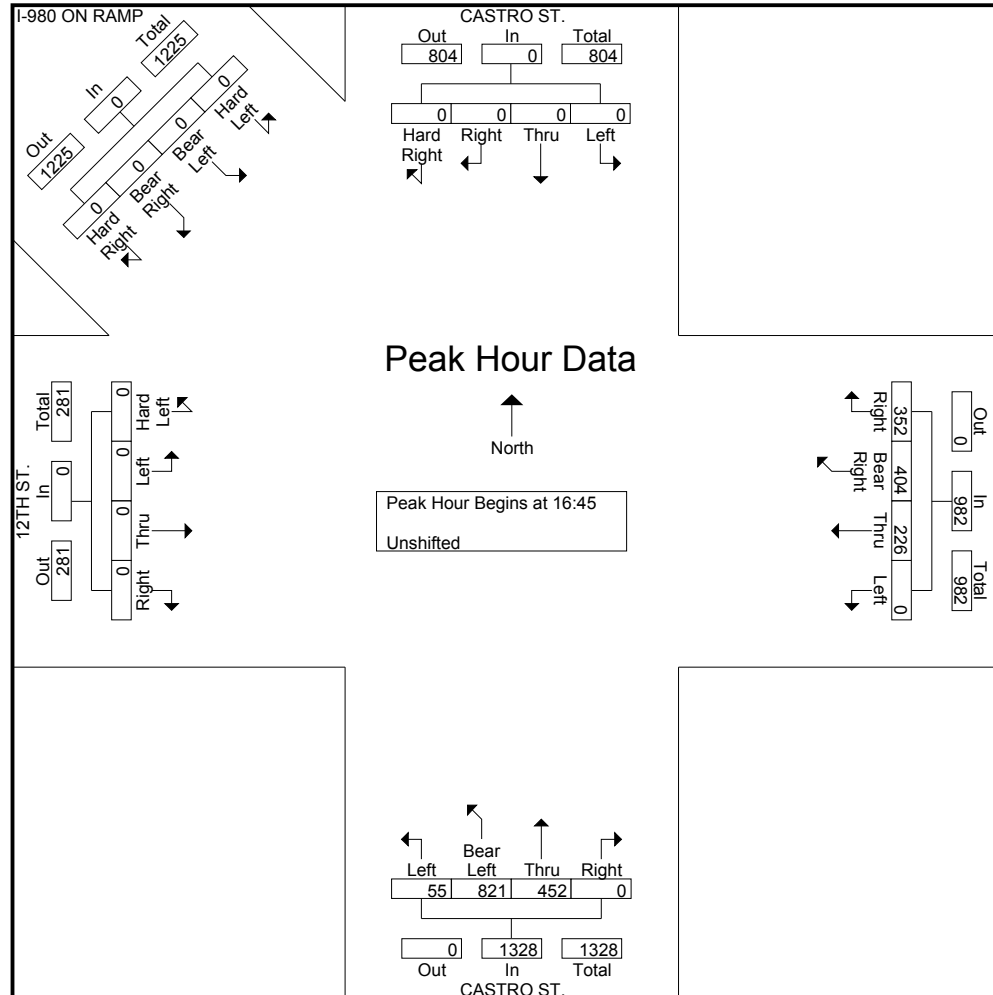
[illegible]

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-019 CASTRO-12TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-018 BRUSH-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

Groups Printed- Unshifted

| | BRUSH ST.
Southbound | | | | | | 11TH ST.
Westbound | | | | | | I-980 ON RAMP
Northwestbound | | | | | | BRUSH ST.
Northbound | | | | | | 11TH ST.
Eastbound | | | | | | | | |
|---------------|-------------------------|-----------|------|-------|------|------------|-----------------------|------|------|-------|------|------------|---------------------------------|-----------|------------|------------|------|------------|-------------------------|------|-------|------------|------|------------|-----------------------|------|------------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Bear Left | Thru | Right | Peds | App. Total | Hard Left | Left | Thru | Right | Peds | App. Total | Hard Left | Bear Left | Bear Right | Hard Right | Peds | App. Total | Left | Thru | Right | Hard Right | Peds | App. Total | Left | Thru | Bear Right | Right | Peds | App. Total | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 | 113 | 9 | 181 | 3 | 1 | 306 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 13 | 5 | 1 | 0 | 19 | 2 | 325 | 327 |
| 07:15 | 144 | 15 | 223 | 7 | 3 | 389 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 8 | 0 | 0 | 28 | 3 | 417 | 420 |
| 07:30 | 154 | 18 | 281 | 9 | 2 | 462 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 5 | 2 | 2 | 30 | 4 | 492 | 496 |
| 07:45 | 219 | 14 | 286 | 10 | 1 | 529 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 11 | 1 | 2 | 50 | 3 | 579 | 582 |
| Total | 630 | 56 | 971 | 29 | 7 | 1686 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 94 | 29 | 4 | 4 | 127 | 12 | 1813 | 1825 |
| 08:00 | 249 | 28 | 296 | 7 | 10 | 580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 4 | 0 | 2 | 37 | 12 | 617 | 629 |
| 08:15 | 221 | 15 | 228 | 7 | 5 | 471 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 6 | 0 | 4 | 44 | 9 | 515 | 524 |
| 08:30 | 196 | 12 | 261 | 6 | 6 | 475 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 9 | 0 | 4 | 41 | 10 | 516 | 526 |
| 08:45 | 188 | 12 | 271 | 7 | 2 | 478 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 7 | 4 | 2 | 62 | 4 | 540 | 544 |
| Total | 854 | 67 | 1056 | 27 | 23 | 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 154 | 26 | 4 | 12 | 184 | 35 | 2188 | 2223 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 86 | 34 | 145 | 6 | 7 | 271 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 12 | 1 | 4 | 63 | 11 | 334 | 345 |
| 16:15 | 95 | 29 | 173 | 14 | 5 | 311 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 45 | 10 | 3 | 4 | 58 | 10 | 369 | 379 |
| 16:30 | 96 | 39 | 184 | 14 | 1 | 333 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 15 | 4 | 3 | 69 | 4 | 402 | 406 |
| 16:45 | 94 | 30 | 179 | 12 | 2 | 315 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 9 | 3 | 3 | 69 | 5 | 384 | 389 |
| Total | 371 | 132 | 681 | 46 | 15 | 1230 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 202 | 46 | 11 | 14 | 259 | 30 | 1489 | 1519 |
| 17:00 | 78 | 27 | 177 | 11 | 6 | 293 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 9 | 4 | 4 | 60 | 10 | 353 | 363 |
| 17:15 | 93 | 23 | 237 | 10 | 4 | 363 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 15 | 3 | 4 | 78 | 8 | 441 | 449 |
| 17:30 | 94 | 24 | 220 | 6 | 3 | 344 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 12 | 4 | 1 | 57 | 4 | 401 | 405 |
| 17:45 | 74 | 18 | 195 | 11 | 0 | 298 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 4 | 0 | 1 | 45 | 1 | 343 | 344 |
| Total | 339 | 92 | 829 | 38 | 13 | 1298 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 189 | 40 | 11 | 10 | 240 | 23 | 1538 | 1561 |
| Grand Total | 2194 | 347 | 3537 | 140 | 58 | 6218 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 639 | 141 | 30 | 40 | 810 | 100 | 7028 | 7128 |
| Approch % | 35.3 | 5.6 | 56.9 | 2.3 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 78.9 | 17.4 | 3.7 | | | | | |
| Total % | 31.2 | 4.9 | 50.3 | 2 | | 88.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.1 | 2 | 0.4 | | 11.5 | 1.4 | 98.6 | |

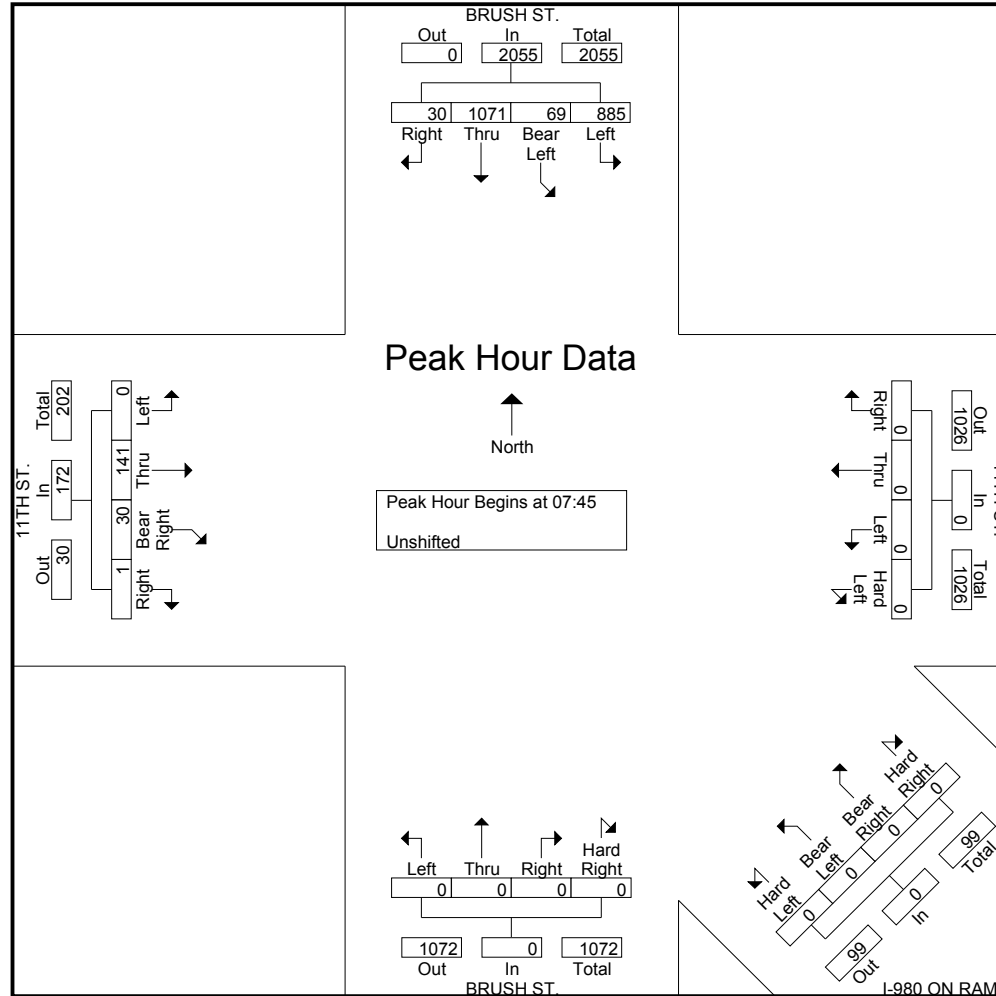
| | BRUSH ST.
Southbound | | | | | 11TH ST.
Westbound | | | | | I-980 ON RAMP
Northwestbound | | | | | BRUSH ST.
Northbound | | | | | 11TH ST.
Eastbound | | | | | | |
|--|-------------------------|-----------|------|-------|------------|-----------------------|------|------|-------|------------|---------------------------------|-----------|------------|------------|------------|-------------------------|------|-------|------------|------------|-----------------------|------|------------|-------|------------|------------|--|
| Start Time | Left | Bear Left | Thru | Right | App. Total | Hard Left | Left | Thru | Right | App. Total | Hard Left | Bear Left | Bear Right | Hard Right | App. Total | Left | Thru | Right | Hard Right | App. Total | Left | Thru | Bear Right | Right | App. Total | Int. Total | |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07:45 | 219 | 14 | 286 | 10 | 529 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 11 | 1 | 50 | 579 | |
| 08:00 | 249 | 28 | 296 | 7 | 580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 4 | 0 | 37 | 617 | |
| 08:15 | 221 | 15 | 228 | 7 | 471 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 6 | 0 | 44 | 515 | |
| 08:30 | 196 | 12 | 261 | 6 | 475 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 9 | 0 | 41 | 516 | |
| Total Volume | 885 | 69 | 1071 | 30 | 2055 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 141 | 30 | 1 | 172 | 2227 | |
| % App. Total | 43.1 | 3.4 | 52.1 | 1.5 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 17.4 | 0.6 | | | |
| PHF | .889 | .616 | .905 | .750 | .886 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .928 | .682 | .250 | .860 | .902 | |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-018 BRUSH-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

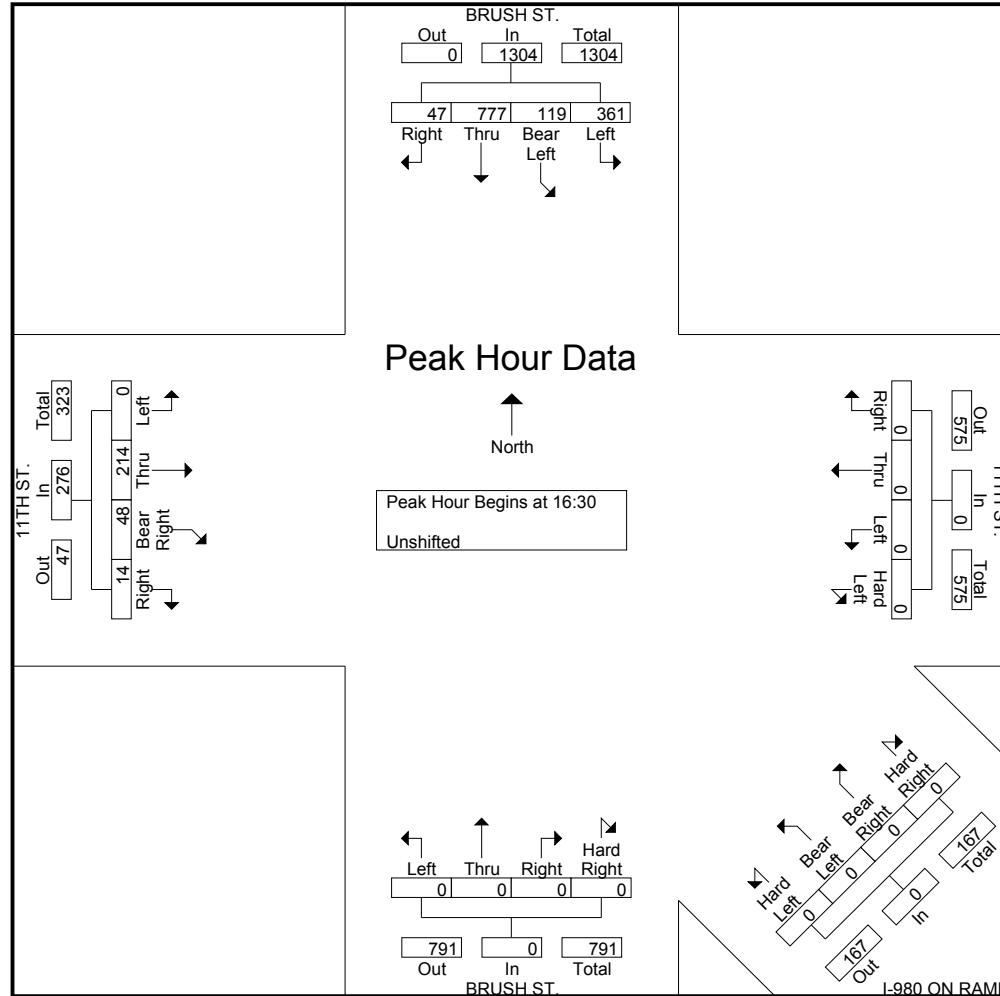
| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 16:30 | 96 | 39 | 184 | 14 | 333 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 15 | 4 | 69 | 402 |
| 16:45 | 94 | 30 | 179 | 12 | 315 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 9 | 3 | 69 | 384 |
| 17:00 | 78 | 27 | 177 | 11 | 293 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 9 | 4 | 60 | 353 |
| 17:15 | 93 | 23 | 237 | 10 | 363 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 15 | 3 | 78 | 441 |
| Total Volume | 361 | 119 | 777 | 47 | 1304 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 214 | 48 | 14 | 276 | 1580 |
| % App. Total | 27.7 | 9.1 | 59.6 | 3.6 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 77.5 | 17.4 | 5.1 | | |
| PHF | .940 | .763 | .820 | .839 | .898 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .892 | .800 | .875 | .885 | .896 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-018 BRUSH-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 3



ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Oak St & 14th St

Date: 05/21/2008

| Start Time | Oak St Southbound | | | | 14th St Westbound | | | | Oak St Northbound | | | | 14th St Eastbound | | | | Int Total |
|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 7:00 | 0 | 0 | 0 | 0 | 0 | 42 | 30 | 72 | 10 | 79 | 0 | 89 | 2 | 32 | 0 | 34 | 195 |
| 7:15 | 0 | 0 | 0 | 0 | 0 | 62 | 59 | 121 | 13 | 95 | 1 | 109 | 8 | 30 | 0 | 38 | 268 |
| 7:30 | 0 | 0 | 0 | 0 | 0 | 75 | 78 | 153 | 18 | 111 | 0 | 129 | 7 | 45 | 0 | 52 | 334 |
| 7:45 | 0 | 0 | 0 | 0 | 0 | 104 | 93 | 197 | 26 | 135 | 3 | 164 | 8 | 45 | 0 | 53 | 414 |
| Total | 0 | 0 | 0 | 0 | 0 | 283 | 260 | 543 | 67 | 420 | 4 | 491 | 25 | 152 | 0 | 177 | 1211 |
| 8:00 | 0 | 0 | 0 | 0 | 1 | 129 | 125 | 255 | 24 | 119 | 3 | 146 | 8 | 58 | 0 | 66 | 467 |
| 8:15 | 0 | 0 | 0 | 0 | 0 | 155 | 112 | 267 | 28 | 132 | 8 | 168 | 10 | 73 | 0 | 83 | 518 |
| 8:30 | 0 | 0 | 0 | 0 | 0 | 140 | 124 | 264 | 34 | 126 | 4 | 164 | 8 | 72 | 0 | 80 | 508 |
| 8:45 | 0 | 0 | 0 | 0 | 0 | 123 | 119 | 242 | 30 | 128 | 8 | 166 | 8 | 58 | 0 | 66 | 474 |
| Total | 0 | 0 | 0 | 0 | 1 | 547 | 480 | 1028 | 116 | 505 | 23 | 644 | 34 | 261 | 0 | 295 | 1967 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 85 | 51 | 136 | 43 | 104 | 8 | 155 | 25 | 106 | 0 | 131 | 422 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 80 | 54 | 134 | 25 | 95 | 7 | 127 | 21 | 119 | 0 | 140 | 401 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 90 | 46 | 136 | 35 | 119 | 7 | 161 | 21 | 126 | 0 | 147 | 444 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 92 | 52 | 144 | 32 | 120 | 12 | 164 | 12 | 165 | 0 | 177 | 485 |
| Total | 0 | 0 | 0 | 0 | 0 | 347 | 203 | 550 | 135 | 438 | 34 | 607 | 79 | 516 | 0 | 595 | 1752 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 92 | 48 | 140 | 44 | 144 | 7 | 195 | 7 | 174 | 0 | 181 | 516 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 87 | 57 | 144 | 51 | 133 | 8 | 192 | 13 | 224 | 0 | 237 | 573 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 84 | 61 | 145 | 44 | 131 | 8 | 183 | 21 | 204 | 0 | 225 | 553 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 71 | 40 | 111 | 40 | 132 | 3 | 175 | 23 | 173 | 0 | 196 | 482 |
| Total | 0 | 0 | 0 | 0 | 0 | 334 | 206 | 540 | 179 | 540 | 26 | 745 | 64 | 775 | 0 | 839 | 2124 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|------|------|------|------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|-------|------|
| Grand Total | 0 | 0 | 0 | 0 | 1 | 1511 | 1149 | 2661 | 497 | 1903 | 87 | 2487 | 202 | 1704 | 0 | 1906 | 7054 |
| Apprch% | 0.0% | 0.0% | 0.0% | | 0.0% | 56.8% | 43.2% | | 20.0% | 76.5% | 3.5% | | 10.6% | 89.4% | 0.0% | | |
| Total % | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 21.4% | 16.3% | 37.7% | 7.0% | 27.0% | 1.2% | 35.3% | 2.9% | 24.2% | 0.0% | 27.0% | |

City of Oakland

Oak St & 14th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| Start Time | Oak St Southbound | | | | 14th St Westbound | | | | Oak St Northbound | | | | 14th St Eastbound | | | | Int Total |
|--------------|-------------------|------|-------|------------|-------------------|-------|-------|------------|-------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 800 | 0 | 0 | 0 | 0 | 1 | 129 | 125 | 255 | 24 | 119 | 3 | 146 | 8 | 58 | 0 | 66 | 467 |
| 815 | 0 | 0 | 0 | 0 | 0 | 155 | 112 | 267 | 28 | 132 | 8 | 168 | 10 | 73 | 0 | 83 | 518 |
| 830 | 0 | 0 | 0 | 0 | 0 | 140 | 124 | 264 | 34 | 126 | 4 | 164 | 8 | 72 | 0 | 80 | 508 |
| 845 | 0 | 0 | 0 | 0 | 0 | 123 | 119 | 242 | 30 | 128 | 8 | 166 | 8 | 58 | 0 | 66 | 474 |
| Total Volume | 0 | 0 | 0 | 0 | 1 | 547 | 480 | 1028 | 116 | 505 | 23 | 644 | 34 | 261 | 0 | 295 | 1967 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.1% | 53.2% | 46.7% | | 18.0% | 78.4% | 3.6% | | 11.5% | 88.5% | 0.0% | | |
| PHF | 0.000 | | | | 0.963 | | | | 0.958 | | | | 0.889 | | | | |

PM Peak Hr Begins at 445 PM

| Start Time | Oak St Southbound | | | | 14th St Westbound | | | | Oak St Northbound | | | | 14th St Eastbound | | | | Int Total |
|--------------|-------------------|------|-------|------------|-------------------|-------|-------|------------|-------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 445 | 0 | 0 | 0 | 0 | 0 | 92 | 52 | 144 | 32 | 120 | 12 | 164 | 12 | 165 | 0 | 177 | 485 |
| 500 | 0 | 0 | 0 | 0 | 0 | 92 | 48 | 140 | 44 | 144 | 7 | 195 | 7 | 174 | 0 | 181 | 516 |
| 515 | 0 | 0 | 0 | 0 | 0 | 87 | 57 | 144 | 51 | 133 | 8 | 192 | 13 | 224 | 0 | 237 | 573 |
| 530 | 0 | 0 | 0 | 0 | 0 | 84 | 61 | 145 | 44 | 131 | 8 | 183 | 21 | 204 | 0 | 225 | 553 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 355 | 218 | 573 | 171 | 528 | 35 | 734 | 53 | 767 | 0 | 820 | 2127 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 62.0% | 38.0% | | 23.3% | 71.9% | 4.8% | | 6.5% | 93.5% | 0.0% | | |
| PHF | 0.000 | | | | 0.988 | | | | 0.941 | | | | 0.865 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Madison St & 14th St

Date: 05/22/2008

| | Madison St Southbound | | | | 14th St Westbound | | | | Madison St Northbound | | | | 14th St Eastbound | | | | |
|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 5 | 48 | 2 | 55 | 2 | 61 | 0 | 63 | 0 | 0 | 0 | 0 | 0 | 30 | 4 | 34 | 152 |
| 7:15 | 6 | 59 | 1 | 66 | 1 | 74 | 0 | 75 | 0 | 0 | 0 | 0 | 0 | 54 | 6 | 60 | 201 |
| 7:30 | 9 | 63 | 3 | 75 | 2 | 96 | 0 | 98 | 0 | 0 | 0 | 0 | 0 | 46 | 9 | 55 | 228 |
| 7:45 | 14 | 75 | 2 | 91 | 4 | 129 | 0 | 133 | 0 | 0 | 0 | 0 | 0 | 49 | 8 | 57 | 281 |
| Total | 34 | 245 | 8 | 287 | 9 | 360 | 0 | 369 | 0 | 0 | 0 | 0 | 0 | 179 | 27 | 206 | 862 |
| 8:00 | 10 | 79 | 6 | 95 | 2 | 142 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 52 | 10 | 62 | 301 |
| 8:15 | 17 | 80 | 5 | 102 | 6 | 161 | 0 | 167 | 0 | 0 | 0 | 0 | 0 | 78 | 14 | 92 | 361 |
| 8:30 | 14 | 74 | 2 | 90 | 8 | 160 | 0 | 168 | 0 | 0 | 0 | 0 | 0 | 52 | 9 | 61 | 319 |
| 8:45 | 9 | 75 | 4 | 88 | 5 | 158 | 0 | 163 | 0 | 0 | 0 | 0 | 0 | 51 | 6 | 57 | 308 |
| Total | 50 | 308 | 17 | 375 | 21 | 621 | 0 | 642 | 0 | 0 | 0 | 0 | 0 | 233 | 39 | 272 | 1289 |
| 16:00 | 42 | 107 | 2 | 151 | 3 | 127 | 0 | 130 | 0 | 0 | 0 | 0 | 0 | 103 | 16 | 119 | 400 |
| 16:15 | 42 | 128 | 4 | 174 | 6 | 130 | 0 | 136 | 0 | 0 | 0 | 0 | 0 | 104 | 21 | 125 | 435 |
| 16:30 | 52 | 112 | 4 | 168 | 8 | 124 | 0 | 132 | 0 | 0 | 0 | 0 | 0 | 110 | 15 | 125 | 425 |
| 16:45 | 61 | 115 | 6 | 182 | 6 | 116 | 0 | 122 | 0 | 0 | 0 | 0 | 0 | 115 | 15 | 130 | 434 |
| Total | 197 | 462 | 16 | 675 | 23 | 497 | 0 | 520 | 0 | 0 | 0 | 0 | 0 | 432 | 67 | 499 | 1694 |
| 17:00 | 69 | 131 | 3 | 203 | 7 | 129 | 0 | 136 | 0 | 0 | 0 | 0 | 0 | 123 | 15 | 138 | 477 |
| 17:15 | 74 | 123 | 1 | 198 | 2 | 109 | 0 | 111 | 0 | 0 | 0 | 0 | 0 | 143 | 20 | 163 | 472 |
| 17:30 | 76 | 125 | 6 | 207 | 6 | 112 | 0 | 118 | 0 | 0 | 0 | 0 | 0 | 148 | 14 | 162 | 487 |
| 17:45 | 68 | 122 | 6 | 196 | 7 | 118 | 0 | 125 | 0 | 0 | 0 | 0 | 0 | 124 | 12 | 136 | 457 |
| Total | 287 | 501 | 16 | 804 | 22 | 468 | 0 | 490 | 0 | 0 | 0 | 0 | 0 | 538 | 61 | 599 | 1893 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|------|-------|------|-------|------|-------|------|------|------|------|------|-------|-------|-------|------|
| Grand Total | 568 | 1516 | 57 | 2141 | 75 | 1946 | 0 | 2021 | 0 | 0 | 0 | 0 | 0 | 1382 | 194 | 1576 | 5738 |
| Apprch% | #### | 70.8% | 2.7% | | 3.7% | 96.3% | 0.0% | | 0.0% | 0.0% | 0.0% | 0 | 0.0% | 87.7% | 12.3% | | |
| Total % | 9.9% | 26.4% | 1.0% | 37.3% | 1.3% | 33.9% | 0.0% | 35.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 24.1% | 3.4% | 27.5% | |

City of Oakland

Madison St & 14th St

Date: 05/22/2008

AM Peak Hr Begins at 800 AM

| | Madison St Southbound | | | | 14th St Westbound | | | | Madison St Northbound | | | | 14th St Eastbound | | | | |
|--------------|-----------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------------------|------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 10 | 79 | 6 | 95 | 2 | 142 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 52 | 10 | 62 | 301 |
| 815 | 17 | 80 | 5 | 102 | 6 | 161 | 0 | 167 | 0 | 0 | 0 | 0 | 0 | 78 | 14 | 92 | 361 |
| 830 | 14 | 74 | 2 | 90 | 8 | 160 | 0 | 168 | 0 | 0 | 0 | 0 | 0 | 52 | 9 | 61 | 319 |
| 845 | 9 | 75 | 4 | 88 | 5 | 158 | 0 | 163 | 0 | 0 | 0 | 0 | 0 | 51 | 6 | 57 | 308 |
| Total Volume | 50 | 308 | 17 | 375 | 21 | 621 | 0 | 642 | 0 | 0 | 0 | 0 | 0 | 233 | 39 | 272 | 1289 |
| % App Total. | #### | 82.1% | 4.5% | | 3.3% | 96.7% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 85.7% | 14.3% | | |
| PHF | 0.919 | | | | 0.955 | | | | 0.000 | | | | 0.739 | | | | |

PM Peak Hr Begins at 500 PM

| | Madison St Southbound | | | | 14th St Westbound | | | | Madison St Northbound | | | | 14th St Eastbound | | | | |
|--------------|-----------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------------------|------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 500 | 69 | 131 | 3 | 203 | 7 | 129 | 0 | 136 | 0 | 0 | 0 | 0 | 0 | 123 | 15 | 138 | 477 |
| 515 | 74 | 123 | 1 | 198 | 2 | 109 | 0 | 111 | 0 | 0 | 0 | 0 | 0 | 143 | 20 | 163 | 472 |
| 530 | 76 | 125 | 6 | 207 | 6 | 112 | 0 | 118 | 0 | 0 | 0 | 0 | 0 | 148 | 14 | 162 | 487 |
| 545 | 68 | 122 | 6 | 196 | 7 | 118 | 0 | 125 | 0 | 0 | 0 | 0 | 0 | 124 | 12 | 136 | 457 |
| Total Volume | 287 | 501 | 16 | 804 | 22 | 468 | 0 | 490 | 0 | 0 | 0 | 0 | 0 | 538 | 61 | 599 | 1893 |
| % App Total. | #### | 62.3% | 2.0% | | 4.5% | 95.5% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 89.8% | 10.2% | | |
| PHF | 0.971 | | | | 0.901 | | | | 0.000 | | | | 0.919 | | | | |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-017 HARRISON-14TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

Groups Printed- Unshifted

| | HARRISON ST.
Southbound | | | | | 14TH ST.
Westbound | | | | | HARRISON ST.
Northbound | | | | | 14TH ST.
Eastbound | | | | | Exclu. Total | Inclu. Total | Int. Total |
|---------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | | | |
| 07:00 | 3 | 11 | 3 | 7 | 17 | 1 | 33 | 12 | 15 | 46 | 5 | 49 | 1 | 9 | 55 | 3 | 23 | 1 | 2 | 27 | 33 | 145 | 178 |
| 07:15 | 5 | 10 | 3 | 5 | 18 | 3 | 37 | 9 | 11 | 49 | 7 | 49 | 2 | 5 | 58 | 1 | 17 | 1 | 3 | 19 | 24 | 144 | 168 |
| 07:30 | 5 | 11 | 1 | 14 | 17 | 2 | 64 | 18 | 18 | 84 | 9 | 51 | 5 | 6 | 65 | 2 | 22 | 0 | 7 | 24 | 45 | 190 | 235 |
| 07:45 | 5 | 10 | 1 | 25 | 16 | 2 | 88 | 16 | 23 | 106 | 16 | 84 | 4 | 13 | 104 | 6 | 29 | 1 | 19 | 36 | 80 | 262 | 342 |
| Total | 18 | 42 | 8 | 51 | 68 | 8 | 222 | 55 | 67 | 285 | 37 | 233 | 12 | 33 | 282 | 12 | 91 | 3 | 31 | 106 | 182 | 741 | 923 |
| 08:00 | 3 | 16 | 7 | 12 | 26 | 2 | 78 | 17 | 29 | 97 | 12 | 82 | 4 | 7 | 98 | 11 | 22 | 1 | 10 | 34 | 58 | 255 | 313 |
| 08:15 | 6 | 15 | 5 | 20 | 26 | 2 | 81 | 25 | 28 | 108 | 9 | 98 | 5 | 15 | 112 | 11 | 37 | 2 | 13 | 50 | 76 | 296 | 372 |
| 08:30 | 6 | 10 | 6 | 23 | 22 | 1 | 93 | 14 | 23 | 108 | 16 | 81 | 11 | 22 | 108 | 4 | 38 | 0 | 13 | 42 | 81 | 280 | 361 |
| 08:45 | 10 | 22 | 6 | 25 | 38 | 2 | 88 | 28 | 31 | 118 | 19 | 92 | 3 | 39 | 114 | 12 | 44 | 7 | 25 | 63 | 120 | 333 | 453 |
| Total | 25 | 63 | 24 | 80 | 112 | 7 | 340 | 84 | 111 | 431 | 56 | 353 | 23 | 83 | 432 | 38 | 141 | 10 | 61 | 189 | 335 | 1164 | 1499 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 9 | 29 | 5 | 16 | 43 | 2 | 73 | 24 | 24 | 99 | 13 | 88 | 8 | 20 | 109 | 7 | 46 | 3 | 6 | 56 | 66 | 307 | 373 |
| 16:15 | 11 | 18 | 5 | 18 | 34 | 2 | 72 | 15 | 19 | 89 | 20 | 84 | 3 | 19 | 107 | 5 | 66 | 6 | 17 | 77 | 73 | 307 | 380 |
| 16:30 | 11 | 26 | 5 | 8 | 42 | 4 | 82 | 17 | 23 | 103 | 16 | 90 | 11 | 15 | 117 | 9 | 53 | 2 | 25 | 64 | 71 | 326 | 397 |
| 16:45 | 12 | 27 | 7 | 16 | 46 | 2 | 71 | 11 | 16 | 84 | 13 | 73 | 2 | 15 | 88 | 14 | 73 | 3 | 22 | 90 | 69 | 308 | 377 |
| Total | 43 | 100 | 22 | 58 | 165 | 10 | 298 | 67 | 82 | 375 | 62 | 335 | 24 | 69 | 421 | 35 | 238 | 14 | 70 | 287 | 279 | 1248 | 1527 |
| 17:00 | 29 | 41 | 13 | 20 | 83 | 3 | 78 | 7 | 27 | 88 | 17 | 87 | 4 | 13 | 108 | 14 | 91 | 3 | 34 | 108 | 94 | 387 | 481 |
| 17:15 | 24 | 43 | 9 | 15 | 76 | 4 | 101 | 8 | 14 | 113 | 14 | 108 | 2 | 30 | 124 | 19 | 93 | 0 | 25 | 112 | 84 | 425 | 509 |
| 17:30 | 21 | 35 | 13 | 16 | 69 | 4 | 76 | 9 | 40 | 89 | 17 | 89 | 6 | 14 | 112 | 13 | 77 | 1 | 52 | 91 | 122 | 361 | 483 |
| 17:45 | 21 | 30 | 7 | 31 | 58 | 5 | 80 | 13 | 35 | 98 | 10 | 88 | 9 | 31 | 107 | 15 | 98 | 3 | 50 | 116 | 147 | 379 | 526 |
| Total | 95 | 149 | 42 | 82 | 286 | 16 | 335 | 37 | 116 | 388 | 58 | 372 | 21 | 88 | 451 | 61 | 359 | 7 | 161 | 427 | 447 | 1552 | 1999 |
| Grand Total | 181 | 354 | 96 | 271 | 631 | 41 | 1195 | 243 | 376 | 1479 | 213 | 1293 | 80 | 273 | 1586 | 146 | 829 | 34 | 323 | 1009 | 1243 | 4705 | 5948 |
| Apprch % | 28.7 | 56.1 | 15.2 | | | 2.8 | 80.8 | 16.4 | | | 13.4 | 81.5 | 5 | | | 14.5 | 82.2 | 3.4 | | | | | |
| Total % | 3.8 | 7.5 | 2 | | 13.4 | 0.9 | 25.4 | 5.2 | | 31.4 | 4.5 | 27.5 | 1.7 | | 33.7 | 3.1 | 17.6 | 0.7 | | 21.4 | 20.9 | 79.1 | |

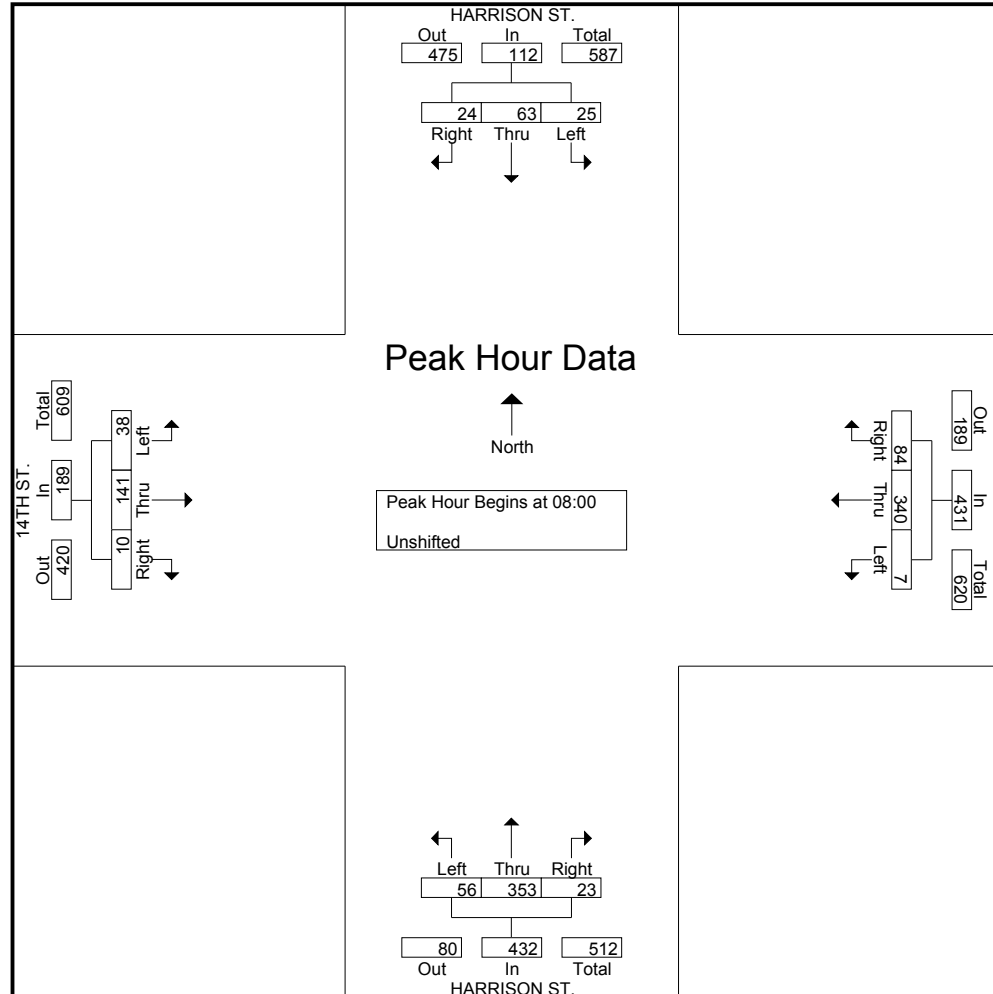
| | HARRISON ST.
Southbound | | | | 14TH ST.
Westbound | | | | HARRISON ST.
Northbound | | | | 14TH ST.
Eastbound | | | | |
|--|----------------------------|------|-------|------------|-----------------------|------|-------|------------|----------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 3 | 16 | 7 | 26 | 2 | 78 | 17 | 97 | 12 | 82 | 4 | 98 | 11 | 22 | 1 | 34 | 255 |
| 08:15 | 6 | 15 | 5 | 26 | 2 | 81 | 25 | 108 | 9 | 98 | 5 | 112 | 11 | 37 | 2 | 50 | 296 |
| 08:30 | 6 | 10 | 6 | 22 | 1 | 93 | 14 | 108 | 16 | 81 | 11 | 108 | 4 | 38 | 0 | 42 | 280 |
| 08:45 | 10 | 22 | 6 | 38 | 2 | 88 | 28 | 118 | 19 | 92 | 3 | 114 | 12 | 44 | 7 | 63 | 333 |
| Total Volume | 25 | 63 | 24 | 112 | 7 | 340 | 84 | 431 | 56 | 353 | 23 | 432 | 38 | 141 | 10 | 189 | 1164 |
| % App. Total | 22.3 | 56.2 | 21.4 | | 1.6 | 78.9 | 19.5 | | 13 | 81.7 | 5.3 | | 20.1 | 74.6 | 5.3 | | |
| PHF | .625 | .716 | .857 | .737 | .875 | .914 | .750 | .913 | .737 | .901 | .523 | .947 | .792 | .801 | .357 | .750 | .874 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-017 HARRISON-14TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 17:00

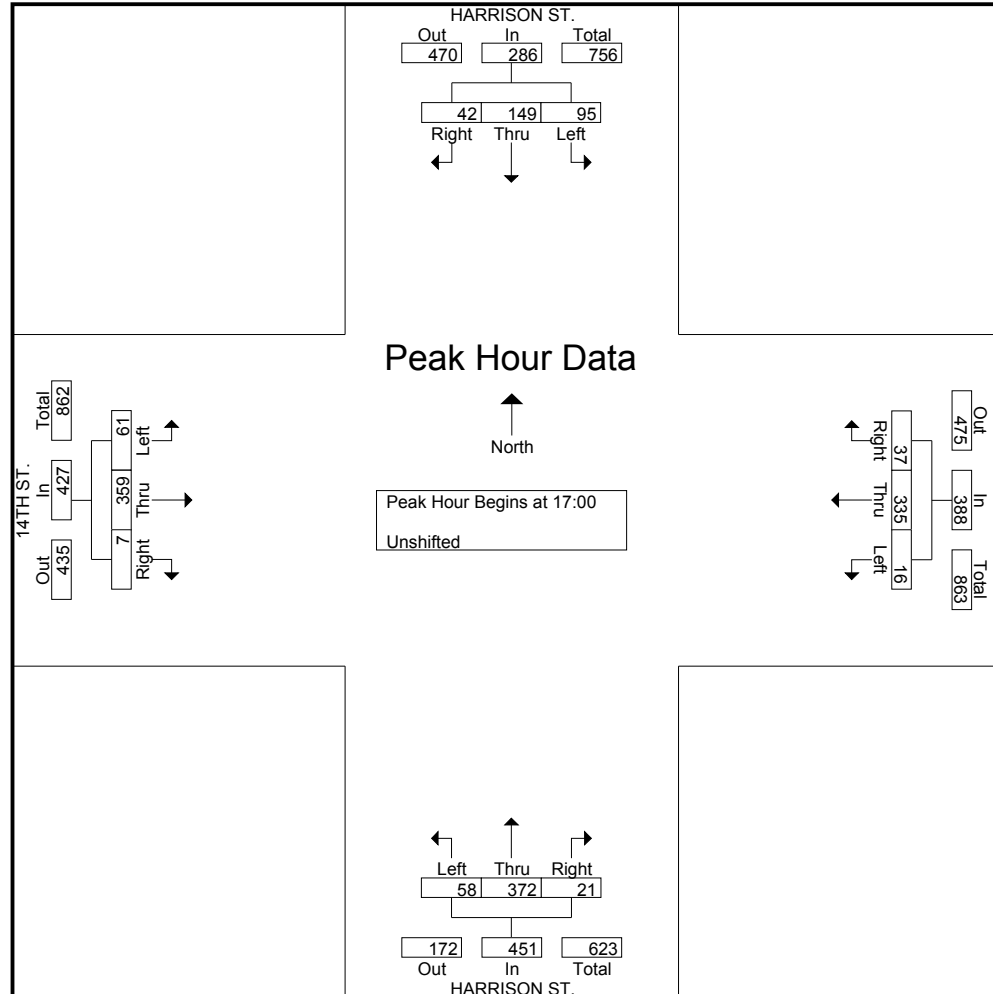
| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 17:00 | 29 | 41 | 13 | 83 | 3 | 78 | 7 | 88 | 17 | 87 | 4 | 108 | 14 | 91 | 3 | 108 | 387 |
| 17:15 | 24 | 43 | 9 | 76 | 4 | 101 | 8 | 113 | 14 | 108 | 2 | 124 | 19 | 93 | 0 | 112 | 425 |
| 17:30 | 21 | 35 | 13 | 69 | 4 | 76 | 9 | 89 | 17 | 89 | 6 | 112 | 13 | 77 | 1 | 91 | 361 |
| 17:45 | 21 | 30 | 7 | 58 | 5 | 80 | 13 | 98 | 10 | 88 | 9 | 107 | 15 | 98 | 3 | 116 | 379 |
| Total Volume | 95 | 149 | 42 | 286 | 16 | 335 | 37 | 388 | 58 | 372 | 21 | 451 | 61 | 359 | 7 | 427 | 1552 |
| % App. Total | 33.2 | 52.1 | 14.7 | | 4.1 | 86.3 | 9.5 | | 12.9 | 82.5 | 4.7 | | 14.3 | 84.1 | 1.6 | | |
| PHF | .819 | .866 | .808 | .861 | .800 | .829 | .712 | .858 | .853 | .861 | .583 | .909 | .803 | .916 | .583 | .920 | .913 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-017 HARRISON-14TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 3



ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Madison St & 12th St

Date: 05/21/2008

| | Madison St Southbound | | | | 12th St Westbound | | | | Madison St Northbound | | | | 12th St Eastbound | | | | Int Total |
|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 7:00 | 0 | 43 | 9 | 52 | 33 | 120 | 0 | 153 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 205 |
| 7:15 | 0 | 57 | 10 | 67 | 64 | 163 | 0 | 227 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 294 |
| 7:30 | 0 | 52 | 17 | 69 | 65 | 230 | 0 | 295 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 364 |
| 7:45 | 0 | 69 | 9 | 78 | 78 | 273 | 0 | 351 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 429 |
| Total | 0 | 221 | 45 | 266 | 240 | 786 | 0 | 1026 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1292 |
| 8:00 | 0 | 80 | 12 | 92 | 79 | 315 | 0 | 394 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 486 |
| 8:15 | 0 | 80 | 20 | 100 | 86 | 315 | 0 | 401 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 501 |
| 8:30 | 0 | 81 | 18 | 99 | 97 | 329 | 0 | 426 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 525 |
| 8:45 | 0 | 75 | 15 | 90 | 91 | 318 | 0 | 409 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 499 |
| Total | 0 | 316 | 65 | 381 | 353 | 1277 | 0 | 1630 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2011 |
| 16:00 | 0 | 120 | 11 | 131 | 50 | 152 | 0 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 333 |
| 16:15 | 0 | 116 | 13 | 129 | 47 | 168 | 0 | 215 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 344 |
| 16:30 | 0 | 127 | 17 | 144 | 62 | 179 | 0 | 241 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 385 |
| 16:45 | 0 | 120 | 24 | 144 | 48 | 188 | 0 | 236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 380 |
| Total | 0 | 483 | 65 | 548 | 207 | 687 | 0 | 894 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1442 |
| 17:00 | 0 | 157 | 11 | 168 | 57 | 202 | 0 | 259 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 427 |
| 17:15 | 0 | 169 | 10 | 179 | 44 | 198 | 0 | 242 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 421 |
| 17:30 | 0 | 129 | 8 | 137 | 54 | 195 | 0 | 249 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 386 |
| 17:45 | 0 | 127 | 9 | 136 | 53 | 191 | 0 | 244 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 380 |
| Total | 0 | 582 | 38 | 620 | 208 | 786 | 0 | 994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1614 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|-------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|------|------|
| Grand Total | 0 | 1602 | 213 | 1815 | 1008 | 3536 | 0 | 4544 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6359 |
| Apprch% | 0.0% | 88.3% | 11.7% | | 22.2% | 77.8% | 0.0% | | 0.0% | 0.0% | 0.0% | 0 | 0.0% | 0.0% | 0.0% | | |
| Total % | 0.0% | 25.2% | 3.3% | 28.5% | 15.9% | 55.6% | 0.0% | 71.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |

City of Oakland

Madison St & 12th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| | Madison St Southbound | | | | 12th St Westbound | | | | Madison St Northbound | | | | 12th St Eastbound | | | | Int Total |
|--------------|-----------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 800 | 0 | 80 | 12 | 92 | 79 | 315 | 0 | 394 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 486 |
| 815 | 0 | 80 | 20 | 100 | 86 | 315 | 0 | 401 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 501 |
| 830 | 0 | 81 | 18 | 99 | 97 | 329 | 0 | 426 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 525 |
| 845 | 0 | 75 | 15 | 90 | 91 | 318 | 0 | 409 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 499 |
| Total Volume | 0 | 316 | 65 | 381 | 353 | 1277 | 0 | 1630 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2011 |
| % App Total. | 0.0% | 82.9% | 17.1% | | 21.7% | 78.3% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| PHF | 0.953 | | | | 0.957 | | | | 0.000 | | | | 0.000 | | | | |

PM Peak Hr Begins at 500 PM

| | Madison St Southbound | | | | 12th St Westbound | | | | Madison St Northbound | | | | 12th St Eastbound | | | | Int Total |
|--------------|-----------------------|-------|-------|------------|-------------------|-------|-------|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 500 | 0 | 157 | 11 | 168 | 57 | 202 | 0 | 259 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 427 |
| 515 | 0 | 169 | 10 | 179 | 44 | 198 | 0 | 242 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 421 |
| 530 | 0 | 129 | 8 | 137 | 54 | 195 | 0 | 249 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 386 |
| 545 | 0 | 127 | 9 | 136 | 53 | 191 | 0 | 244 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 380 |
| Total Volume | 0 | 582 | 38 | 620 | 208 | 786 | 0 | 994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1614 |
| % App Total. | 0.0% | 93.9% | 6.1% | | 20.9% | 79.1% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| PHF | 0.866 | | | | 0.959 | | | | 0.000 | | | | 0.000 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Oak St & 12th St

Date: 05/21/2008

| Start Time | Oak St Southbound | | | | 12th St Westbound | | | | Oak St Northbound | | | | 12th St Eastbound | | | | Int Total |
|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 7:00 | 0 | 0 | 0 | 0 | 0 | 140 | 5 | 145 | 18 | 92 | 0 | 110 | 0 | 0 | 0 | 0 | 255 |
| 7:15 | 0 | 0 | 0 | 0 | 0 | 199 | 4 | 203 | 30 | 110 | 0 | 140 | 0 | 0 | 0 | 0 | 343 |
| 7:30 | 0 | 0 | 0 | 0 | 0 | 265 | 8 | 273 | 45 | 134 | 0 | 179 | 0 | 0 | 0 | 0 | 452 |
| 7:45 | 0 | 0 | 0 | 0 | 0 | 300 | 11 | 311 | 65 | 170 | 0 | 235 | 0 | 0 | 0 | 0 | 546 |
| Total | 0 | 0 | 0 | 0 | 0 | 904 | 28 | 932 | 158 | 506 | 0 | 664 | 0 | 0 | 0 | 0 | 1596 |
| 8:00 | 0 | 0 | 0 | 0 | 0 | 346 | 18 | 364 | 71 | 146 | 0 | 217 | 0 | 0 | 0 | 0 | 581 |
| 8:15 | 0 | 0 | 0 | 0 | 0 | 362 | 16 | 378 | 64 | 181 | 0 | 245 | 0 | 0 | 0 | 0 | 623 |
| 8:30 | 0 | 0 | 0 | 0 | 0 | 368 | 19 | 387 | 74 | 161 | 0 | 235 | 0 | 0 | 0 | 0 | 622 |
| 8:45 | 0 | 0 | 0 | 0 | 0 | 355 | 13 | 368 | 66 | 180 | 0 | 246 | 0 | 0 | 0 | 0 | 614 |
| Total | 0 | 0 | 0 | 0 | 0 | 1431 | 66 | 1497 | 275 | 668 | 0 | 943 | 0 | 0 | 0 | 0 | 2440 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 162 | 11 | 173 | 36 | 161 | 0 | 197 | 0 | 0 | 0 | 0 | 370 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 197 | 9 | 206 | 29 | 133 | 0 | 162 | 0 | 0 | 0 | 0 | 368 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 205 | 10 | 215 | 34 | 171 | 0 | 205 | 0 | 0 | 0 | 0 | 420 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 207 | 9 | 216 | 32 | 173 | 0 | 205 | 0 | 0 | 0 | 0 | 421 |
| Total | 0 | 0 | 0 | 0 | 0 | 771 | 39 | 810 | 131 | 638 | 0 | 769 | 0 | 0 | 0 | 0 | 1579 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 222 | 12 | 234 | 45 | 220 | 0 | 265 | 0 | 0 | 0 | 0 | 499 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 203 | 16 | 219 | 41 | 215 | 0 | 256 | 0 | 0 | 0 | 0 | 475 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 210 | 12 | 222 | 36 | 198 | 0 | 234 | 0 | 0 | 0 | 0 | 456 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 213 | 10 | 223 | 27 | 189 | 0 | 216 | 0 | 0 | 0 | 0 | 439 |
| Total | 0 | 0 | 0 | 0 | 0 | 848 | 50 | 898 | 149 | 822 | 0 | 971 | 0 | 0 | 0 | 0 | 1869 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|------|------|------|------|-------|------|-------|-------|-------|------|-------|------|------|------|------|------|
| Grand Total | 0 | 0 | 0 | 0 | 0 | 3954 | 183 | 4137 | 713 | 2634 | 0 | 3347 | 0 | 0 | 0 | 0 | 7484 |
| Apprch% | 0.0% | 0.0% | 0.0% | | 0.0% | 95.6% | 4.4% | | 21.3% | 78.7% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| Total % | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 52.8% | 2.4% | 55.3% | 9.5% | 35.2% | 0.0% | 44.7% | 0.0% | 0.0% | 0.0% | 0.0% | |

City of Oakland

Oak St & 12th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| Start Time | Oak St Southbound | | | | 12th St Westbound | | | | Oak St Northbound | | | | 12th St Eastbound | | | | Int Total |
|--------------|-------------------|------|-------|------------|-------------------|-------|-------|------------|-------------------|-------|-------|------------|-------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 800 | 0 | 0 | 0 | 0 | 0 | 346 | 18 | 364 | 71 | 146 | 0 | 217 | 0 | 0 | 0 | 0 | 581 |
| 815 | 0 | 0 | 0 | 0 | 0 | 362 | 16 | 378 | 64 | 181 | 0 | 245 | 0 | 0 | 0 | 0 | 623 |
| 830 | 0 | 0 | 0 | 0 | 0 | 368 | 19 | 387 | 74 | 161 | 0 | 235 | 0 | 0 | 0 | 0 | 622 |
| 845 | 0 | 0 | 0 | 0 | 0 | 355 | 13 | 368 | 66 | 180 | 0 | 246 | 0 | 0 | 0 | 0 | 614 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 1431 | 66 | 1497 | 275 | 668 | 0 | 943 | 0 | 0 | 0 | 0 | 2440 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 95.6% | 4.4% | | 29.2% | 70.8% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| PHF | 0.000 | | | | 0.967 | | | | 0.958 | | | | 0.000 | | | | |

PM Peak Hr Begins at 500 PM

| Start Time | Oak St Southbound | | | | 12th St Westbound | | | | Oak St Northbound | | | | 12th St Eastbound | | | | Int Total |
|--------------|-------------------|------|-------|------------|-------------------|-------|-------|------------|-------------------|-------|-------|------------|-------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 500 | 0 | 0 | 0 | 0 | 0 | 222 | 12 | 234 | 45 | 220 | 0 | 265 | 0 | 0 | 0 | 0 | 499 |
| 515 | 0 | 0 | 0 | 0 | 0 | 203 | 16 | 219 | 41 | 215 | 0 | 256 | 0 | 0 | 0 | 0 | 475 |
| 530 | 0 | 0 | 0 | 0 | 0 | 210 | 12 | 222 | 36 | 198 | 0 | 234 | 0 | 0 | 0 | 0 | 456 |
| 545 | 0 | 0 | 0 | 0 | 0 | 213 | 10 | 223 | 27 | 189 | 0 | 216 | 0 | 0 | 0 | 0 | 439 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 848 | 50 | 898 | 149 | 822 | 0 | 971 | 0 | 0 | 0 | 0 | 1869 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 94.4% | 5.6% | | 15.3% | 84.7% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| PHF | 0.000 | | | | 0.959 | | | | 0.916 | | | | 0.000 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Oak St & 11th St

Date: 05/21/2008

| | Oak St Southbound | | | | 11th St Westbound | | | | Oak St Northbound | | | | 11th St Eastbound | | | | |
|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 109 | 0 | 109 | 2 | 0 | 0 | 2 | 111 |
| 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 132 | 0 | 132 | 4 | 0 | 0 | 4 | 136 |
| 7:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 172 | 0 | 172 | 6 | 0 | 0 | 6 | 178 |
| 7:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 219 | 0 | 219 | 10 | 0 | 0 | 10 | 229 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 632 | 0 | 632 | 22 | 0 | 0 | 22 | 654 |
| 8:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 0 | 220 | 11 | 0 | 0 | 11 | 231 |
| 8:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 229 | 0 | 229 | 14 | 0 | 0 | 14 | 243 |
| 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 225 | 0 | 225 | 16 | 0 | 0 | 16 | 241 |
| 8:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 229 | 0 | 229 | 15 | 0 | 0 | 15 | 244 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 903 | 0 | 903 | 56 | 0 | 0 | 56 | 959 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 181 | 0 | 181 | 16 | 0 | 0 | 16 | 197 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 149 | 0 | 149 | 10 | 0 | 0 | 10 | 159 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 194 | 0 | 194 | 8 | 0 | 0 | 8 | 202 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 196 | 0 | 196 | 10 | 0 | 0 | 10 | 206 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 720 | 0 | 720 | 44 | 0 | 0 | 44 | 764 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 244 | 0 | 244 | 20 | 0 | 0 | 20 | 264 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 235 | 0 | 235 | 17 | 0 | 0 | 17 | 252 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 221 | 0 | 221 | 11 | 0 | 0 | 11 | 232 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 0 | 201 | 9 | 0 | 0 | 9 | 210 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 901 | 0 | 901 | 57 | 0 | 0 | 57 | 958 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|------|------|------|------|------|------|------|------|--------|------|-------|-------|------|------|------|------|
| Grand Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3156 | 0 | 3156 | 179 | 0 | 0 | 179 | 3335 |
| Apprch% | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | ##### | 0.0% | 0.0% | | |
| Total % | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 94.6% | 0.0% | 94.6% | 5.4% | 0.0% | 0.0% | 5.4% | |

City of Oakland

Oak St & 11th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| | Oak St Southbound | | | | 11th St Westbound | | | | Oak St Northbound | | | | 11th St Eastbound | | | | |
|--------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|--------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 0 | 220 | 11 | 0 | 0 | 11 | 231 |
| 815 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 229 | 0 | 229 | 14 | 0 | 0 | 14 | 243 |
| 830 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 225 | 0 | 225 | 16 | 0 | 0 | 16 | 241 |
| 845 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 229 | 0 | 229 | 15 | 0 | 0 | 15 | 244 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 903 | 0 | 903 | 56 | 0 | 0 | 56 | 959 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | ##### | 0.0% | 0.0% | | |
| PHF | 0.000 | | | | 0.000 | | | | 0.986 | | | | 0.875 | | | | |

PM Peak Hr Begins at 500 PM

| | Oak St Southbound | | | | 11th St Westbound | | | | Oak St Northbound | | | | 11th St Eastbound | | | | |
|--------------|-------------------|------|-------|------------|-------------------|------|-------|------------|-------------------|--------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 244 | 0 | 244 | 20 | 0 | 0 | 20 | 264 |
| 515 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 235 | 0 | 235 | 17 | 0 | 0 | 17 | 252 |
| 530 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 221 | 0 | 221 | 11 | 0 | 0 | 11 | 232 |
| 545 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 0 | 201 | 9 | 0 | 0 | 9 | 210 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 901 | 0 | 901 | 57 | 0 | 0 | 57 | 958 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 100.0% | 0.0% | | ##### | 0.0% | 0.0% | | |
| PHF | 0.000 | | | | 0.000 | | | | 0.923 | | | | 0.713 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Madison St & 11th St

Date: 05/21/2008

| | Madison St Southbound | | | | 11th St Westbound | | | | Madison St Northbound | | | | 11th St Eastbound | | | | |
|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------------------|------|-------|------------|-------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 3 | 73 | 0 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 6 | 35 | 111 |
| 7:15 | 2 | 114 | 0 | 116 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 14 | 44 | 160 |
| 7:30 | 3 | 112 | 0 | 115 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 | 15 | 61 | 176 |
| 7:45 | 2 | 163 | 0 | 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67 | 25 | 92 | 257 |
| Total | 10 | 462 | 0 | 472 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 172 | 60 | 232 | 704 |
| 8:00 | 1 | 160 | 0 | 161 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 30 | 112 | 273 |
| 8:15 | 9 | 161 | 0 | 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 91 | 30 | 121 | 291 |
| 8:30 | 10 | 172 | 0 | 182 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 98 | 36 | 134 | 316 |
| 8:45 | 9 | 159 | 0 | 168 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 26 | 87 | 255 |
| Total | 29 | 652 | 0 | 681 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 332 | 122 | 454 | 1135 |
| 16:00 | 12 | 160 | 0 | 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 140 | 32 | 172 | 344 |
| 16:15 | 9 | 144 | 0 | 153 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 125 | 27 | 152 | 305 |
| 16:30 | 17 | 188 | 0 | 205 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 158 | 43 | 201 | 406 |
| 16:45 | 11 | 153 | 0 | 164 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 151 | 32 | 183 | 347 |
| Total | 49 | 645 | 0 | 694 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 574 | 134 | 708 | 1402 |
| 17:00 | 13 | 198 | 0 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 181 | 35 | 216 | 427 |
| 17:15 | 15 | 195 | 0 | 210 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 194 | 41 | 235 | 445 |
| 17:30 | 7 | 162 | 0 | 169 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 198 | 39 | 237 | 406 |
| 17:45 | 8 | 174 | 0 | 182 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 | 47 | 234 | 416 |
| Total | 43 | 729 | 0 | 772 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 760 | 162 | 922 | 1694 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|------|-------|------|------|------|------|------|------|------|------|------|-------|-------|-------|------|
| Grand Total | 131 | 2488 | 0 | 2619 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1838 | 478 | 2316 | 4935 |
| Apprch% | 5.0% | 95.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 79.4% | 20.6% | | |
| Total % | 2.7% | 50.4% | 0.0% | 53.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 37.2% | 9.7% | 46.9% | |

City of Oakland

Madison St & 11th St

Date: 05/21/2008

AM Peak Hr Begins at 745 AM

| | Madison St Southbound | | | | 11th St Westbound | | | | Madison St Northbound | | | | 11th St Eastbound | | | | |
|--------------|-----------------------|-------|-------|------------|-------------------|------|-------|------------|-----------------------|------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 745 | 2 | 163 | 0 | 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67 | 25 | 92 | 257 |
| 800 | 1 | 160 | 0 | 161 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 30 | 112 | 273 |
| 815 | 9 | 161 | 0 | 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 91 | 30 | 121 | 291 |
| 830 | 10 | 172 | 0 | 182 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 98 | 36 | 134 | 316 |
| Total Volume | 22 | 656 | 0 | 678 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 338 | 121 | 459 | 1137 |
| % App Total. | 3.2% | 96.8% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 73.6% | 26.4% | | |
| PHF | 0.931 | | | | 0.000 | | | | 0.000 | | | | 0.856 | | | | |

PM Peak Hr Begins at 500 PM

| | Madison St Southbound | | | | 11th St Westbound | | | | Madison St Northbound | | | | 11th St Eastbound | | | | |
|--------------|-----------------------|-------|-------|------------|-------------------|------|-------|------------|-----------------------|------|-------|------------|-------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 500 | 13 | 198 | 0 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 181 | 35 | 216 | 427 |
| 515 | 15 | 195 | 0 | 210 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 194 | 41 | 235 | 445 |
| 530 | 7 | 162 | 0 | 169 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 198 | 39 | 237 | 406 |
| 545 | 8 | 174 | 0 | 182 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 | 47 | 234 | 416 |
| Total Volume | 43 | 729 | 0 | 772 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 760 | 162 | 922 | 1694 |
| % App Total. | 5.6% | 94.4% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 82.4% | 17.6% | | |
| PHF | 0.915 | | | | 0.000 | | | | 0.000 | | | | 0.973 | | | | |

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-020 FRANKLIN-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

Groups Printed- Unshifted

| | FRANKLIN ST.
Southbound | | | | | 11TH ST.
Westbound | | | | | FRANKLIN ST.
Northbound | | | | | 11TH ST.
Eastbound | | | | | Exclu. Total | Inclu. Total | Int. Total |
|---------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|----------------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|--------------|--------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | | | |
| 07:00 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 25 | 9 | 13 | 34 | 20 | 41 | 0 | 14 | 61 | 60 | 95 | 155 |
| 07:15 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 42 | 14 | 20 | 56 | 19 | 61 | 0 | 18 | 80 | 75 | 136 | 211 |
| 07:30 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 56 | 11 | 27 | 67 | 18 | 58 | 0 | 22 | 76 | 106 | 143 | 249 |
| 07:45 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 61 | 14 | 17 | 75 | 20 | 64 | 0 | 24 | 84 | 93 | 159 | 252 |
| Total | 0 | 0 | 0 | 84 | 0 | 0 | 0 | 0 | 95 | 0 | 0 | 184 | 48 | 77 | 232 | 77 | 224 | 0 | 78 | 301 | 334 | 533 | 867 |
| 08:00 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 63 | 12 | 21 | 75 | 20 | 83 | 0 | 37 | 103 | 137 | 178 | 315 |
| 08:15 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 94 | 11 | 2 | 105 | 23 | 82 | 0 | 21 | 105 | 77 | 210 | 287 |
| 08:30 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 59 | 15 | 12 | 74 | 13 | 92 | 0 | 14 | 105 | 63 | 179 | 242 |
| 08:45 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 63 | 12 | 8 | 75 | 17 | 85 | 0 | 20 | 102 | 76 | 177 | 253 |
| Total | 0 | 0 | 0 | 105 | 0 | 0 | 0 | 0 | 113 | 0 | 0 | 279 | 50 | 43 | 329 | 73 | 342 | 0 | 92 | 415 | 353 | 744 | 1097 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 2 | 0 | 6 | 75 | 14 | 8 | 95 | 1 | 131 | 0 | 17 | 132 | 46 | 227 | 273 |
| 16:15 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 52 | 29 | 35 | 81 | 2 | 121 | 0 | 37 | 123 | 119 | 204 | 323 |
| 16:30 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 47 | 27 | 51 | 74 | 2 | 120 | 0 | 47 | 122 | 154 | 196 | 350 |
| 16:45 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 53 | 21 | 69 | 74 | 4 | 129 | 0 | 40 | 133 | 178 | 207 | 385 |
| Total | 0 | 0 | 0 | 159 | 0 | 0 | 0 | 0 | 34 | 0 | 6 | 227 | 91 | 163 | 324 | 9 | 501 | 0 | 141 | 510 | 497 | 834 | 1331 |
| 17:00 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 63 | 28 | 42 | 91 | 4 | 152 | 0 | 24 | 156 | 125 | 247 | 372 |
| 17:15 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 61 | 29 | 16 | 90 | 8 | 173 | 0 | 21 | 181 | 73 | 271 | 344 |
| 17:30 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 65 | 27 | 21 | 92 | 5 | 157 | 0 | 22 | 162 | 79 | 254 | 333 |
| 17:45 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 77 | 28 | 27 | 105 | 3 | 123 | 0 | 25 | 126 | 92 | 231 | 323 |
| Total | 0 | 0 | 0 | 137 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 266 | 112 | 106 | 378 | 20 | 605 | 0 | 92 | 625 | 369 | 1003 | 1372 |
| Grand Total | 0 | 0 | 0 | 485 | 0 | 0 | 0 | 0 | 276 | 0 | 6 | 956 | 301 | 389 | 1263 | 179 | 1672 | 0 | 403 | 1851 | 1553 | 3114 | 4667 |
| Apprch % | 0 | 0 | 0 | | | 0 | 0 | 0 | | | 0.5 | 75.7 | 23.8 | | | 9.7 | 90.3 | 0 | | | | | |
| Total % | 0 | 0 | 0 | | | 0 | 0 | 0 | | | 0.2 | 30.7 | 9.7 | | 40.6 | 5.7 | 53.7 | 0 | | 59.4 | 33.3 | 66.7 | |

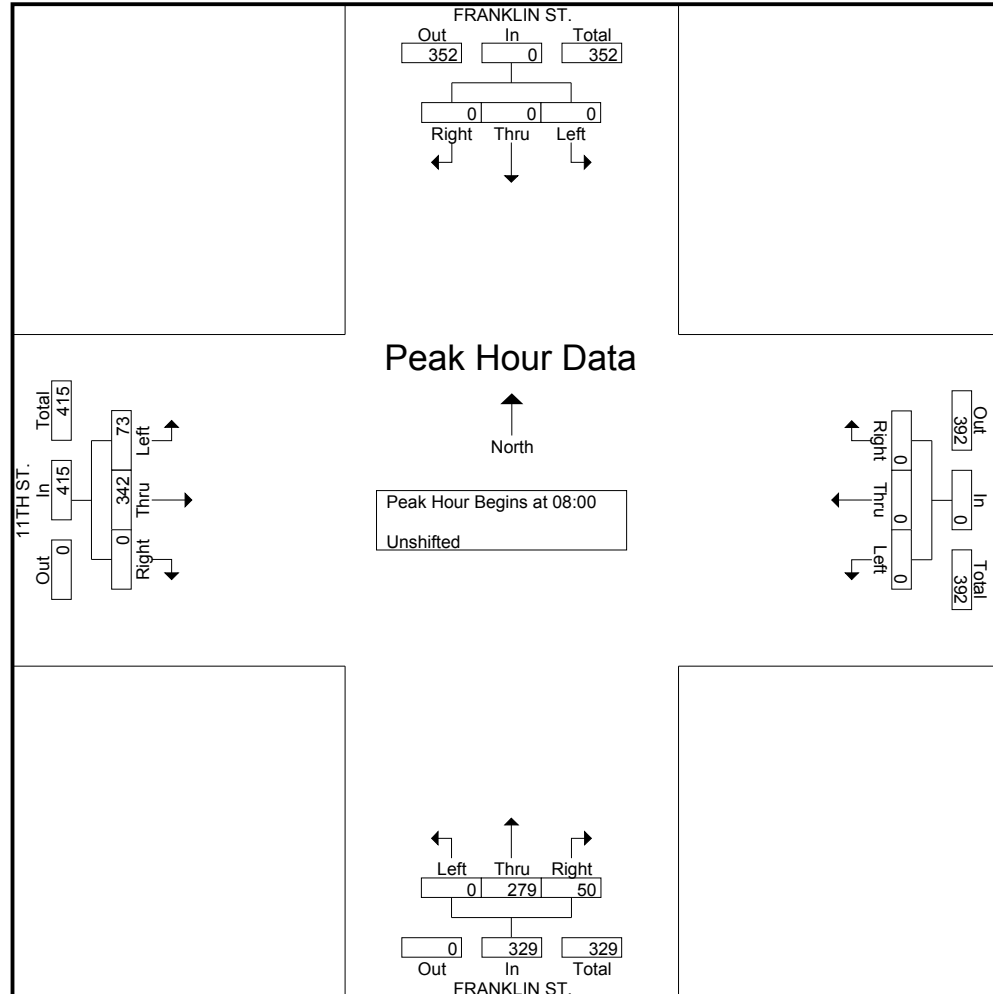
| | FRANKLIN ST.
Southbound | | | | 11TH ST.
Westbound | | | | FRANKLIN ST.
Northbound | | | | 11TH ST.
Eastbound | | | | |
|--|----------------------------|------|-------|------------|-----------------------|------|-------|------------|----------------------------|------|-------|------------|-----------------------|------|-------|------------|------------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63 | 12 | 75 | 20 | 83 | 0 | 103 | 178 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 | 11 | 105 | 23 | 82 | 0 | 105 | 210 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 59 | 15 | 74 | 13 | 92 | 0 | 105 | 179 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63 | 12 | 75 | 17 | 85 | 0 | 102 | 177 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 279 | 50 | 329 | 73 | 342 | 0 | 415 | 744 |
| % App. Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 84.8 | 15.2 | | 17.6 | 82.4 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .742 | .833 | .783 | .793 | .929 | .000 | .988 | .886 |

All Traffic Data

(916) 771-8700
F (916) 786-2879

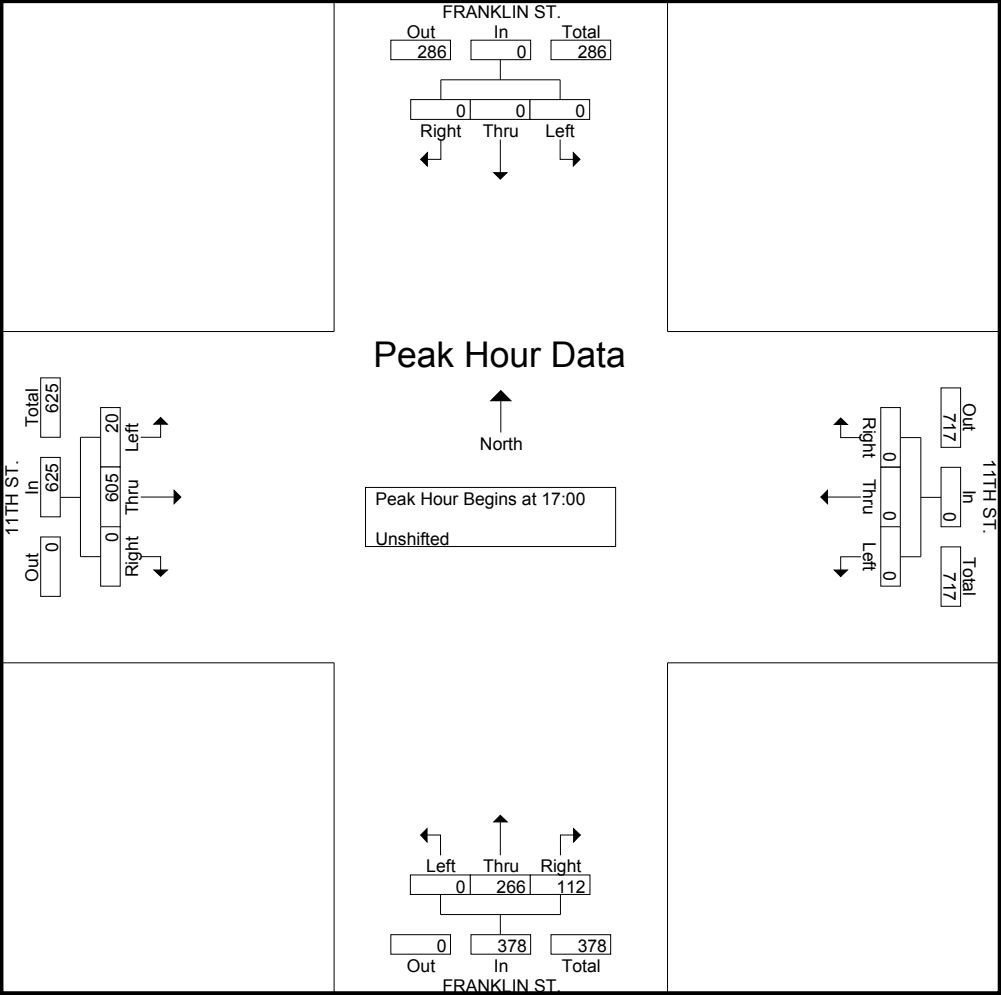
OAKLAND

File Name : 08-7458-020 FRANKLIN-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

| | | | | | | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|-----------|-----------|------------|----------|------------|------|------------|------------|
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63 | 28 | 91 | 4 | 152 | 0 | 156 | 247 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 29 | 90 | 8 | 173 | 0 | 181 | 271 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 27 | 92 | 5 | 157 | 0 | 162 | 254 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 77 | 28 | 105 | 3 | 123 | 0 | 126 | 231 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 266 | 112 | 378 | 20 | 605 | 0 | 625 | 1003 |
| % App. Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 70.4 | 29.6 | 378 | 3.2 | 96.8 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .864 | .966 | .900 | .625 | .874 | .000 | .863 | .925 |



ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Oak St & 7th St

Date: 05/21/2008

| | Oak St Southbound | | | | 7th St Westbound | | | | Oak St Northbound | | | | 7th St Eastbound | | | | |
|------------|-------------------|------|-------|------------|------------------|------|-------|------------|-------------------|------|-------|------------|------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 125 | 18 | 143 | 13 | 55 | 0 | 68 | 211 |
| 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 137 | 25 | 162 | 14 | 55 | 0 | 69 | 231 |
| 7:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 192 | 36 | 228 | 23 | 84 | 0 | 107 | 335 |
| 7:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 49 | 250 | 22 | 131 | 0 | 153 | 403 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 655 | 128 | 783 | 72 | 325 | 0 | 397 | 1180 |
| 8:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 218 | 53 | 271 | 28 | 98 | 0 | 126 | 397 |
| 8:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 277 | 44 | 321 | 31 | 133 | 0 | 164 | 485 |
| 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 63 | 283 | 30 | 127 | 0 | 157 | 440 |
| 8:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 223 | 87 | 310 | 26 | 125 | 0 | 151 | 461 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 938 | 247 | 1185 | 115 | 483 | 0 | 598 | 1783 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 158 | 45 | 203 | 34 | 139 | 0 | 173 | 376 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 140 | 40 | 180 | 15 | 151 | 0 | 166 | 346 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 162 | 43 | 205 | 39 | 183 | 0 | 222 | 427 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 162 | 59 | 221 | 34 | 170 | 0 | 204 | 425 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 622 | 187 | 809 | 122 | 643 | 0 | 765 | 1574 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 202 | 85 | 287 | 44 | 230 | 0 | 274 | 561 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 208 | 85 | 293 | 36 | 229 | 0 | 265 | 558 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 191 | 86 | 277 | 41 | 219 | 0 | 260 | 537 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 184 | 73 | 257 | 28 | 219 | 0 | 247 | 504 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 785 | 329 | 1114 | 149 | 897 | 0 | 1046 | 2160 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|------|-------|------|
| Grand Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3000 | 891 | 3891 | 458 | 2348 | 0 | 2806 | 6697 |
| Apprch% | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 77.1% | 22.9% | | 16.3% | 83.7% | 0.0% | | |
| Total % | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 44.8% | 13.3% | 58.1% | 6.8% | 35.1% | 0.0% | 41.9% | |

City of Oakland

Oak St & 7th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| | Oak St Southbound | | | | 7th St Westbound | | | | Oak St Northbound | | | | 7th St Eastbound | | | | |
|--------------|-------------------|------|-------|------------|------------------|------|-------|------------|-------------------|-------|-------|------------|------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 218 | 53 | 271 | 28 | 98 | 0 | 126 | 397 |
| 815 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 277 | 44 | 321 | 31 | 133 | 0 | 164 | 485 |
| 830 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 63 | 283 | 30 | 127 | 0 | 157 | 440 |
| 845 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 223 | 87 | 310 | 26 | 125 | 0 | 151 | 461 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 938 | 247 | 1185 | 115 | 483 | 0 | 598 | 1783 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 79.2% | 20.8% | | 19.2% | 80.8% | 0.0% | | |
| PHF | 0.000 | | | | 0.000 | | | | 0.923 | | | | 0.912 | | | | |

PM Peak Hr Begins at 500 PM

| | Oak St Southbound | | | | 7th St Westbound | | | | Oak St Northbound | | | | 7th St Eastbound | | | | |
|--------------|-------------------|------|-------|------------|------------------|------|-------|------------|-------------------|-------|-------|------------|------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 202 | 85 | 287 | 44 | 230 | 0 | 274 | 561 |
| 515 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 208 | 85 | 293 | 36 | 229 | 0 | 265 | 558 |
| 530 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 191 | 86 | 277 | 41 | 219 | 0 | 260 | 537 |
| 545 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 184 | 73 | 257 | 28 | 219 | 0 | 247 | 504 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 785 | 329 | 1114 | 149 | 897 | 0 | 1046 | 2160 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 70.5% | 29.5% | | 14.2% | 85.8% | 0.0% | | |
| PHF | 0.000 | | | | 0.000 | | | | 0.951 | | | | 0.954 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Madison St & 7th St

Date: 05/21/2008

| | Madison St Southbound | | | | 7th St Westbound | | | | Madison St Northbound | | | | 7th St Eastbound | | | | |
|------------|-----------------------|------|-------|------------|------------------|------|-------|------------|-----------------------|------|-------|------------|------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 13 | 100 | 0 | 113 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 68 | 122 | 235 |
| 7:15 | 12 | 113 | 0 | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 56 | 99 | 155 | 280 |
| 7:30 | 21 | 125 | 0 | 146 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 90 | 78 | 168 | 314 |
| 7:45 | 39 | 134 | 0 | 173 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 102 | 70 | 172 | 345 |
| Total | 85 | 472 | 0 | 557 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 302 | 315 | 617 | 1174 |
| 8:00 | 29 | 134 | 0 | 163 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 | 61 | 155 | 318 |
| 8:15 | 35 | 130 | 0 | 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 122 | 50 | 172 | 337 |
| 8:30 | 30 | 131 | 0 | 161 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 127 | 59 | 186 | 347 |
| 8:45 | 31 | 129 | 0 | 160 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 126 | 70 | 196 | 356 |
| Total | 125 | 524 | 0 | 649 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 469 | 240 | 709 | 1358 |
| 16:00 | 26 | 166 | 0 | 192 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 138 | 75 | 213 | 405 |
| 16:15 | 24 | 134 | 0 | 158 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 140 | 72 | 212 | 370 |
| 16:30 | 36 | 170 | 0 | 206 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 177 | 64 | 241 | 447 |
| 16:45 | 42 | 131 | 0 | 173 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 162 | 57 | 219 | 392 |
| Total | 128 | 601 | 0 | 729 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 617 | 268 | 885 | 1614 |
| 17:00 | 68 | 185 | 0 | 253 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 65 | 266 | 519 |
| 17:15 | 64 | 175 | 0 | 239 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 206 | 58 | 264 | 503 |
| 17:30 | 57 | 170 | 0 | 227 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 57 | 258 | 485 |
| 17:45 | 48 | 174 | 0 | 222 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 204 | 58 | 262 | 484 |
| Total | 237 | 704 | 0 | 941 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 812 | 238 | 1050 | 1991 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|------|-------|------|------|------|------|------|------|------|------|------|-------|-------|-------|------|
| Grand Total | 575 | 2301 | 0 | 2876 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2200 | 1061 | 3261 | 6137 |
| Apprch% | #### | 80.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 67.5% | 32.5% | | |
| Total % | 9.4% | 37.5% | 0.0% | 46.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 35.8% | 17.3% | 53.1% | |

City of Oakland

Madison St & 7th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| | Madison St Southbound | | | | 7th St Westbound | | | | Madison St Northbound | | | | 7th St Eastbound | | | | |
|--------------|-----------------------|-------|-------|------------|------------------|------|-------|------------|-----------------------|------|-------|------------|------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 29 | 134 | 0 | 163 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 | 61 | 155 | 318 |
| 815 | 35 | 130 | 0 | 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 122 | 50 | 172 | 337 |
| 830 | 30 | 131 | 0 | 161 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 127 | 59 | 186 | 347 |
| 845 | 31 | 129 | 0 | 160 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 126 | 70 | 196 | 356 |
| Total Volume | 125 | 524 | 0 | 649 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 469 | 240 | 709 | 1358 |
| % App Total. | #### | 80.7% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 66.1% | 33.9% | | |
| PHF | 0.983 | | | | 0.000 | | | | 0.000 | | | | 0.904 | | | | |

PM Peak Hr Begins at 500 PM

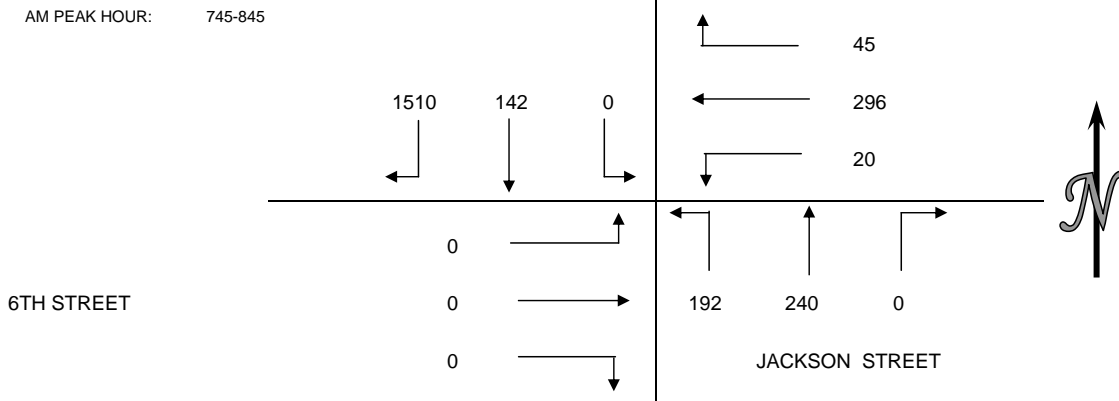
| | Madison St Southbound | | | | 7th St Westbound | | | | Madison St Northbound | | | | 7th St Eastbound | | | | |
|--------------|-----------------------|-------|-------|------------|------------------|------|-------|------------|-----------------------|------|-------|------------|------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 500 | 68 | 185 | 0 | 253 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 65 | 266 | 519 |
| 515 | 64 | 175 | 0 | 239 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 206 | 58 | 264 | 503 |
| 530 | 57 | 170 | 0 | 227 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 57 | 258 | 485 |
| 545 | 48 | 174 | 0 | 222 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 204 | 58 | 262 | 484 |
| Total Volume | 237 | 704 | 0 | 941 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 812 | 238 | 1050 | 1991 |
| % App Total. | #### | 74.8% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 77.3% | 22.7% | | |
| PHF | 0.930 | | | | 0.000 | | | | 0.000 | | | | 0.987 | | | | |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: THURSDAY OCTOBER 23, 2008
 PERIOD: 7:00 AM TO 9:00 AM
 INTERSECTION: N/S JACKSON STREET
 E/W 6TH STREET
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-715 | 277 | 19 | 0 | 7 | 65 | 3 | 0 | 33 | 38 | 0 | 0 | 0 | 442 |
| 715-730 | 373 | 36 | 0 | 10 | 71 | 6 | 0 | 33 | 43 | 0 | 0 | 0 | 572 |
| 730-745 | 336 | 19 | 0 | 9 | 81 | 2 | 0 | 42 | 61 | 0 | 0 | 0 | 550 |
| 745-800 | 392 | 33 | 0 | 9 | 77 | 5 | 0 | 69 | 57 | 0 | 0 | 0 | 642 |
| 800-815 | 368 | 26 | 0 | 11 | 73 | 5 | 0 | 54 | 47 | 0 | 0 | 0 | 584 |
| 815-830 | 399 | 39 | 0 | 13 | 77 | 3 | 0 | 65 | 41 | 0 | 0 | 0 | 637 |
| 830-845 | 351 | 44 | 0 | 12 | 69 | 7 | 0 | 52 | 47 | 0 | 0 | 0 | 582 |
| 845-900 | 320 | 42 | 0 | 7 | 96 | 5 | 0 | 66 | 50 | 0 | 0 | 0 | 586 |
| HOURLY TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-800 | 1378 | 107 | 0 | 35 | 294 | 16 | 0 | 177 | 199 | 0 | 0 | 0 | 2206 |
| 715-815 | 1469 | 114 | 0 | 39 | 302 | 18 | 0 | 198 | 208 | 0 | 0 | 0 | 2348 |
| 730-830 | 1495 | 117 | 0 | 42 | 308 | 15 | 0 | 230 | 206 | 0 | 0 | 0 | 2413 |
| 745-845 | 1510 | 142 | 0 | 45 | 296 | 20 | 0 | 240 | 192 | 0 | 0 | 0 | 2445 |
| 800-900 | 1438 | 151 | 0 | 43 | 315 | 20 | 0 | 237 | 185 | 0 | 0 | 0 | 2389 |

PHF 0.946115 0.806818 0.865385 0.961039 0.714286 0.869565 0.842105



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 0 | 1 | 0 | 2 | 3 |
| 715-730 | 0 | 8 | 0 | 1 | 9 |
| 730-745 | 0 | 8 | 0 | 0 | 8 |
| 745-800 | 0 | 15 | 1 | 1 | 17 |
| 800-815 | 1 | 19 | 0 | 0 | 20 |
| 815-830 | 1 | 11 | 1 | 0 | 13 |
| 830-845 | 0 | 12 | 0 | 1 | 13 |
| 845-900 | 0 | 14 | 0 | 1 | 15 |
| HOURLY TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 0 | 32 | 1 | 4 | 37 |
| 715-815 | 1 | 50 | 1 | 2 | 54 |
| 730-830 | 2 | 53 | 2 | 1 | 58 |
| 745-845 | 2 | 57 | 2 | 2 | 63 |
| 800-900 | 2 | 56 | 1 | 2 | 61 |

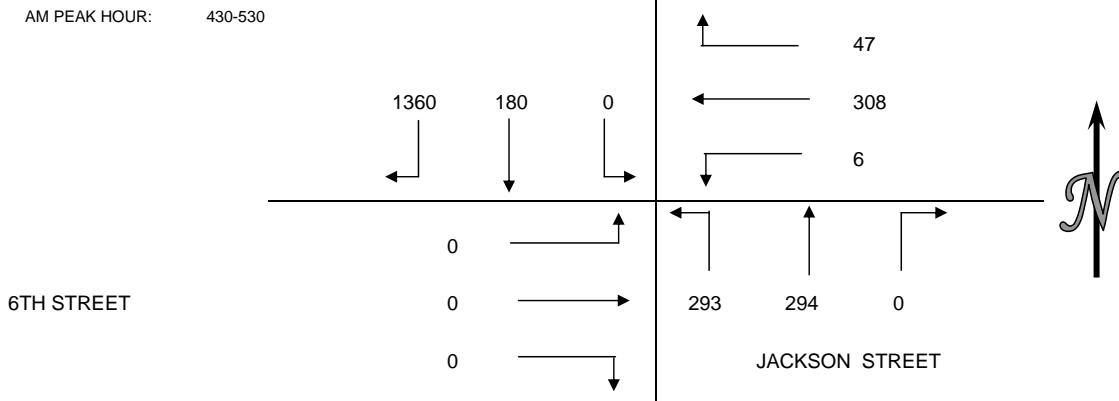
| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 0 | 0 | 0 | 1 | 1 |
| 715-730 | 0 | 0 | 0 | 0 | 0 |
| 730-745 | 0 | 0 | 0 | 0 | 0 |
| 745-800 | 0 | 0 | 0 | 0 | 0 |
| 800-815 | 0 | 0 | 0 | 0 | 0 |
| 815-830 | 0 | 0 | 0 | 0 | 0 |
| 830-845 | 0 | 0 | 0 | 0 | 0 |
| 845-900 | 0 | 0 | 0 | 0 | 0 |
| HOURLY TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 0 | 0 | 0 | 1 | 1 |
| 715-815 | 0 | 0 | 0 | 0 | 0 |
| 730-830 | 0 | 0 | 0 | 0 | 0 |
| 745-845 | 0 | 0 | 0 | 0 | 0 |
| 800-900 | 0 | 0 | 0 | 0 | 0 |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: THURSDAY OCTOBER 23, 2008
 PERIOD: 4:00 PM TO 6:00 PM
 INTERSECTION: N/S JACKSON STREET
 E/W 6TH STREET
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-415 | 335 | 42 | 0 | 7 | 101 | 1 | 0 | 60 | 73 | 0 | 0 | 0 | 619 |
| 415-430 | 307 | 29 | 0 | 9 | 67 | 1 | 0 | 52 | 70 | 0 | 0 | 0 | 535 |
| 430-445 | 345 | 45 | 0 | 11 | 97 | 2 | 0 | 79 | 87 | 0 | 0 | 0 | 666 |
| 445-500 | 329 | 43 | 0 | 11 | 53 | 1 | 0 | 82 | 74 | 0 | 0 | 0 | 593 |
| 500-515 | 348 | 49 | 0 | 11 | 99 | 0 | 0 | 76 | 72 | 0 | 0 | 0 | 655 |
| 515-530 | 338 | 43 | 0 | 14 | 59 | 3 | 0 | 57 | 60 | 0 | 0 | 0 | 574 |
| 530-545 | 336 | 48 | 0 | 9 | 83 | 1 | 0 | 56 | 52 | 0 | 0 | 0 | 585 |
| 545-600 | 304 | 52 | 0 | 19 | 83 | 4 | 0 | 59 | 69 | 0 | 0 | 0 | 590 |
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-500 | 1316 | 159 | 0 | 38 | 318 | 5 | 0 | 273 | 304 | 0 | 0 | 0 | 2413 |
| 415-515 | 1329 | 166 | 0 | 42 | 316 | 4 | 0 | 289 | 303 | 0 | 0 | 0 | 2449 |
| 430-530 | 1360 | 180 | 0 | 47 | 308 | 6 | 0 | 294 | 293 | 0 | 0 | 0 | 2488 |
| 445-545 | 1351 | 183 | 0 | 45 | 294 | 5 | 0 | 271 | 258 | 0 | 0 | 0 | 2407 |
| 500-600 | 1326 | 192 | 0 | 53 | 324 | 8 | 0 | 248 | 253 | 0 | 0 | 0 | 2404 |

PHF 0.977011 0.918367 0.839286 0.777778 0.5 0.896341 0.841954



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 0 | 11 | 0 | 0 | 11 |
| 415-430 | 0 | 3 | 0 | 0 | 3 |
| 430-445 | 0 | 7 | 0 | 0 | 7 |
| 445-500 | 0 | 3 | 0 | 0 | 3 |
| 500-515 | 0 | 9 | 0 | 0 | 9 |
| 515-530 | 0 | 4 | 0 | 0 | 4 |
| 530-545 | 0 | 6 | 0 | 0 | 6 |
| 545-600 | 0 | 8 | 0 | 0 | 8 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 0 | 24 | 0 | 0 | 24 |
| 415-515 | 0 | 22 | 0 | 0 | 22 |
| 430-530 | 0 | 23 | 0 | 0 | 23 |
| 445-545 | 0 | 22 | 0 | 0 | 22 |
| 500-600 | 0 | 27 | 0 | 0 | 27 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 0 | 0 | 0 | 0 | 0 |
| 415-430 | 0 | 0 | 0 | 1 | 1 |
| 430-445 | 0 | 0 | 0 | 0 | 0 |
| 445-500 | 0 | 0 | 0 | 0 | 0 |
| 500-515 | 0 | 2 | 0 | 0 | 2 |
| 515-530 | 0 | 0 | 0 | 0 | 0 |
| 530-545 | 0 | 2 | 0 | 0 | 2 |
| 545-600 | 0 | 0 | 0 | 0 | 0 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 0 | 0 | 0 | 1 | 1 |
| 415-515 | 0 | 2 | 0 | 1 | 3 |
| 430-530 | 0 | 2 | 0 | 0 | 2 |
| 445-545 | 0 | 4 | 0 | 0 | 4 |
| 500-600 | 0 | 4 | 0 | 0 | 4 |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Oak St & 6th St

Date: 05/21/2008

| Start Time | Oak St Southbound | | | | 6th St Westbound | | | | Oak St Northbound | | | | 6th St Eastbound | | | | Int Total |
|------------|-------------------|------|-------|------------|------------------|------|-------|------------|-------------------|------|-------|------------|------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 7:00 | 0 | 0 | 0 | 0 | 21 | 19 | 95 | 135 | 23 | 38 | 0 | 61 | 0 | 0 | 0 | 0 | 196 |
| 7:15 | 0 | 0 | 0 | 0 | 23 | 16 | 131 | 170 | 18 | 43 | 0 | 61 | 0 | 0 | 0 | 0 | 231 |
| 7:30 | 0 | 0 | 0 | 0 | 27 | 17 | 164 | 208 | 34 | 60 | 0 | 94 | 0 | 0 | 0 | 0 | 302 |
| 7:45 | 0 | 0 | 0 | 0 | 35 | 15 | 150 | 200 | 20 | 100 | 0 | 120 | 0 | 0 | 0 | 0 | 320 |
| Total | 0 | 0 | 0 | 0 | 106 | 67 | 540 | 713 | 95 | 241 | 0 | 336 | 0 | 0 | 0 | 0 | 1049 |
| 8:00 | 0 | 0 | 0 | 0 | 39 | 10 | 162 | 211 | 25 | 97 | 0 | 122 | 0 | 0 | 0 | 0 | 333 |
| 8:15 | 0 | 0 | 0 | 0 | 30 | 11 | 206 | 247 | 31 | 109 | 0 | 140 | 0 | 0 | 0 | 0 | 387 |
| 8:30 | 0 | 0 | 0 | 0 | 33 | 14 | 165 | 212 | 26 | 112 | 0 | 138 | 0 | 0 | 0 | 0 | 350 |
| 8:45 | 0 | 0 | 0 | 0 | 18 | 13 | 204 | 235 | 41 | 111 | 0 | 152 | 0 | 0 | 0 | 0 | 387 |
| Total | 0 | 0 | 0 | 0 | 120 | 48 | 737 | 905 | 123 | 429 | 0 | 552 | 0 | 0 | 0 | 0 | 1457 |
| 16:00 | 0 | 0 | 0 | 0 | 17 | 16 | 132 | 165 | 29 | 59 | 0 | 88 | 0 | 0 | 0 | 0 | 253 |
| 16:15 | 0 | 0 | 0 | 0 | 14 | 15 | 108 | 137 | 31 | 65 | 0 | 96 | 0 | 0 | 0 | 0 | 233 |
| 16:30 | 0 | 0 | 0 | 0 | 24 | 11 | 114 | 149 | 39 | 83 | 0 | 122 | 0 | 0 | 0 | 0 | 271 |
| 16:45 | 0 | 0 | 0 | 0 | 12 | 10 | 117 | 139 | 42 | 105 | 0 | 147 | 0 | 0 | 0 | 0 | 286 |
| Total | 0 | 0 | 0 | 0 | 67 | 52 | 471 | 590 | 141 | 312 | 0 | 453 | 0 | 0 | 0 | 0 | 1043 |
| 17:00 | 0 | 0 | 0 | 0 | 23 | 14 | 162 | 199 | 41 | 123 | 0 | 164 | 0 | 0 | 0 | 0 | 363 |
| 17:15 | 0 | 0 | 0 | 0 | 13 | 12 | 159 | 184 | 43 | 137 | 0 | 180 | 0 | 0 | 0 | 0 | 364 |
| 17:30 | 0 | 0 | 0 | 0 | 7 | 13 | 144 | 164 | 38 | 152 | 0 | 190 | 0 | 0 | 0 | 0 | 354 |
| 17:45 | 0 | 0 | 0 | 0 | 12 | 8 | 143 | 163 | 32 | 112 | 0 | 144 | 0 | 0 | 0 | 0 | 307 |
| Total | 0 | 0 | 0 | 0 | 55 | 47 | 608 | 710 | 154 | 524 | 0 | 678 | 0 | 0 | 0 | 0 | 1388 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|------|------|------|-------|------|-------|-------|-------|-------|------|-------|------|------|------|------|------|
| Grand Total | 0 | 0 | 0 | 0 | 348 | 214 | 2356 | 2918 | 513 | 1506 | 0 | 2019 | 0 | 0 | 0 | 0 | 4937 |
| Apprch% | 0.0% | 0.0% | 0.0% | | 11.9% | 7.3% | 80.7% | | 25.4% | 74.6% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| Total % | 0.0% | 0.0% | 0.0% | 0.0% | 7.0% | 4.3% | 47.7% | 59.1% | 10.4% | 30.5% | 0.0% | 40.9% | 0.0% | 0.0% | 0.0% | 0.0% | |

City of Oakland

Oak St & 6th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| Start Time | Oak St Southbound | | | | 6th St Westbound | | | | Oak St Northbound | | | | 6th St Eastbound | | | | Int Total |
|--------------|-------------------|------|-------|------------|------------------|------|-------|------------|-------------------|-------|-------|------------|------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 800 | 0 | 0 | 0 | 0 | 39 | 10 | 162 | 211 | 25 | 97 | 0 | 122 | 0 | 0 | 0 | 0 | 333 |
| 815 | 0 | 0 | 0 | 0 | 30 | 11 | 206 | 247 | 31 | 109 | 0 | 140 | 0 | 0 | 0 | 0 | 387 |
| 830 | 0 | 0 | 0 | 0 | 33 | 14 | 165 | 212 | 26 | 112 | 0 | 138 | 0 | 0 | 0 | 0 | 350 |
| 845 | 0 | 0 | 0 | 0 | 18 | 13 | 204 | 235 | 41 | 111 | 0 | 152 | 0 | 0 | 0 | 0 | 387 |
| Total Volume | 0 | 0 | 0 | 0 | 120 | 48 | 737 | 905 | 123 | 429 | 0 | 552 | 0 | 0 | 0 | 0 | 1457 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 13.3% | 5.3% | 81.4% | | 22.3% | 77.7% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| PHF | 0.000 | | | | 0.916 | | | | 0.908 | | | | 0.000 | | | | |

PM Peak Hr Begins at 500 PM

| Start Time | Oak St Southbound | | | | 6th St Westbound | | | | Oak St Northbound | | | | 6th St Eastbound | | | | Int Total |
|--------------|-------------------|------|-------|------------|------------------|------|-------|------------|-------------------|-------|-------|------------|------------------|------|-------|------------|-----------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | |
| 500 | 0 | 0 | 0 | 0 | 23 | 14 | 162 | 199 | 41 | 123 | 0 | 164 | 0 | 0 | 0 | 0 | 363 |
| 515 | 0 | 0 | 0 | 0 | 13 | 12 | 159 | 184 | 43 | 137 | 0 | 180 | 0 | 0 | 0 | 0 | 364 |
| 530 | 0 | 0 | 0 | 0 | 7 | 13 | 144 | 164 | 38 | 152 | 0 | 190 | 0 | 0 | 0 | 0 | 354 |
| 545 | 0 | 0 | 0 | 0 | 12 | 8 | 143 | 163 | 32 | 112 | 0 | 144 | 0 | 0 | 0 | 0 | 307 |
| Total Volume | 0 | 0 | 0 | 0 | 55 | 47 | 608 | 710 | 154 | 524 | 0 | 678 | 0 | 0 | 0 | 0 | 1388 |
| % App Total. | 0.0% | 0.0% | 0.0% | | 7.7% | 6.6% | 85.6% | | 22.7% | 77.3% | 0.0% | | 0.0% | 0.0% | 0.0% | | |
| PHF | 0.000 | | | | 0.892 | | | | 0.892 | | | | 0.000 | | | | |

ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland

Oak St & 5th St

Date: 05/21/2008

| | Oak St Southbound | | | | 5th St Westbound | | | | Oak St Northbound | | | | 5th St Eastbound | | | | |
|------------|-------------------|------|-------|------------|------------------|------|-------|------------|-------------------|------|-------|------------|------------------|------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 7:00 | 0 | 18 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 45 | 19 | 64 | 16 | 93 | 25 | 134 | 216 |
| 7:15 | 0 | 23 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 27 | 13 | 40 | 29 | 141 | 31 | 201 | 264 |
| 7:30 | 0 | 23 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 46 | 25 | 71 | 42 | 104 | 21 | 167 | 261 |
| 7:45 | 1 | 37 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 47 | 16 | 63 | 59 | 144 | 23 | 226 | 327 |
| Total | 1 | 101 | 0 | 102 | 0 | 0 | 0 | 0 | 0 | 165 | 73 | 238 | 146 | 482 | 100 | 728 | 1068 |
| 8:00 | 0 | 38 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 47 | 18 | 65 | 70 | 155 | 41 | 266 | 369 |
| 8:15 | 1 | 30 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 60 | 10 | 70 | 77 | 115 | 47 | 239 | 340 |
| 8:30 | 0 | 32 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 53 | 23 | 76 | 76 | 147 | 45 | 268 | 376 |
| 8:45 | 2 | 17 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 70 | 17 | 87 | 80 | 134 | 19 | 233 | 339 |
| Total | 3 | 117 | 0 | 120 | 0 | 0 | 0 | 0 | 0 | 230 | 68 | 298 | 303 | 551 | 152 | 1006 | 1424 |
| 16:00 | 2 | 10 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 58 | 15 | 73 | 30 | 91 | 18 | 139 | 224 |
| 16:15 | 1 | 18 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 43 | 13 | 56 | 42 | 129 | 19 | 190 | 265 |
| 16:30 | 0 | 24 | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 59 | 20 | 79 | 58 | 123 | 14 | 195 | 298 |
| 16:45 | 0 | 14 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 78 | 13 | 91 | 66 | 128 | 24 | 218 | 323 |
| Total | 3 | 66 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 238 | 61 | 299 | 196 | 471 | 75 | 742 | 1110 |
| 17:00 | 1 | 19 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 97 | 22 | 119 | 71 | 124 | 20 | 215 | 354 |
| 17:15 | 0 | 16 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 123 | 14 | 137 | 57 | 122 | 16 | 195 | 348 |
| 17:30 | 0 | 9 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 148 | 13 | 161 | 49 | 102 | 9 | 160 | 330 |
| 17:45 | 0 | 9 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 106 | 14 | 120 | 39 | 104 | 6 | 149 | 278 |
| Total | 1 | 53 | 0 | 54 | 0 | 0 | 0 | 0 | 0 | 474 | 63 | 537 | 216 | 452 | 51 | 719 | 1310 |

| | | | | | | | | | | | | | | | | | |
|-------------|------|-------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|------|
| Grand Total | 8 | 337 | 0 | 345 | 0 | 0 | 0 | 0 | 0 | 1107 | 265 | 1372 | 861 | 1956 | 378 | 3195 | 4912 |
| Apprch% | 2.3% | 97.7% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 80.7% | 19.3% | | 26.9% | 61.2% | 11.8% | | |
| Total % | 0.2% | 6.9% | 0.0% | 7.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 22.5% | 5.4% | 27.9% | 17.5% | 39.8% | 7.7% | 65.0% | |

City of Oakland

Oak St & 5th St

Date: 05/21/2008

AM Peak Hr Begins at 800 AM

| | Oak St Southbound | | | | 5th St Westbound | | | | Oak St Northbound | | | | 5th St Eastbound | | | | |
|--------------|-------------------|-------|-------|------------|------------------|------|-------|------------|-------------------|-------|-------|------------|------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 800 | 0 | 38 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 47 | 18 | 65 | 70 | 155 | 41 | 266 | 369 |
| 815 | 1 | 30 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 60 | 10 | 70 | 77 | 115 | 47 | 239 | 340 |
| 830 | 0 | 32 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 53 | 23 | 76 | 76 | 147 | 45 | 268 | 376 |
| 845 | 2 | 17 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 70 | 17 | 87 | 80 | 134 | 19 | 233 | 339 |
| Total Volume | 3 | 117 | 0 | 120 | 0 | 0 | 0 | 0 | 0 | 230 | 68 | 298 | 303 | 551 | 152 | 1006 | 1424 |
| % App Total. | 2.5% | 97.5% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 77.2% | 22.8% | | 30.1% | 54.8% | 15.1% | | |
| PHF | 0.789 | | | | 0.000 | | | | 0.856 | | | | 0.938 | | | | |

PM Peak Hr Begins at 445 PM

| | Oak St Southbound | | | | 5th St Westbound | | | | Oak St Northbound | | | | 5th St Eastbound | | | | |
|--------------|-------------------|-------|-------|------------|------------------|------|-------|------------|-------------------|-------|-------|------------|------------------|-------|-------|------------|-----------|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int Total |
| 445 | 0 | 14 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 78 | 13 | 91 | 66 | 128 | 24 | 218 | 323 |
| 500 | 1 | 19 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 97 | 22 | 119 | 71 | 124 | 20 | 215 | 354 |
| 515 | 0 | 16 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 123 | 14 | 137 | 57 | 122 | 16 | 195 | 348 |
| 530 | 0 | 9 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 148 | 13 | 161 | 49 | 102 | 9 | 160 | 330 |
| Total Volume | 1 | 58 | 0 | 59 | 0 | 0 | 0 | 0 | 0 | 446 | 62 | 508 | 243 | 476 | 69 | 788 | 1355 |
| % App Total. | 1.7% | 98.3% | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.0% | 87.8% | 12.2% | | 30.8% | 60.4% | 8.8% | | |
| PHF | 0.738 | | | | 0.000 | | | | 0.789 | | | | 0.904 | | | | |

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| PROJECT: | | OAKLAND TRAFFIC STUDY | | | | | SURVEY DATE: | | | 2008/11/12 | | | DAY: | | WEDNESDAY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|-----------------------|------------|------|-------|------------|--------------|-------|-----------|------------|-------|-----------|-------|-------|-------------|--|--|------------|--|--|------------|--|--|-----------|--|--|-----------|--|--|-------|------|----|--|------|------|-------|------|------|-------|------|------|-------|------|------|-------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|---|----|----|----|----|---|---|---|---|----|---|----|-----|---------|-----|---------|---|-----|----|----|-----|---|---|---|---|----|---|-----|-----|---------|-----|---------|---|-----|-----|----|-----|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-----|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-----|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-------|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-------|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-------|---|---|---|---|-----|---|-----|-------|-----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|---|----|----|----|----|---|---|---|---|----|---|----|-----|---------|-----|---------|---|----|----|----|-----|---|---|---|---|----|---|----|-----|---------|-----|---------|---|----|----|----|-----|---|---|---|---|----|---|----|-----|---------|-----|---------|---|----|----|----|-----|---|---|---|---|----|---|----|-----|---------|-----|---------|---|-----|----|----|-----|---|---|---|---|-----|---|----|-----|---------|-----|---------|---|-----|----|----|-----|---|---|---|---|-----|---|----|-----|---------|-----|---------|---|----|----|----|-----|---|---|---|---|----|---|----|-----|---------|-----|---------|---|-----|----|----|-----|---|---|---|---|-----|---|----|-----|---------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|---|-----|-----|-----|-----|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-----|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-----|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-----|---|---|---|---|-----|---|-----|-------|---------|-----|---------|---|-----|-----|-----|-------|---|---|---|---|-----|---|-----|-------|
| N-S Approach: | | GRAND AVENUE | | | | | SURVEY TIME: | | | 7:00 午前 | | | TO | | 9:00 午前 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E-W Approach: | | EL EMBARCADERO | | | | | CITY: | | | OAKLAND | | | FILE: | | 2811065-1AM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div><div><div>PEAK HOUR</div><div>08:00 午前 TO 09:00 午前</div><div><div><div><div><div>0</div><div>1,088</div><div>155</div></div><div><div><div>0</div><div>0</div><div>0</div></div></div><div><div><div>0</div><div>0</div><div>0</div></div></div><div><div><div>0</div><div>0</div><div>0</div></div></div><div><div><div>0</div><div>459</div><div>292</div></div><div><div><div>302</div><div>0</div><div>443</div></div></div><div><div><div>2,739</div></div></div></div><div><div>NORTH</div><div>↑</div></div><div>EL EMBARCADERO</div><div>GRAND AVENUE</div></div></div><div><div>ARRIVAL / DEPARTURE VOLUMES</div><div><div>PHF=0.85</div><div><div>1,243</div><div>761</div></div><div><div>PHF=0.90</div><div><div>0</div><div>0</div><div>0</div></div><div><div>745</div><div>447</div></div><div><div>PHF=#DIV/0!</div><div><div>1,531</div><div>751</div></div><div>PHF=0.93</div></div></div></div></div><table><tr><th colspan="3">TIME PERIOD</th><th colspan="3">NORTHBOUND</th><th colspan="3">SOUTHBOUND</th><th colspan="3">EASTBOUND</th><th colspan="3">WESTBOUND</th><th rowspan="2">TOTAL</th></tr><tr><th>From</th><th>To</th><th></th><th>Left</th><th>Thru</th><th>Right</th><th>Left</th><th>Thru</th><th>Right</th><th>Left</th><th>Thru</th><th>Right</th><th>Left</th><th>Thru</th><th>Right</th></tr><tr><td colspan="16">SURVEY DATA</td></tr><tr><td>7:00 AM</td><td>---</td><td>7:15 午前</td><td>0</td><td>73</td><td>58</td><td>19</td><td>91</td><td>0</td><td>0</td><td>0</td><td>0</td><td>37</td><td>0</td><td>47</td><td>325</td></tr><tr><td>7:15 午前</td><td>---</td><td>7:30 午前</td><td>0</td><td>144</td><td>90</td><td>35</td><td>191</td><td>0</td><td>0</td><td>0</td><td>0</td><td>73</td><td>0</td><td>103</td><td>636</td></tr><tr><td>7:30 午前</td><td>---</td><td>7:45 午前</td><td>0</td><td>233</td><td>132</td><td>76</td><td>375</td><td>0</td><td>0</td><td>0</td><td>0</td><td>128</td><td>0</td><td>175</td><td>1,119</td></tr><tr><td>7:45 午前</td><td>---</td><td>8:00 午前</td><td>0</td><td>326</td><td>193</td><td>121</td><td>558</td><td>0</td><td>0</td><td>0</td><td>0</td><td>215</td><td>0</td><td>251</td><td>1,664</td></tr><tr><td>8:00 午前</td><td>---</td><td>8:15 午前</td><td>0</td><td>436</td><td>267</td><td>150</td><td>779</td><td>0</td><td>0</td><td>0</td><td>0</td><td>318</td><td>0</td><td>330</td><td>2,280</td></tr><tr><td>8:15 午前</td><td>---</td><td>8:30 午前</td><td>0</td><td>550</td><td>350</td><td>192</td><td>1,041</td><td>0</td><td>0</td><td>0</td><td>0</td><td>443</td><td>0</td><td>412</td><td>2,988</td></tr><tr><td>8:30 午前</td><td>---</td><td>8:45 午前</td><td>0</td><td>646</td><td>423</td><td>235</td><td>1,321</td><td>0</td><td>0</td><td>0</td><td>0</td><td>534</td><td>0</td><td>491</td><td>3,650</td></tr><tr><td>8:45 午前</td><td>---</td><td>9:00 午前</td><td>0</td><td>785</td><td>485</td><td>276</td><td>1,646</td><td>0</td><td>0</td><td>0</td><td>0</td><td>658</td><td>0</td><td>553</td><td>4,403</td></tr><tr><td colspan="16">TOTAL BY PERIOD</td></tr><tr><td>7:00 AM</td><td>---</td><td>7:15 午前</td><td>0</td><td>73</td><td>58</td><td>19</td><td>91</td><td>0</td><td>0</td><td>0</td><td>0</td><td>37</td><td>0</td><td>47</td><td>325</td></tr><tr><td>7:15 午前</td><td>---</td><td>7:30 午前</td><td>0</td><td>71</td><td>32</td><td>16</td><td>100</td><td>0</td><td>0</td><td>0</td><td>0</td><td>36</td><td>0</td><td>56</td><td>311</td></tr><tr><td>7:30 午前</td><td>---</td><td>7:45 午前</td><td>0</td><td>89</td><td>42</td><td>41</td><td>184</td><td>0</td><td>0</td><td>0</td><td>0</td><td>55</td><td>0</td><td>72</td><td>483</td></tr><tr><td>7:45 午前</td><td>---</td><td>8:00 午前</td><td>0</td><td>93</td><td>61</td><td>45</td><td>183</td><td>0</td><td>0</td><td>0</td><td>0</td><td>87</td><td>0</td><td>76</td><td>545</td></tr><tr><td>8:00 午前</td><td>---</td><td>8:15 午前</td><td>0</td><td>110</td><td>74</td><td>29</td><td>221</td><td>0</td><td>0</td><td>0</td><td>0</td><td>103</td><td>0</td><td>79</td><td>616</td></tr><tr><td>8:15 午前</td><td>---</td><td>8:30 午前</td><td>0</td><td>114</td><td>83</td><td>42</td><td>262</td><td>0</td><td>0</td><td>0</td><td>0</td><td>125</td><td>0</td><td>82</td><td>708</td></tr><tr><td>8:30 午前</td><td>---</td><td>8:45 午前</td><td>0</td><td>96</td><td>73</td><td>43</td><td>280</td><td>0</td><td>0</td><td>0</td><td>0</td><td>91</td><td>0</td><td>79</td><td>662</td></tr><tr><td>8:45 午前</td><td>---</td><td>9:00 午前</td><td>0</td><td>139</td><td>62</td><td>41</td><td>325</td><td>0</td><td>0</td><td>0</td><td>0</td><td>124</td><td>0</td><td>62</td><td>753</td></tr><tr><td colspan="16">HOURLY TOTALS</td></tr><tr><td>7:00 AM</td><td>---</td><td>8:00 午前</td><td>0</td><td>326</td><td>193</td><td>121</td><td>558</td><td>0</td><td>0</td><td>0</td><td>0</td><td>215</td><td>0</td><td>251</td><td>1,664</td></tr><tr><td>7:15 午前</td><td>---</td><td>8:15 午前</td><td>0</td><td>363</td><td>209</td><td>131</td><td>688</td><td>0</td><td>0</td><td>0</td><td>0</td><td>281</td><td>0</td><td>283</td><td>1,955</td></tr><tr><td>7:30 午前</td><td>---</td><td>8:30 午前</td><td>0</td><td>406</td><td>260</td><td>157</td><td>850</td><td>0</td><td>0</td><td>0</td><td>0</td><td>370</td><td>0</td><td>309</td><td>2,352</td></tr><tr><td>7:45 午前</td><td>---</td><td>8:45 午前</td><td>0</td><td>413</td><td>291</td><td>159</td><td>946</td><td>0</td><td>0</td><td>0</td><td>0</td><td>406</td><td>0</td><td>316</td><td>2,531</td></tr><tr><td>8:00 午前</td><td>---</td><td>9:00 午前</td><td>0</td><td>459</td><td>292</td><td>155</td><td>1,088</td><td>0</td><td>0</td><td>0</td><td>0</td><td>443</td><td>0</td><td>302</td><td>2,739</td></tr></table><div><div>Telephone: (510)232-1271</div><div>Fax: (510)232-1272</div></div></div></div></div> | | | | | | | | | | | | | | | TIME PERIOD | | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | From | To | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | SURVEY DATA | | | | | | | | | | | | | | | | 7:00 AM | --- | 7:15 午前 | 0 | 73 | 58 | 19 | 91 | 0 | 0 | 0 | 0 | 37 | 0 | 47 | 325 | 7:15 午前 | --- | 7:30 午前 | 0 | 144 | 90 | 35 | 191 | 0 | 0 | 0 | 0 | 73 | 0 | 103 | 636 | 7:30 午前 | --- | 7:45 午前 | 0 | 233 | 132 | 76 | 375 | 0 | 0 | 0 | 0 | 128 | 0 | 175 | 1,119 | 7:45 午前 | --- | 8:00 午前 | 0 | 326 | 193 | 121 | 558 | 0 | 0 | 0 | 0 | 215 | 0 | 251 | 1,664 | 8:00 午前 | --- | 8:15 午前 | 0 | 436 | 267 | 150 | 779 | 0 | 0 | 0 | 0 | 318 | 0 | 330 | 2,280 | 8:15 午前 | --- | 8:30 午前 | 0 | 550 | 350 | 192 | 1,041 | 0 | 0 | 0 | 0 | 443 | 0 | 412 | 2,988 | 8:30 午前 | --- | 8:45 午前 | 0 | 646 | 423 | 235 | 1,321 | 0 | 0 | 0 | 0 | 534 | 0 | 491 | 3,650 | 8:45 午前 | --- | 9:00 午前 | 0 | 785 | 485 | 276 | 1,646 | 0 | 0 | 0 | 0 | 658 | 0 | 553 | 4,403 | TOTAL BY PERIOD | | | | | | | | | | | | | | | | 7:00 AM | --- | 7:15 午前 | 0 | 73 | 58 | 19 | 91 | 0 | 0 | 0 | 0 | 37 | 0 | 47 | 325 | 7:15 午前 | --- | 7:30 午前 | 0 | 71 | 32 | 16 | 100 | 0 | 0 | 0 | 0 | 36 | 0 | 56 | 311 | 7:30 午前 | --- | 7:45 午前 | 0 | 89 | 42 | 41 | 184 | 0 | 0 | 0 | 0 | 55 | 0 | 72 | 483 | 7:45 午前 | --- | 8:00 午前 | 0 | 93 | 61 | 45 | 183 | 0 | 0 | 0 | 0 | 87 | 0 | 76 | 545 | 8:00 午前 | --- | 8:15 午前 | 0 | 110 | 74 | 29 | 221 | 0 | 0 | 0 | 0 | 103 | 0 | 79 | 616 | 8:15 午前 | --- | 8:30 午前 | 0 | 114 | 83 | 42 | 262 | 0 | 0 | 0 | 0 | 125 | 0 | 82 | 708 | 8:30 午前 | --- | 8:45 午前 | 0 | 96 | 73 | 43 | 280 | 0 | 0 | 0 | 0 | 91 | 0 | 79 | 662 | 8:45 午前 | --- | 9:00 午前 | 0 | 139 | 62 | 41 | 325 | 0 | 0 | 0 | 0 | 124 | 0 | 62 | 753 | HOURLY TOTALS | | | | | | | | | | | | | | | | 7:00 AM | --- | 8:00 午前 | 0 | 326 | 193 | 121 | 558 | 0 | 0 | 0 | 0 | 215 | 0 | 251 | 1,664 | 7:15 午前 | --- | 8:15 午前 | 0 | 363 | 209 | 131 | 688 | 0 | 0 | 0 | 0 | 281 | 0 | 283 | 1,955 | 7:30 午前 | --- | 8:30 午前 | 0 | 406 | 260 | 157 | 850 | 0 | 0 | 0 | 0 | 370 | 0 | 309 | 2,352 | 7:45 午前 | --- | 8:45 午前 | 0 | 413 | 291 | 159 | 946 | 0 | 0 | 0 | 0 | 406 | 0 | 316 | 2,531 | 8:00 午前 | --- | 9:00 午前 | 0 | 459 | 292 | 155 | 1,088 | 0 | 0 | 0 | 0 | 443 | 0 | 302 | 2,739 |
| TIME PERIOD | | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From | To | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SURVEY DATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 0 | 73 | 58 | 19 | 91 | 0 | 0 | 0 | 0 | 37 | 0 | 47 | 325 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:15 午前 | --- | 7:30 午前 | 0 | 144 | 90 | 35 | 191 | 0 | 0 | 0 | 0 | 73 | 0 | 103 | 636 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:30 午前 | --- | 7:45 午前 | 0 | 233 | 132 | 76 | 375 | 0 | 0 | 0 | 0 | 128 | 0 | 175 | 1,119 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:45 午前 | --- | 8:00 午前 | 0 | 326 | 193 | 121 | 558 | 0 | 0 | 0 | 0 | 215 | 0 | 251 | 1,664 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:00 午前 | --- | 8:15 午前 | 0 | 436 | 267 | 150 | 779 | 0 | 0 | 0 | 0 | 318 | 0 | 330 | 2,280 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:15 午前 | --- | 8:30 午前 | 0 | 550 | 350 | 192 | 1,041 | 0 | 0 | 0 | 0 | 443 | 0 | 412 | 2,988 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:30 午前 | --- | 8:45 午前 | 0 | 646 | 423 | 235 | 1,321 | 0 | 0 | 0 | 0 | 534 | 0 | 491 | 3,650 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:45 午前 | --- | 9:00 午前 | 0 | 785 | 485 | 276 | 1,646 | 0 | 0 | 0 | 0 | 658 | 0 | 553 | 4,403 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 0 | 73 | 58 | 19 | 91 | 0 | 0 | 0 | 0 | 37 | 0 | 47 | 325 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:15 午前 | --- | 7:30 午前 | 0 | 71 | 32 | 16 | 100 | 0 | 0 | 0 | 0 | 36 | 0 | 56 | 311 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:30 午前 | --- | 7:45 午前 | 0 | 89 | 42 | 41 | 184 | 0 | 0 | 0 | 0 | 55 | 0 | 72 | 483 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:45 午前 | --- | 8:00 午前 | 0 | 93 | 61 | 45 | 183 | 0 | 0 | 0 | 0 | 87 | 0 | 76 | 545 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:00 午前 | --- | 8:15 午前 | 0 | 110 | 74 | 29 | 221 | 0 | 0 | 0 | 0 | 103 | 0 | 79 | 616 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:15 午前 | --- | 8:30 午前 | 0 | 114 | 83 | 42 | 262 | 0 | 0 | 0 | 0 | 125 | 0 | 82 | 708 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:30 午前 | --- | 8:45 午前 | 0 | 96 | 73 | 43 | 280 | 0 | 0 | 0 | 0 | 91 | 0 | 79 | 662 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:45 午前 | --- | 9:00 午前 | 0 | 139 | 62 | 41 | 325 | 0 | 0 | 0 | 0 | 124 | 0 | 62 | 753 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HOURLY TOTALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 8:00 午前 | 0 | 326 | 193 | 121 | 558 | 0 | 0 | 0 | 0 | 215 | 0 | 251 | 1,664 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:15 午前 | --- | 8:15 午前 | 0 | 363 | 209 | 131 | 688 | 0 | 0 | 0 | 0 | 281 | 0 | 283 | 1,955 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:30 午前 | --- | 8:30 午前 | 0 | 406 | 260 | 157 | 850 | 0 | 0 | 0 | 0 | 370 | 0 | 309 | 2,352 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:45 午前 | --- | 8:45 午前 | 0 | 413 | 291 | 159 | 946 | 0 | 0 | 0 | 0 | 406 | 0 | 316 | 2,531 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8:00 午前 | --- | 9:00 午前 | 0 | 459 | 292 | 155 | 1,088 | 0 | 0 | 0 | 0 | 443 | 0 | 302 | 2,739 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----|-----------------------|------|-------|------------|------|--------------|-----------|------|------------|-----------|-------|-------|-------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| PROJECT: | | OAKLAND TRAFFIC STUDY | | | | | SURVEY DATE: | | | 2008/11/06 | | DAY: | | | THURSDAY | | | | | | | | | | | | | | |
| N-S Approach: | | GRAND AVENUE | | | | | SURVEY TIME: | | | 4:00 午後 | | TO | | | 6:00 午後 | | | | | | | | | | | | | | |
| E-W Approach: | | EL EMBARCADERO | | | | | CITY: | | | OAKLAND | | FILE: | | | 2811065-1PM | | | | | | | | | | | | | | |
| <div><div><div>PEAK HOUR</div><div>05:00 午後 TO 06:00 午後</div><div><div>0723235</div><div>02550245</div><div>01,000700</div><div>TOTAL 3,158</div></div><div>EL EMBARCADERO</div><div>GRAND AVENUE</div><div>NORTH</div></div></div> | | | | | | | | | | | | | | | <div><div>ARRIVAL / DEPARTURE VOLUMES</div><div>PHF= 0.90</div><div>9581,255</div><div>PHF= 0.89</div><div>500935</div><div>PHF= #DIV/0!</div><div>9681,700</div><div>PHF= 0.92</div></div> | | | | | | | | | | | | | | |
| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | | | | | | | | | | | | | | | |
| From | To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | | | | | | | | | | | | | |
| SURVEY DATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 4:15 午後 | 0 | 142 | 114 | 47 | 143 | 0 | 0 | 0 | 0 | 48 | 0 | 47 | 541 | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 4:30 午後 | 0 | 285 | 219 | 95 | 275 | 0 | 0 | 0 | 0 | 99 | 0 | 92 | 1,065 | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 4:45 午後 | 0 | 498 | 392 | 164 | 429 | 0 | 0 | 0 | 0 | 154 | 0 | 129 | 1,766 | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:00 午後 | 0 | 681 | 541 | 206 | 565 | 0 | 0 | 0 | 0 | 197 | 0 | 189 | 2,379 | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 5:15 午後 | 0 | 891 | 665 | 270 | 738 | 0 | 0 | 0 | 0 | 255 | 0 | 271 | 3,090 | | | | | | | | | | | | | | |
| 5:15 午後 | --- | 5:30 午後 | 0 | 1,145 | 874 | 328 | 915 | 0 | 0 | 0 | 0 | 316 | 0 | 350 | 3,928 | | | | | | | | | | | | | | |
| 5:30 午後 | --- | 5:45 午後 | 0 | 1,412 | 1,070 | 381 | 1,083 | 0 | 0 | 0 | 0 | 375 | 0 | 407 | 4,728 | | | | | | | | | | | | | | |
| 5:45 午後 | --- | 6:00 午後 | 0 | 1,681 | 1,241 | 441 | 1,288 | 0 | 0 | 0 | 0 | 442 | 0 | 444 | 5,537 | | | | | | | | | | | | | | |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 4:15 午後 | 0 | 142 | 114 | 47 | 143 | 0 | 0 | 0 | 0 | 48 | 0 | 47 | 541 | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 4:30 午後 | 0 | 143 | 105 | 48 | 132 | 0 | 0 | 0 | 0 | 51 | 0 | 45 | 524 | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 4:45 午後 | 0 | 213 | 173 | 69 | 154 | 0 | 0 | 0 | 0 | 55 | 0 | 37 | 701 | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:00 午後 | 0 | 183 | 149 | 42 | 136 | 0 | 0 | 0 | 0 | 43 | 0 | 60 | 613 | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 5:15 午後 | 0 | 210 | 124 | 64 | 173 | 0 | 0 | 0 | 0 | 58 | 0 | 82 | 711 | | | | | | | | | | | | | | |
| 5:15 午後 | --- | 5:30 午後 | 0 | 254 | 209 | 58 | 177 | 0 | 0 | 0 | 0 | 61 | 0 | 79 | 838 | | | | | | | | | | | | | | |
| 5:30 午後 | --- | 5:45 午後 | 0 | 267 | 196 | 53 | 168 | 0 | 0 | 0 | 0 | 59 | 0 | 57 | 800 | | | | | | | | | | | | | | |
| 5:45 午後 | --- | 6:00 午後 | 0 | 269 | 171 | 60 | 205 | 0 | 0 | 0 | 0 | 67 | 0 | 37 | 809 | | | | | | | | | | | | | | |
| HOURLY TOTALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 5:00 午後 | 0 | 681 | 541 | 206 | 565 | 0 | 0 | 0 | 0 | 197 | 0 | 189 | 2,379 | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 5:15 午後 | 0 | 749 | 551 | 223 | 595 | 0 | 0 | 0 | 0 | 207 | 0 | 224 | 2,549 | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 5:30 午後 | 0 | 860 | 655 | 233 | 640 | 0 | 0 | 0 | 0 | 217 | 0 | 258 | 2,863 | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:45 午後 | 0 | 914 | 678 | 217 | 654 | 0 | 0 | 0 | 0 | 221 | 0 | 278 | 2,962 | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 6:00 午後 | 0 | 1,000 | 700 | 235 | 723 | 0 | 0 | 0 | 0 | 245 | 0 | 255 | 3,158 | | | | | | | | | | | | | | |
| Telephone: (510)232-1271 Fax: (510)232-1272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

B . A . Y . M . E . T . R . I . C . S .

| | | | | | | | | | | | | | | | | | |
|--|-----------------------|--|--|--|--|--|--|---------------|--|--|------------|--|--|-------------------|--|-----------|--|
| PROJECT: | OAKLAND TRAFFIC STUDY | | | | | | | SURVEY DATE: | | | 2008/11/12 | | | DAY: | | WEDNESDAY | |
| N-S Approach: | LAKESHORE AVENUE | | | | | | | SURVEY TIME: | | | 7:00 午前 | | | TO | | 9:00 午前 | |
| E-W Approach: | EL EMBARCADERO | | | | | | | CITY: OAKLAND | | | | | | FILE: 2811065-2AM | | | |
| <div><div>PEAK HOUR</div><div>08:00 午前 TO 09:00 午前</div><div><div><div><div><div><div></div><div>262</div><div>572</div><div>0</div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div><div></div><div></div><div></div></div><div><div>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B . A . Y . M . E . T . R . I . C . S .

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|---|-----|-----------------------|-----|-------|---|---|-----|--------------------|--------------|-----|------------|------------|-------|------------|-------|-------|-------------|------|-------|-----------|------|-------|-------|-------|----|------|------|-------|------|------|-------|------|------|-------|------|------|-------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|----|-----|---|---|-----|----|----|---|----|---|---|---|-----|---------|-----|---------|-----|-----|---|---|-----|----|-----|---|-----|---|---|---|-----|---------|-----|---------|-----|-----|---|---|-----|----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-------|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-------|---|---|-----|-----|-----|---|-------|---|---|---|-------|-----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|----|-----|---|---|-----|----|----|---|----|---|---|---|-----|---------|-----|---------|----|-----|---|---|-----|----|----|---|----|---|---|---|-----|---------|-----|---------|----|-----|---|---|-----|----|----|---|-----|---|---|---|-----|---------|-----|---------|----|-----|---|---|-----|----|----|---|----|---|---|---|-----|---------|-----|---------|----|-----|---|---|-----|----|----|---|-----|---|---|---|-----|---------|-----|---------|-----|-----|---|---|-----|----|----|---|-----|---|---|---|-----|---------|-----|---------|----|-----|---|---|-----|----|----|---|-----|---|---|---|-----|---------|-----|---------|----|-----|---|---|-----|----|----|---|-----|---|---|---|-----|---------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|---------|-----|---------|-----|-----|---|---|-----|-----|-----|---|-----|---|---|---|-------|--------------------------|--|--|--|--|--|--|--|--------------------|--|--|--|--|--|--|--|
| PROJECT: | | OAKLAND TRAFFIC STUDY | | | | | | | SURVEY DATE: | | | 2008/11/06 | | | DAY: | | THURSDAY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N-S Approach: | | LAKESHORE AVENUE | | | | | | | SURVEY TIME: | | | 4:00 午後 | | | TO | | 6:00 午後 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E-W Approach: | | EL EMBARCADERO | | | | | | | CITY: | | | OAKLAND | | | FILE: | | 2811065-2PM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div>PEAK HOUR</div> <div>05:00 午後 TO 06:00 午後</div> <div><div><div><div><div>148</div><div>466</div><div>0</div></div><div><div><div><div>311</div><div>0</div><div>623</div></div><div>TOTAL
2,563</div><div><div><div>0</div><div>0</div><div>0</div></div></div><div><div><div>350</div><div>665</div><div>0</div></div></div></div><div>NORTH</div><div>EL EMBARCADERO</div><div>LAKESHORE AVENUE</div></div><div>ARRIVAL / DEPARTURE VOLUMES</div><div><div><div>PHF=0.85</div><div><div>614</div><div>976</div></div><div><div><div>PHF=
#DIV/0!</div></div><div><div>498</div><div>934</div><div>PHF=0.87</div></div><div><div>1,089</div><div>1,015</div><div>PHF=0.90</div></div></div></div></div><tr><td colspan="2">TIME PERIOD</td><td colspan="3">NORTHBOUND</td><td colspan="3">SOUTHBOUND</td><td colspan="3">EASTBOUND</td><td colspan="3">WESTBOUND</td><td rowspan="2">TOTAL</td></tr><tr><td>From</td><td>To</td><td>Left</td><td>Thru</td><td>Right</td><td>Left</td><td>Thru</td><td>Right</td><td>Left</td><td>Thru</td><td>Right</td><td>Left</td><td>Thru</td><td>Right</td></tr><tr><td colspan="16">SURVEY DATA</td></tr><tr><td>4:00 PM</td><td>---</td><td>4:15 午後</td><td>61</td><td>136</td><td>0</td><td>0</td><td>120</td><td>35</td><td>67</td><td>0</td><td>95</td><td>0</td><td>0</td><td>0</td><td>514</td></tr><tr><td>4:15 午後</td><td>---</td><td>4:30 午後</td><td>127</td><td>258</td><td>0</td><td>0</td><td>221</td><td>65</td><td>124</td><td>0</td><td>191</td><td>0</td><td>0</td><td>0</td><td>986</td></tr><tr><td>4:30 午後</td><td>---</td><td>4:45 午後</td><td>194</td><td>396</td><td>0</td><td>0</td><td>325</td><td>91</td><td>185</td><td>0</td><td>376</td><td>0</td><td>0</td><td>0</td><td>1,567</td></tr><tr><td>4:45 午後</td><td>---</td><td>5:00 午後</td><td>261</td><td>525</td><td>0</td><td>0</td><td>448</td><td>127</td><td>274</td><td>0</td><td>475</td><td>0</td><td>0</td><td>0</td><td>2,110</td></tr><tr><td>5:00 午後</td><td>---</td><td>5:15 午後</td><td>355</td><td>713</td><td>0</td><td>0</td><td>582</td><td>173</td><td>359</td><td>0</td><td>578</td><td>0</td><td>0</td><td>0</td><td>2,760</td></tr><tr><td>5:15 午後</td><td>---</td><td>5:30 午後</td><td>459</td><td>866</td><td>0</td><td>0</td><td>692</td><td>207</td><td>443</td><td>0</td><td>761</td><td>0</td><td>0</td><td>0</td><td>3,428</td></tr><tr><td>5:30 午後</td><td>---</td><td>5:45 午後</td><td>541</td><td>1,059</td><td>0</td><td>0</td><td>798</td><td>241</td><td>526</td><td>0</td><td>926</td><td>0</td><td>0</td><td>0</td><td>4,091</td></tr><tr><td>5:45 午後</td><td>---</td><td>6:00 午後</td><td>611</td><td>1,190</td><td>0</td><td>0</td><td>914</td><td>275</td><td>585</td><td>0</td><td>1,098</td><td>0</td><td>0</td><td>0</td><td>4,673</td></tr><tr><td colspan="16">TOTAL BY PERIOD</td></tr><tr><td>4:00 PM</td><td>---</td><td>4:15 午後</td><td>61</td><td>136</td><td>0</td><td>0</td><td>120</td><td>35</td><td>67</td><td>0</td><td>95</td><td>0</td><td>0</td><td>0</td><td>514</td></tr><tr><td>4:15 午後</td><td>---</td><td>4:30 午後</td><td>66</td><td>122</td><td>0</td><td>0</td><td>101</td><td>30</td><td>57</td><td>0</td><td>96</td><td>0</td><td>0</td><td>0</td><td>472</td></tr><tr><td>4:30 午後</td><td>---</td><td>4:45 午後</td><td>67</td><td>138</td><td>0</td><td>0</td><td>104</td><td>26</td><td>61</td><td>0</td><td>185</td><td>0</td><td>0</td><td>0</td><td>581</td></tr><tr><td>4:45 午後</td><td>---</td><td>5:00 午後</td><td>67</td><td>129</td><td>0</td><td>0</td><td>123</td><td>36</td><td>89</td><td>0</td><td>99</td><td>0</td><td>0</td><td>0</td><td>543</td></tr><tr><td>5:00 午後</td><td>---</td><td>5:15 午後</td><td>94</td><td>188</td><td>0</td><td>0</td><td>134</td><td>46</td><td>85</td><td>0</td><td>103</td><td>0</td><td>0</td><td>0</td><td>650</td></tr><tr><td>5:15 午後</td><td>---</td><td>5:30 午後</td><td>104</td><td>153</td><td>0</td><td>0</td><td>110</td><td>34</td><td>84</td><td>0</td><td>183</td><td>0</td><td>0</td><td>0</td><td>668</td></tr><tr><td>5:30 午後</td><td>---</td><td>5:45 午後</td><td>82</td><td>193</td><td>0</td><td>0</td><td>106</td><td>34</td><td>83</td><td>0</td><td>165</td><td>0</td><td>0</td><td>0</td><td>663</td></tr><tr><td>5:45 午後</td><td>---</td><td>6:00 午後</td><td>70</td><td>131</td><td>0</td><td>0</td><td>116</td><td>34</td><td>59</td><td>0</td><td>172</td><td>0</td><td>0</td><td>0</td><td>582</td></tr><tr><td colspan="16">HOURLY TOTALS</td></tr><tr><td>4:00 PM</td><td>---</td><td>5:00 午後</td><td>261</td><td>525</td><td>0</td><td>0</td><td>448</td><td>127</td><td>274</td><td>0</td><td>475</td><td>0</td><td>0</td><td>0</td><td>2,110</td></tr><tr><td>4:15 午後</td><td>---</td><td>5:15 午後</td><td>294</td><td>577</td><td>0</td><td>0</td><td>462</td><td>138</td><td>292</td><td>0</td><td>483</td><td>0</td><td>0</td><td>0</td><td>2,246</td></tr><tr><td>4:30 午後</td><td>---</td><td>5:30 午後</td><td>332</td><td>608</td><td>0</td><td>0</td><td>471</td><td>142</td><td>319</td><td>0</td><td>570</td><td>0</td><td>0</td><td>0</td><td>2,442</td></tr><tr><td>4:45 午後</td><td>---</td><td>5:45 午後</td><td>347</td><td>663</td><td>0</td><td>0</td><td>473</td><td>150</td><td>341</td><td>0</td><td>550</td><td>0</td><td>0</td><td>0</td><td>2,524</td></tr><tr><td>5:00 午後</td><td>---</td><td>6:00 午後</td><td>350</td><td>665</td><td>0</td><td>0</td><td>466</td><td>148</td><td>311</td><td>0</td><td>623</td><td>0</td><td>0</td><td>0</td><td>2,563</td></tr><tr><td colspan="8">Telephone: (510)232-1271</td><td colspan="8">Fax: (510)232-1272</td></tr></div></div></div> | | | | | | | | | TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | From | To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | SURVEY DATA | | | | | | | | | | | | | | | | 4:00 PM | --- | 4:15 午後 | 61 | 136 | 0 | 0 | 120 | 35 | 67 | 0 | 95 | 0 | 0 | 0 | 514 | 4:15 午後 | --- | 4:30 午後 | 127 | 258 | 0 | 0 | 221 | 65 | 124 | 0 | 191 | 0 | 0 | 0 | 986 | 4:30 午後 | --- | 4:45 午後 | 194 | 396 | 0 | 0 | 325 | 91 | 185 | 0 | 376 | 0 | 0 | 0 | 1,567 | 4:45 午後 | --- | 5:00 午後 | 261 | 525 | 0 | 0 | 448 | 127 | 274 | 0 | 475 | 0 | 0 | 0 | 2,110 | 5:00 午後 | --- | 5:15 午後 | 355 | 713 | 0 | 0 | 582 | 173 | 359 | 0 | 578 | 0 | 0 | 0 | 2,760 | 5:15 午後 | --- | 5:30 午後 | 459 | 866 | 0 | 0 | 692 | 207 | 443 | 0 | 761 | 0 | 0 | 0 | 3,428 | 5:30 午後 | --- | 5:45 午後 | 541 | 1,059 | 0 | 0 | 798 | 241 | 526 | 0 | 926 | 0 | 0 | 0 | 4,091 | 5:45 午後 | --- | 6:00 午後 | 611 | 1,190 | 0 | 0 | 914 | 275 | 585 | 0 | 1,098 | 0 | 0 | 0 | 4,673 | TOTAL BY PERIOD | | | | | | | | | | | | | | | | 4:00 PM | --- | 4:15 午後 | 61 | 136 | 0 | 0 | 120 | 35 | 67 | 0 | 95 | 0 | 0 | 0 | 514 | 4:15 午後 | --- | 4:30 午後 | 66 | 122 | 0 | 0 | 101 | 30 | 57 | 0 | 96 | 0 | 0 | 0 | 472 | 4:30 午後 | --- | 4:45 午後 | 67 | 138 | 0 | 0 | 104 | 26 | 61 | 0 | 185 | 0 | 0 | 0 | 581 | 4:45 午後 | --- | 5:00 午後 | 67 | 129 | 0 | 0 | 123 | 36 | 89 | 0 | 99 | 0 | 0 | 0 | 543 | 5:00 午後 | --- | 5:15 午後 | 94 | 188 | 0 | 0 | 134 | 46 | 85 | 0 | 103 | 0 | 0 | 0 | 650 | 5:15 午後 | --- | 5:30 午後 | 104 | 153 | 0 | 0 | 110 | 34 | 84 | 0 | 183 | 0 | 0 | 0 | 668 | 5:30 午後 | --- | 5:45 午後 | 82 | 193 | 0 | 0 | 106 | 34 | 83 | 0 | 165 | 0 | 0 | 0 | 663 | 5:45 午後 | --- | 6:00 午後 | 70 | 131 | 0 | 0 | 116 | 34 | 59 | 0 | 172 | 0 | 0 | 0 | 582 | HOURLY TOTALS | | | | | | | | | | | | | | | | 4:00 PM | --- | 5:00 午後 | 261 | 525 | 0 | 0 | 448 | 127 | 274 | 0 | 475 | 0 | 0 | 0 | 2,110 | 4:15 午後 | --- | 5:15 午後 | 294 | 577 | 0 | 0 | 462 | 138 | 292 | 0 | 483 | 0 | 0 | 0 | 2,246 | 4:30 午後 | --- | 5:30 午後 | 332 | 608 | 0 | 0 | 471 | 142 | 319 | 0 | 570 | 0 | 0 | 0 | 2,442 | 4:45 午後 | --- | 5:45 午後 | 347 | 663 | 0 | 0 | 473 | 150 | 341 | 0 | 550 | 0 | 0 | 0 | 2,524 | 5:00 午後 | --- | 6:00 午後 | 350 | 665 | 0 | 0 | 466 | 148 | 311 | 0 | 623 | 0 | 0 | 0 | 2,563 | Telephone: (510)232-1271 | | | | | | | | Fax: (510)232-1272 | | | | | | | |
| | | | | | | | | | TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | | TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | From | To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | SURVEY DATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 4:00 PM | --- | 4:15 午後 | 61 | 136 | 0 | 0 | 120 | 35 | 67 | 0 | 95 | 0 | 0 | 0 | 514 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 4:30 午後 | 127 | 258 | 0 | 0 | 221 | 65 | 124 | 0 | 191 | 0 | 0 | 0 | 986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 4:45 午後 | 194 | 396 | 0 | 0 | 325 | 91 | 185 | 0 | 376 | 0 | 0 | 0 | 1,567 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:00 午後 | 261 | 525 | 0 | 0 | 448 | 127 | 274 | 0 | 475 | 0 | 0 | 0 | 2,110 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 5:15 午後 | 355 | 713 | 0 | 0 | 582 | 173 | 359 | 0 | 578 | 0 | 0 | 0 | 2,760 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:15 午後 | --- | 5:30 午後 | 459 | 866 | 0 | 0 | 692 | 207 | 443 | 0 | 761 | 0 | 0 | 0 | 3,428 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:30 午後 | --- | 5:45 午後 | 541 | 1,059 | 0 | 0 | 798 | 241 | 526 | 0 | 926 | 0 | 0 | 0 | 4,091 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:45 午後 | --- | 6:00 午後 | 611 | 1,190 | 0 | 0 | 914 | 275 | 585 | 0 | 1,098 | 0 | 0 | 0 | 4,673 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 4:15 午後 | 61 | 136 | 0 | 0 | 120 | 35 | 67 | 0 | 95 | 0 | 0 | 0 | 514 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 4:30 午後 | 66 | 122 | 0 | 0 | 101 | 30 | 57 | 0 | 96 | 0 | 0 | 0 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 4:45 午後 | 67 | 138 | 0 | 0 | 104 | 26 | 61 | 0 | 185 | 0 | 0 | 0 | 581 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:00 午後 | 67 | 129 | 0 | 0 | 123 | 36 | 89 | 0 | 99 | 0 | 0 | 0 | 543 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 5:15 午後 | 94 | 188 | 0 | 0 | 134 | 46 | 85 | 0 | 103 | 0 | 0 | 0 | 650 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:15 午後 | --- | 5:30 午後 | 104 | 153 | 0 | 0 | 110 | 34 | 84 | 0 | 183 | 0 | 0 | 0 | 668 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:30 午後 | --- | 5:45 午後 | 82 | 193 | 0 | 0 | 106 | 34 | 83 | 0 | 165 | 0 | 0 | 0 | 663 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:45 午後 | --- | 6:00 午後 | 70 | 131 | 0 | 0 | 116 | 34 | 59 | 0 | 172 | 0 | 0 | 0 | 582 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HOURLY TOTALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 5:00 午後 | 261 | 525 | 0 | 0 | 448 | 127 | 274 | 0 | 475 | 0 | 0 | 0 | 2,110 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 5:15 午後 | 294 | 577 | 0 | 0 | 462 | 138 | 292 | 0 | 483 | 0 | 0 | 0 | 2,246 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 5:30 午後 | 332 | 608 | 0 | 0 | 471 | 142 | 319 | 0 | 570 | 0 | 0 | 0 | 2,442 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:45 午後 | 347 | 663 | 0 | 0 | 473 | 150 | 341 | 0 | 550 | 0 | 0 | 0 | 2,524 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 6:00 午後 | 350 | 665 | 0 | 0 | 466 | 148 | 311 | 0 | 623 | 0 | 0 | 0 | 2,563 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Telephone: (510)232-1271 | | | | | | | | Fax: (510)232-1272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | | | | | | | | | |
|--|-----|------------------------------------|------|-------|--------------------|------|--------------|-----------|------|--|-----------|------|-------|-------|-------------|--|--|--|--|
| PROJECT: | | OAKLAND TRAFFIC STUDY | | | | | SURVEY DATE: | | | 2008/11/12 | | | DAY: | | WEDNESDAY | | | | |
| N-S Approach: | | GRAND AVENUE | | | | | SURVEY TIME: | | | 7:00 午前 | | | TO | | 9:00 午前 | | | | |
| E-W Approach: | | MacARTHUR BLVD / I-580 EB OFF-RAMP | | | | | CITY: | | | OAKLAND | | | FILE: | | 2811065-3AM | | | | |
| <div>PEAK HOUR
08:00 午前 TO 09:00 午前</div> <div><div><div><div><div>0</div><div>980</div><div>277</div></div><div><div>395</div><div>626</div><div>270</div></div><div><div>0</div><div>571</div><div>182</div></div></div><div><div><div>MacARTHUR BLVD</div><div><div>TOTAL</div><div>3,301</div></div><div>MacARTHUR BLVD / I-580 EB OFF-RAMP</div></div><div><div>0</div><div>0</div><div>0</div></div></div><div><div>NORTH</div><div>GRAND AVENUE</div></div></div></div> | | | | | | | | | | <div>ARRIVAL / DEPARTURE VOLUMES</div> <div><div>PHF=</div><div>0.87</div></div> <div><div>1,257</div><div>966</div></div> <div><div><div>PHF=</div><div>#DIV/0!</div></div><div><div>0</div><div>1,291</div><div>PHF=</div><div>0.80</div></div><div><div>0</div><div>1,085</div><div>PHF=</div><div>0.93</div></div></div> | | | | | | | | | |
| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | | | | | |
| From | To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | | | |
| SURVEY DATA | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 0 | 91 | 27 | 32 | 87 | 0 | 43 | 67 | 21 | 0 | 0 | 0 | 368 | | | | |
| 7:15 午前 | --- | 7:30 午前 | 0 | 193 | 48 | 53 | 179 | 0 | 87 | 164 | 47 | 0 | 0 | 0 | 771 | | | | |
| 7:30 午前 | --- | 7:45 午前 | 0 | 314 | 90 | 95 | 351 | 0 | 143 | 275 | 100 | 0 | 0 | 0 | 1,368 | | | | |
| 7:45 午前 | --- | 8:00 午前 | 0 | 440 | 133 | 162 | 534 | 0 | 210 | 411 | 144 | 0 | 0 | 0 | 2,034 | | | | |
| 8:00 午前 | --- | 8:15 午前 | 0 | 588 | 174 | 212 | 715 | 0 | 319 | 577 | 209 | 0 | 0 | 0 | 2,794 | | | | |
| 8:15 午前 | --- | 8:30 午前 | 0 | 744 | 216 | 284 | 972 | 0 | 401 | 731 | 260 | 0 | 0 | 0 | 3,608 | | | | |
| 8:30 午前 | --- | 8:45 午前 | 0 | 868 | 255 | 371 | 1,221 | 0 | 479 | 859 | 316 | 0 | 0 | 0 | 4,369 | | | | |
| 8:45 午前 | --- | 9:00 午前 | 0 | 1,011 | 315 | 439 | 1,514 | 0 | 605 | 1,037 | 414 | 0 | 0 | 0 | 5,335 | | | | |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 0 | 91 | 27 | 32 | 87 | 0 | 43 | 67 | 21 | 0 | 0 | 0 | 368 | | | | |
| 7:15 午前 | --- | 7:30 午前 | 0 | 102 | 21 | 21 | 92 | 0 | 44 | 97 | 26 | 0 | 0 | 0 | 403 | | | | |
| 7:30 午前 | --- | 7:45 午前 | 0 | 121 | 42 | 42 | 172 | 0 | 56 | 111 | 53 | 0 | 0 | 0 | 597 | | | | |
| 7:45 午前 | --- | 8:00 午前 | 0 | 126 | 43 | 67 | 183 | 0 | 67 | 136 | 44 | 0 | 0 | 0 | 666 | | | | |
| 8:00 午前 | --- | 8:15 午前 | 0 | 148 | 41 | 50 | 181 | 0 | 109 | 166 | 65 | 0 | 0 | 0 | 760 | | | | |
| 8:15 午前 | --- | 8:30 午前 | 0 | 156 | 42 | 72 | 257 | 0 | 82 | 154 | 51 | 0 | 0 | 0 | 814 | | | | |
| 8:30 午前 | --- | 8:45 午前 | 0 | 124 | 39 | 87 | 249 | 0 | 78 | 128 | 56 | 0 | 0 | 0 | 761 | | | | |
| 8:45 午前 | --- | 9:00 午前 | 0 | 143 | 60 | 68 | 293 | 0 | 126 | 178 | 98 | 0 | 0 | 0 | 966 | | | | |
| HOURLY TOTALS | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 8:00 午前 | 0 | 440 | 133 | 162 | 534 | 0 | 210 | 411 | 144 | 0 | 0 | 0 | 2,034 | | | | |
| 7:15 午前 | --- | 8:15 午前 | 0 | 497 | 147 | 180 | 628 | 0 | 276 | 510 | 188 | 0 | 0 | 0 | 2,426 | | | | |
| 7:30 午前 | --- | 8:30 午前 | 0 | 551 | 168 | 231 | 793 | 0 | 314 | 567 | 213 | 0 | 0 | 0 | 2,837 | | | | |
| 7:45 午前 | --- | 8:45 午前 | 0 | 554 | 165 | 276 | 870 | 0 | 336 | 584 | 216 | 0 | 0 | 0 | 3,001 | | | | |
| 8:00 午前 | --- | 9:00 午前 | 0 | 571 | 182 | 277 | 980 | 0 | 395 | 626 | 270 | 0 | 0 | 0 | 3,301 | | | | |
| Telephone: (510)232-1271 | | | | | Fax: (510)232-1272 | | | | | | | | | | | | | | |

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | | | | | | | | |
|--|-----|------------------------------------|------------|-------|--------------------|------------|-------|-------|--------------|-------|-------|------------|------|-------|-------|--|-------------|--|
| PROJECT: | | OAKLAND TRAFFIC STUDY | | | | | | | SURVEY DATE: | | | 2008/11/06 | | | DAY: | | THURSDAY | |
| N-S Approach: | | GRAND AVENUE | | | | | | | SURVEY TIME: | | | 4:00 午後 | | | TO | | 6:00 午後 | |
| E-W Approach: | | MacARTHUR BLVD / I-580 EB OFF-RAMP | | | | | | | CITY: | | | OAKLAND | | | FILE: | | 2811065-3PM | |
| <div><div><div>PEAK HOUR</div><div>05:00 午後 TO 06:00 午後</div><div><div><div><div><div>0</div><div>738</div><div>350</div></div><div><div><div><div><div>298</div><div>768</div><div>224</div></div><div>TOTAL
3,634</div><div><div><div>0</div><div>0</div><div>0</div></div></div><div><div><div>0</div><div>696</div><div>560</div></div></div></div><div>MacARTHUR BLVD / I-580 EB OFF-RAMP</div><div>MacARTHUR BLVD</div><div>GRAND AVENUE</div><div>NORTH</div></div></div><div><div>ARRIVAL / DEPARTURE VOLUMES</div><div><div>PHF=<div>0.94</div></div><div><div><div>1,088</div><div>994</div></div><div><div><div><div><div>PHF=<div>#DIV/0!</div></div></div><div><div><div>0</div><div>0</div><div>0</div></div></div><div><div><div>1,290</div><div>1,678</div></div></div><div><div><div>PHF=<div>0.91</div></div></div><div><div><div>962</div><div>1,256</div></div><div><div>PHF=<div>0.95</div></div></div></div></div></div></div></div></div></div></div></div></div></div></div></div> | | | | | | | | | | | | | | | | | | |
| TIME PERIOD | | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | | | |
| From | To | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | |
| SURVEY DATA | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 4:15 午後 | 0 | 115 | 72 | 80 | 134 | 0 | 85 | 158 | 62 | 0 | 0 | 0 | 706 | | | |
| 4:15 午後 | --- | 4:30 午後 | 0 | 232 | 140 | 145 | 263 | 0 | 176 | 286 | 110 | 0 | 0 | 0 | 1,352 | | | |
| 4:30 午後 | --- | 4:45 午後 | 0 | 351 | 260 | 219 | 420 | 0 | 267 | 479 | 181 | 0 | 0 | 0 | 2,177 | | | |
| 4:45 午後 | --- | 5:00 午後 | 0 | 497 | 365 | 302 | 568 | 0 | 339 | 687 | 214 | 0 | 0 | 0 | 2,972 | | | |
| 5:00 午後 | --- | 5:15 午後 | 0 | 656 | 492 | 379 | 740 | 0 | 415 | 898 | 277 | 0 | 0 | 0 | 3,857 | | | |
| 5:15 午後 | --- | 5:30 午後 | 0 | 843 | 633 | 476 | 925 | 0 | 493 | 1,105 | 325 | 0 | 0 | 0 | 4,800 | | | |
| 5:30 午後 | --- | 5:45 午後 | 0 | 1,007 | 799 | 565 | 1,104 | 0 | 563 | 1,272 | 371 | 0 | 0 | 0 | 5,681 | | | |
| 5:45 午後 | --- | 6:00 午後 | 0 | 1,193 | 925 | 652 | 1,306 | 0 | 637 | 1,455 | 438 | 0 | 0 | 0 | 6,606 | | | |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 4:15 午後 | 0 | 115 | 72 | 80 | 134 | 0 | 85 | 158 | 62 | 0 | 0 | 0 | 706 | | | |
| 4:15 午後 | --- | 4:30 午後 | 0 | 117 | 68 | 65 | 129 | 0 | 91 | 128 | 48 | 0 | 0 | 0 | 646 | | | |
| 4:30 午後 | --- | 4:45 午後 | 0 | 119 | 120 | 74 | 157 | 0 | 91 | 193 | 71 | 0 | 0 | 0 | 825 | | | |
| 4:45 午後 | --- | 5:00 午後 | 0 | 146 | 105 | 83 | 148 | 0 | 72 | 208 | 33 | 0 | 0 | 0 | 795 | | | |
| 5:00 午後 | --- | 5:15 午後 | 0 | 159 | 127 | 77 | 172 | 0 | 76 | 211 | 63 | 0 | 0 | 0 | 885 | | | |
| 5:15 午後 | --- | 5:30 午後 | 0 | 187 | 141 | 97 | 185 | 0 | 78 | 207 | 48 | 0 | 0 | 0 | 943 | | | |
| 5:30 午後 | --- | 5:45 午後 | 0 | 164 | 166 | 89 | 179 | 0 | 70 | 167 | 46 | 0 | 0 | 0 | 881 | | | |
| 5:45 午後 | --- | 6:00 午後 | 0 | 186 | 126 | 87 | 202 | 0 | 74 | 183 | 67 | 0 | 0 | 0 | 925 | | | |
| HOURLY TOTALS | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 5:00 午後 | 0 | 497 | 365 | 302 | 568 | 0 | 339 | 687 | 214 | 0 | 0 | 0 | 2,972 | | | |
| 4:15 午後 | --- | 5:15 午後 | 0 | 541 | 420 | 299 | 606 | 0 | 330 | 740 | 215 | 0 | 0 | 0 | 3,151 | | | |
| 4:30 午後 | --- | 5:30 午後 | 0 | 611 | 493 | 331 | 662 | 0 | 317 | 819 | 215 | 0 | 0 | 0 | 3,448 | | | |
| 4:45 午後 | --- | 5:45 午後 | 0 | 656 | 539 | 346 | 684 | 0 | 296 | 793 | 190 | 0 | 0 | 0 | 3,504 | | | |
| 5:00 午後 | --- | 6:00 午後 | 0 | 696 | 560 | 350 | 738 | 0 | 298 | 768 | 224 | 0 | 0 | 0 | 3,634 | | | |
| Telephone: (510)232-1271 | | | | | Fax: (510)232-1272 | | | | | | | | | | | | | |

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-----|-----------------------------------|--------|--------|------------|--------|--------|--------------|--------|--------|-------|------------|---|--|-------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|
| PROJECT: | | | OAKLAND TRAFFIC STUDY | | | | | | SURVEY DATE: | | | | 2008/11/12 | | DAY: | | WEDNESDAY | | | | | | | | | | | | |
| N-S Approach: | | | LAKESHORE AVENUE | | | | | | SURVEY TIME: | | | | 7:00 午前 | | TO | | 9:00 午前 | | | | | | | | | | | | |
| E-W Approach: | | | MacARTHUR BLVD / I-580 EB ON-RAMP | | | | | | CITY: | | | | OAKLAND | | FILE: | | 2811065-4AM | | | | | | | | | | | | |
| <div><div><div>PEAK HOUR</div><div>08:00 午前 TO 09:00 午前</div><div><div><div>654</div><div>31</div><div>229</div></div><div><div><div>260</div><div>443</div><div>196</div><div>184</div></div><div><div>TOTAL</div><div>2,626</div></div><div><div>340</div><div>259</div><div>30</div></div></div><div><div>MacARTHUR BLVD</div><div>I-580 EB ON-RAMP</div><div>MacARTHUR BLVD</div><div>LAKESHORE AVENUE</div></div><div><div>NORTH</div><div>↑</div></div></div></div></div> | | | | | | | | | | | | | | | <div><div>ARRIVAL / DEPARTURE VOLUMES</div><div><div>PHF=</div><div>0.87</div></div><div><div>914</div><div>600</div></div><div><div><div>PHF=</div><div>#DIV/0!</div></div><div><div>0</div><div>1,083</div></div><div><div>PHF=</div><div>0.87</div></div><div><div>838</div><div>629</div></div><div><div>PHF=</div><div>0.95</div></div></div></div> | | | | | | | | | | | | | | |
| TIME PERIOD | | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | | WESTBOUND | | TOTAL | | | | | | | | | | | | | | |
| From | | To | Thur | To 580 | To Mac | Thru | To Mac | To 580 | Left | To 580 | To Mac | Right | | | | | | | | | | | | | | | | | |
| SURVEY DATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | | --- | 7:15 午前 | 28 | 58 | 7 | 71 | 5 | 57 | 30 | 57 | 20 | 18 | 0 | 0 | 351 | | | | | | | | | | | | | |
| 7:15 午前 | | --- | 7:30 午前 | 84 | 112 | 10 | 191 | 8 | 133 | 55 | 132 | 45 | 40 | 0 | 0 | 810 | | | | | | | | | | | | | |
| 7:30 午前 | | --- | 7:45 午前 | 151 | 165 | 15 | 365 | 17 | 213 | 85 | 233 | 81 | 68 | 0 | 0 | 1,393 | | | | | | | | | | | | | |
| 7:45 午前 | | --- | 8:00 午前 | 230 | 237 | 25 | 511 | 21 | 307 | 118 | 365 | 122 | 110 | 0 | 0 | 2,046 | | | | | | | | | | | | | |
| 8:00 午前 | | --- | 8:15 午前 | 320 | 298 | 34 | 666 | 29 | 357 | 178 | 474 | 171 | 150 | 0 | 0 | 2,677 | | | | | | | | | | | | | |
| 8:15 午前 | | --- | 8:30 午前 | 405 | 360 | 43 | 817 | 33 | 427 | 228 | 582 | 222 | 202 | 0 | 0 | 3,319 | | | | | | | | | | | | | |
| 8:30 午前 | | --- | 8:45 午前 | 489 | 436 | 49 | 996 | 43 | 494 | 298 | 682 | 263 | 244 | 0 | 0 | 3,994 | | | | | | | | | | | | | |
| 8:45 午前 | | --- | 9:00 午前 | 570 | 496 | 55 | 1,165 | 52 | 536 | 378 | 808 | 318 | 294 | 0 | 0 | 4,672 | | | | | | | | | | | | | |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | | --- | 7:15 午前 | 28 | 58 | 7 | 71 | 5 | 57 | 30 | 57 | 20 | 18 | 0 | 0 | 351 | | | | | | | | | | | | | |
| 7:15 午前 | | --- | 7:30 午前 | 56 | 54 | 3 | 120 | 3 | 76 | 25 | 75 | 25 | 22 | 0 | 0 | 459 | | | | | | | | | | | | | |
| 7:30 午前 | | --- | 7:45 午前 | 67 | 53 | 5 | 174 | 9 | 80 | 30 | 101 | 36 | 28 | 0 | 0 | 583 | | | | | | | | | | | | | |
| 7:45 午前 | | --- | 8:00 午前 | 79 | 72 | 10 | 146 | 4 | 94 | 33 | 132 | 41 | 42 | 0 | 0 | 653 | | | | | | | | | | | | | |
| 8:00 午前 | | --- | 8:15 午前 | 90 | 61 | 9 | 155 | 8 | 50 | 60 | 109 | 49 | 40 | 0 | 0 | 631 | | | | | | | | | | | | | |
| 8:15 午前 | | --- | 8:30 午前 | 85 | 62 | 9 | 151 | 4 | 70 | 50 | 108 | 51 | 52 | 0 | 0 | 642 | | | | | | | | | | | | | |
| 8:30 午前 | | --- | 8:45 午前 | 84 | 76 | 6 | 179 | 10 | 67 | 70 | 100 | 41 | 42 | 0 | 0 | 675 | | | | | | | | | | | | | |
| 8:45 午前 | | --- | 9:00 午前 | 81 | 60 | 6 | 169 | 9 | 42 | 80 | 126 | 55 | 50 | 0 | 0 | 678 | | | | | | | | | | | | | |
| HOURLY TOTALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7:00 AM | | --- | 8:00 午前 | 230 | 237 | 25 | 511 | 21 | 307 | 118 | 365 | 122 | 110 | 0 | 0 | 2,046 | | | | | | | | | | | | | |
| 7:15 午前 | | --- | 8:15 午前 | 292 | 240 | 27 | 595 | 24 | 300 | 148 | 417 | 151 | 132 | 0 | 0 | 2,326 | | | | | | | | | | | | | |
| 7:30 午前 | | --- | 8:30 午前 | 321 | 248 | 33 | 626 | 25 | 294 | 173 | 450 | 177 | 162 | 0 | 0 | 2,509 | | | | | | | | | | | | | |
| 7:45 午前 | | --- | 8:45 午前 | 338 | 271 | 34 | 631 | 26 | 281 | 213 | 449 | 182 | 176 | 0 | 0 | 2,601 | | | | | | | | | | | | | |
| 8:00 午前 | | --- | 9:00 午前 | 340 | 259 | 30 | 654 | 31 | 229 | 260 | 443 | 196 | 184 | 0 | 0 | 2,626 | | | | | | | | | | | | | |
| Telephone: (510)232-1271 Fax: (510)232-1272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Telephone: (510)232-1271

Fax: (510)232-1272

B . A . Y . M . E . T . R . I . C . S .

Telephone: (510)232-1271

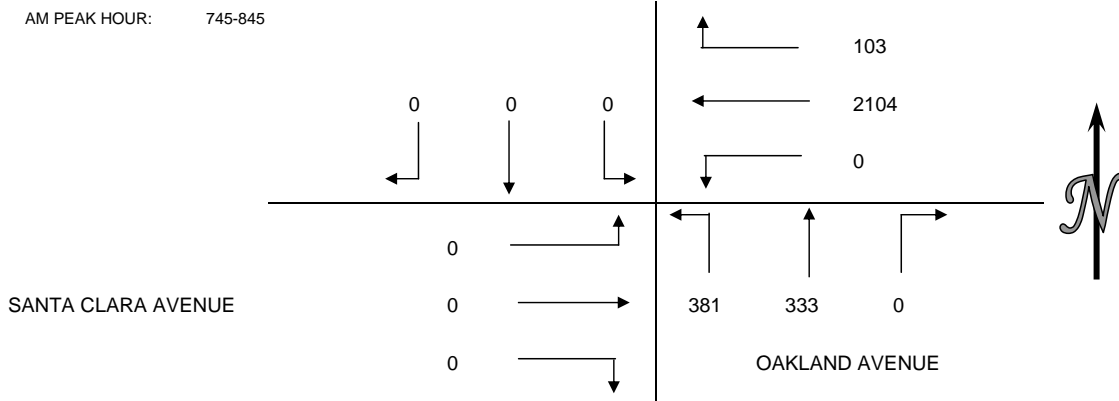
Fax: (510)232-1272

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
 PROJECT: 1938 BROADWAY TRAFFIC COUNTS
 DATE: WEDNESDAY OCTOBER 29, 2008
 PERIOD: 7:00 AM TO 9:00 AM
 INTERSECTION: N/S OAKLAND AVENUE
 E/W SANTA CLARA AVENUE
 CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-715 | 0 | 0 | 0 | 10 | 336 | 0 | 0 | 50 | 55 | 0 | 0 | 0 | 451 |
| 715-730 | 0 | 0 | 0 | 14 | 402 | 0 | 0 | 52 | 75 | 0 | 0 | 0 | 543 |
| 730-745 | 0 | 0 | 0 | 20 | 442 | 0 | 0 | 79 | 80 | 0 | 0 | 0 | 621 |
| 745-800 | 0 | 0 | 0 | 21 | 505 | 0 | 0 | 88 | 87 | 0 | 0 | 0 | 701 |
| 800-815 | 0 | 0 | 0 | 22 | 509 | 0 | 0 | 88 | 91 | 0 | 0 | 0 | 710 |
| 815-830 | 0 | 0 | 0 | 27 | 544 | 0 | 0 | 72 | 101 | 0 | 0 | 0 | 744 |
| 830-845 | 0 | 0 | 0 | 33 | 546 | 0 | 0 | 85 | 102 | 0 | 0 | 0 | 766 |
| 845-900 | 0 | 0 | 0 | 28 | 514 | 0 | 0 | 65 | 90 | 0 | 0 | 0 | 697 |
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-800 | 0 | 0 | 0 | 65 | 1685 | 0 | 0 | 269 | 297 | 0 | 0 | 0 | 2316 |
| 715-815 | 0 | 0 | 0 | 77 | 1858 | 0 | 0 | 307 | 333 | 0 | 0 | 0 | 2575 |
| 730-830 | 0 | 0 | 0 | 90 | 2000 | 0 | 0 | 327 | 359 | 0 | 0 | 0 | 2776 |
| 745-845 | 0 | 0 | 0 | 103 | 2104 | 0 | 0 | 333 | 381 | 0 | 0 | 0 | 2921 |
| 800-900 | 0 | 0 | 0 | 110 | 2113 | 0 | 0 | 310 | 384 | 0 | 0 | 0 | 2917 |

PHF 0.780303 0.96337 0.946023 0.933824



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 3 | 4 | 0 | 0 | 7 |
| 715-730 | 8 | 8 | 0 | 0 | 16 |
| 730-745 | 9 | 7 | 0 | 0 | 16 |
| 745-800 | 3 | 3 | 0 | 0 | 6 |
| 800-815 | 10 | 9 | 0 | 0 | 19 |
| 815-830 | 8 | 1 | 0 | 0 | 9 |
| 830-845 | 9 | 4 | 0 | 0 | 13 |
| 845-900 | 7 | 7 | 0 | 0 | 14 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 23 | 22 | 0 | 0 | 45 |
| 715-815 | 30 | 27 | 0 | 0 | 57 |
| 730-830 | 30 | 20 | 0 | 0 | 50 |
| 745-845 | 30 | 17 | 0 | 0 | 47 |
| 800-900 | 34 | 21 | 0 | 0 | 55 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-715 | 1 | 0 | 0 | 0 | 1 |
| 715-730 | 1 | 1 | 0 | 0 | 2 |
| 730-745 | 1 | 2 | 0 | 0 | 3 |
| 745-800 | 1 | 0 | 0 | 0 | 1 |
| 800-815 | 0 | 0 | 0 | 0 | 0 |
| 815-830 | 2 | 0 | 0 | 0 | 2 |
| 830-845 | 9 | 2 | 0 | 2 | 13 |
| 845-900 | 2 | 0 | 0 | 0 | 2 |
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 700-800 | 4 | 3 | 0 | 0 | 7 |
| 715-815 | 3 | 3 | 0 | 0 | 6 |
| 730-830 | 4 | 2 | 0 | 0 | 6 |
| 745-845 | 12 | 2 | 0 | 2 | 16 |
| 800-900 | 13 | 2 | 0 | 2 | 17 |

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
PROJECT: 1938 BROADWAY TRAFFIC COUNTS
DATE: WEDNESDAY OCTOBER 29, 2008
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S OAKLAND AVENUE
E/W SANTA CLARA AVENUE
CITY: OAKLAND

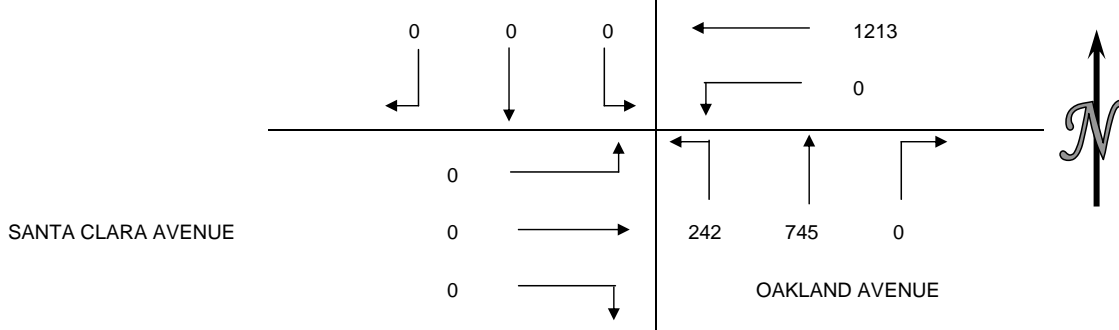
| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-415 | 0 | 0 | 0 | 34 | 344 | 0 | 0 | 134 | 73 | 0 | 0 | 0 | 585 |
| 415-430 | 0 | 0 | 0 | 33 | 292 | 0 | 0 | 135 | 48 | 0 | 0 | 0 | 508 |
| 430-445 | 0 | 0 | 0 | 42 | 270 | 0 | 0 | 149 | 62 | 0 | 0 | 0 | 523 |
| 445-500 | 0 | 0 | 0 | 35 | 254 | 0 | 0 | 160 | 50 | 0 | 0 | 0 | 499 |
| 500-515 | 0 | 0 | 0 | 46 | 280 | 0 | 0 | 182 | 65 | 0 | 0 | 0 | 573 |
| 515-530 | 0 | 0 | 0 | 46 | 312 | 0 | 0 | 198 | 61 | 0 | 0 | 0 | 617 |
| 530-545 | 0 | 0 | 0 | 47 | 316 | 0 | 0 | 193 | 69 | 0 | 0 | 0 | 625 |
| 545-600 | 0 | 0 | 0 | 33 | 305 | 0 | 0 | 172 | 47 | 0 | 0 | 0 | 557 |
| HOUR TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-500 | 0 | 0 | 0 | 144 | 1160 | 0 | 0 | 578 | 233 | 0 | 0 | 0 | 2115 |
| 415-515 | 0 | 0 | 0 | 156 | 1096 | 0 | 0 | 626 | 225 | 0 | 0 | 0 | 2103 |
| 430-530 | 0 | 0 | 0 | 169 | 1116 | 0 | 0 | 689 | 238 | 0 | 0 | 0 | 2212 |
| 445-545 | 0 | 0 | 0 | 174 | 1162 | 0 | 0 | 733 | 245 | 0 | 0 | 0 | 2314 |
| 500-600 | 0 | 0 | 0 | 172 | 1213 | 0 | 0 | 745 | 242 | 0 | 0 | 0 | 2372 |

PHF

0.914894 0.959652

0.940657 0.876812

AM PEAK HOUR: 500-600



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 12 | 10 | 0 | 0 | 22 |
| 415-430 | 6 | 7 | 0 | 0 | 13 |
| 430-445 | 2 | 2 | 0 | 0 | 4 |
| 445-500 | 7 | 7 | 0 | 0 | 14 |
| 500-515 | 2 | 4 | 0 | 0 | 6 |
| 515-530 | 7 | 6 | 0 | 0 | 13 |
| 530-545 | 2 | 7 | 0 | 0 | 9 |
| 545-600 | 2 | 6 | 0 | 0 | 8 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 27 | 26 | 0 | 0 | 53 |
| 415-515 | 17 | 20 | 0 | 0 | 37 |
| 430-530 | 18 | 19 | 0 | 0 | 37 |
| 445-545 | 18 | 24 | 0 | 0 | 42 |
| 500-600 | 13 | 23 | 0 | 0 | 36 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-415 | 3 | 1 | 0 | 0 | 4 |
| 415-430 | 2 | 1 | 0 | 0 | 3 |
| 430-445 | 2 | 1 | 0 | 0 | 3 |
| 445-500 | 2 | 0 | 0 | 0 | 2 |
| 500-515 | 3 | 1 | 0 | 0 | 4 |
| 515-530 | 3 | 0 | 0 | 0 | 3 |
| 530-545 | 1 | 0 | 0 | 0 | 1 |
| 545-600 | 3 | 0 | 0 | 0 | 3 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| PERIOD | | | | | |
| 400-500 | 9 | 3 | 0 | 0 | 12 |
| 415-515 | 9 | 3 | 0 | 0 | 12 |
| 430-530 | 10 | 2 | 0 | 0 | 12 |
| 445-545 | 9 | 1 | 0 | 0 | 10 |
| 500-600 | 10 | 1 | 0 | 0 | 11 |

File Name: C:\Documents and Settings\Administrator\Desktop\09-7021 OAKLAND-F\09-7021-002 HARRISON-SANTA CLARA-F.ppd

Start Date: 13/01/2009

Start Time: 7:15:00 AM

Site Code: 00000000

Comment 1: OAKLAND

Comment 2:

Comment 3:

Comment 4:

| Start Time | HARRISON ST.
Southbound | | | | | SANTA CLARA AVE.
Westbound | | | | | HARRISON ST.
Northbound | | | | | SANTA CLARA AVE.
Northeastbound | | | | | MACARTHUR BLVD.
Eastbound | | | | |
|------------|----------------------------|------|------------|-------|------|-------------------------------|-----------|------|-------|------|----------------------------|------|------|-------|------|------------------------------------|-----------|------------|------------|------|------------------------------|------|-------|------------|------|
| | Left | Thru | Bear Right | Right | Peds | Left | Bear Left | Thru | Right | Peds | Hard Left | Left | Thru | Right | Peds | Hard Left | Bear Left | Bear Right | Hard Right | Peds | Left | Thru | Right | Hard Right | Peds |
| 07:15 | 0 | 153 | 3 | 13 | 4 | 202 | 1 | 283 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 7 |
| 07:30 | 0 | 213 | 1 | 7 | 9 | 241 | 2 | 323 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 5 |
| 07:45 | 0 | 241 | 2 | 7 | 8 | 226 | 3 | 355 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 9 |
| 08:00 | 0 | 263 | 2 | 4 | 1 | 240 | 4 | 358 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 5 |
| 08:15 | 0 | 232 | 1 | 9 | 2 | 244 | 3 | 383 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 6 |
| 08:30 | 0 | 241 | 0 | 6 | 4 | 252 | 2 | 336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 6 |
| 08:45 | 0 | 254 | 0 | 8 | 6 | 237 | 5 | 327 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 10 |
| 09:00 | 0 | 191 | 0 | 7 | 3 | 221 | 7 | 312 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 4 |
| 09:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:15 | 0 | 121 | 0 | 4 | 3 | 109 | 6 | 240 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 2 |
| 16:30 | 0 | 156 | 1 | 9 | 6 | 101 | 7 | 241 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 3 |
| 16:45 | 0 | 144 | 3 | 6 | 7 | 82 | 4 | 258 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 6 |
| 17:00 | 0 | 144 | 0 | 11 | 4 | 94 | 3 | 243 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 10 |
| 17:15 | 0 | 118 | 2 | 12 | 5 | 132 | 4 | 250 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 11 |
| 17:30 | 0 | 146 | 2 | 12 | 3 | 128 | 5 | 255 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 10 |
| 17:45 | 0 | 118 | 1 | 8 | 4 | 121 | 6 | 242 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 8 |
| 18:00 | 0 | 126 | 0 | 6 | 2 | 108 | 9 | 232 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 12 |

BAYMETRICS TRAFFIC RESOURCES

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | |
|----------------------------------|--|--|--|-------------------------------|--|--|--|-----------------------|--|--|--|
| PROJECT: 412 COURT ST. TS | | | | SURVEY DATE: 7/31/2007 | | | | DAY: TUESDAY | | | |
| N-S Approach: MONTE VISTA | | | | SURVEY TIME: 7:00 AM | | | | TO 9:00 AM | | | |
| E-W Approach: OAKLAND | | | | CITY: OAKLAND | | | | FILE: OLMVOLAM | | | |

PEAK HOUR
07:45 AM TO 08:45 AM

TOTAL
750

OAKLAND
MONTE VISTA

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.87

PHF= 0.88

PHF= 0.90

PHF= 0.64

| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | |
|------------------------|-----|------------|------|-------|------------|------|-------|-----------|------|-------|-----------|------|-------|-------|-------|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| SURVEY DATA | | | | | | | | | | | | | | | |
| 07:00 AM | --- | 07:15 AM | 1 | 2 | 1 | 4 | 4 | 1 | 11 | 21 | 1 | 0 | 43 | 1 | 90 |
| 07:15 AM | --- | 07:30 AM | 2 | 5 | 2 | 5 | 6 | 3 | 28 | 52 | 2 | 3 | 98 | 3 | 209 |
| 07:30 AM | --- | 07:45 AM | 3 | 9 | 3 | 7 | 9 | 5 | 43 | 85 | 2 | 4 | 183 | 4 | 357 |
| 07:45 AM | --- | 08:00 AM | 6 | 12 | 6 | 10 | 12 | 10 | 63 | 125 | 3 | 7 | 279 | 8 | 541 |
| 08:00 AM | --- | 08:15 AM | 7 | 14 | 7 | 15 | 16 | 12 | 81 | 175 | 5 | 10 | 391 | 10 | 743 |
| 08:15 AM | --- | 08:30 AM | 10 | 15 | 10 | 19 | 18 | 16 | 96 | 221 | 7 | 12 | 489 | 13 | 926 |
| 08:30 AM | --- | 08:45 AM | 12 | 15 | 11 | 25 | 23 | 18 | 117 | 274 | 8 | 13 | 574 | 17 | 1,107 |
| 08:45 AM | --- | 09:00 AM | 14 | 17 | 13 | 28 | 25 | 21 | 134 | 313 | 8 | 15 | 646 | 20 | 1,254 |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | |
| 07:00 AM | --- | 07:15 AM | 1 | 2 | 1 | 4 | 4 | 1 | 11 | 21 | 1 | 0 | 43 | 1 | 90 |
| 07:15 AM | --- | 07:30 AM | 1 | 3 | 1 | 1 | 2 | 2 | 17 | 31 | 1 | 3 | 55 | 2 | 119 |
| 07:30 AM | --- | 07:45 AM | 1 | 4 | 1 | 2 | 3 | 2 | 15 | 33 | 0 | 1 | 85 | 1 | 148 |
| 07:45 AM | --- | 08:00 AM | 3 | 3 | 3 | 3 | 3 | 5 | 20 | 40 | 1 | 3 | 96 | 4 | 184 |
| 08:00 AM | --- | 08:15 AM | 1 | 2 | 1 | 5 | 4 | 2 | 18 | 50 | 2 | 3 | 112 | 2 | 202 |
| 08:15 AM | --- | 08:30 AM | 3 | 1 | 3 | 4 | 2 | 4 | 15 | 46 | 2 | 2 | 98 | 3 | 183 |
| 08:30 AM | --- | 08:45 AM | 2 | 0 | 1 | 6 | 5 | 2 | 21 | 53 | 1 | 1 | 85 | 4 | 181 |
| 08:45 AM | --- | 09:00 AM | 2 | 2 | 2 | 3 | 2 | 3 | 17 | 39 | 0 | 2 | 72 | 3 | 147 |
| HOURLY TOTALS | | | | | | | | | | | | | | | |
| 07:00 AM | --- | 08:00 AM | 6 | 12 | 6 | 10 | 12 | 10 | 63 | 125 | 3 | 7 | 279 | 8 | 541 |
| 07:15 AM | --- | 08:15 AM | 6 | 12 | 6 | 11 | 12 | 11 | 70 | 154 | 4 | 10 | 348 | 9 | 653 |
| 07:30 AM | --- | 08:30 AM | 8 | 10 | 8 | 14 | 12 | 13 | 68 | 169 | 5 | 9 | 391 | 10 | 717 |
| 07:45 AM | --- | 08:45 AM | 9 | 6 | 8 | 18 | 14 | 13 | 74 | 189 | 6 | 9 | 391 | 13 | 750 |
| 08:00 AM | --- | 09:00 AM | 8 | 5 | 7 | 18 | 13 | 11 | 71 | 188 | 5 | 8 | 367 | 12 | 713 |

BAYMETRICS TRAFFIC RESOURCES

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | |
|----------------------------------|--|--|--|-------------------------------|--|--|--|-----------------------|--|--|--|
| PROJECT: 412 COURT ST. TS | | | | SURVEY DATE: 7/31/2007 | | | | DAY: TUESDAY | | | |
| N-S Approach: MONTE VISTA | | | | SURVEY TIME: 4:00 PM | | | | TO 6:00 PM | | | |
| E-W Approach: OAKLAND | | | | CITY: OAKLAND | | | | FILE: OLMVOLPM | | | |

PEAK HOUR
05:00 PM TO 06:00 PM

TOTAL
917

OAKLAND
MONTE VISTA

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.91

120 202

PHF= 0.84

223 206

539 434

PHF= 0.96

58 52

PHF= 0.81

| TIME PERIOD | | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL |
|------------------------|-----|----------|------------|------|-------|------------|------|-------|-----------|------|-------|-----------|------|-------|-------|
| From | To | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| SURVEY DATA | | | | | | | | | | | | | | | |
| 04:00 PM | --- | 04:15 PM | 0 | 1 | 3 | 7 | 5 | 4 | 25 | 59 | 2 | 2 | 56 | 3 | 167 |
| 04:15 PM | --- | 04:30 PM | 2 | 1 | 10 | 17 | 13 | 10 | 55 | 127 | 3 | 5 | 107 | 5 | 355 |
| 04:30 PM | --- | 04:45 PM | 3 | 2 | 15 | 29 | 24 | 15 | 79 | 199 | 3 | 9 | 155 | 10 | 543 |
| 04:45 PM | --- | 05:00 PM | 3 | 4 | 23 | 39 | 33 | 22 | 114 | 284 | 7 | 11 | 207 | 14 | 761 |
| 05:00 PM | --- | 05:15 PM | 7 | 10 | 29 | 53 | 45 | 25 | 156 | 380 | 10 | 15 | 247 | 20 | 997 |
| 05:15 PM | --- | 05:30 PM | 10 | 13 | 36 | 70 | 53 | 33 | 203 | 468 | 13 | 17 | 300 | 22 | 1,238 |
| 05:30 PM | --- | 05:45 PM | 13 | 18 | 40 | 81 | 60 | 43 | 241 | 553 | 13 | 20 | 344 | 25 | 1,451 |
| 05:45 PM | --- | 06:00 PM | 15 | 22 | 45 | 89 | 70 | 55 | 283 | 646 | 15 | 24 | 385 | 29 | 1,678 |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | |
| 04:00 PM | --- | 04:15 PM | 0 | 1 | 3 | 7 | 5 | 4 | 25 | 59 | 2 | 2 | 56 | 3 | 167 |
| 04:15 PM | --- | 04:30 PM | 2 | 0 | 7 | 10 | 8 | 6 | 30 | 68 | 1 | 3 | 51 | 2 | 188 |
| 04:30 PM | --- | 04:45 PM | 1 | 1 | 5 | 12 | 11 | 5 | 24 | 72 | 0 | 4 | 48 | 5 | 188 |
| 04:45 PM | --- | 05:00 PM | 0 | 2 | 8 | 10 | 9 | 7 | 35 | 85 | 4 | 2 | 52 | 4 | 218 |
| 05:00 PM | --- | 05:15 PM | 4 | 6 | 6 | 14 | 12 | 3 | 42 | 96 | 3 | 4 | 40 | 6 | 236 |
| 05:15 PM | --- | 05:30 PM | 3 | 3 | 7 | 17 | 8 | 8 | 47 | 88 | 3 | 2 | 53 | 2 | 241 |
| 05:30 PM | --- | 05:45 PM | 3 | 5 | 4 | 11 | 7 | 10 | 38 | 85 | 0 | 3 | 44 | 3 | 213 |
| 05:45 PM | --- | 06:00 PM | 2 | 4 | 5 | 8 | 10 | 12 | 42 | 93 | 2 | 4 | 41 | 4 | 227 |
| HOURLY TOTALS | | | | | | | | | | | | | | | |
| 04:00 PM | --- | 05:00 PM | 3 | 4 | 23 | 39 | 33 | 22 | 114 | 284 | 7 | 11 | 207 | 14 | 761 |
| 04:15 PM | --- | 05:15 PM | 7 | 9 | 26 | 46 | 40 | 21 | 131 | 321 | 8 | 13 | 191 | 17 | 830 |
| 04:30 PM | --- | 05:30 PM | 8 | 12 | 26 | 53 | 40 | 23 | 148 | 341 | 10 | 12 | 193 | 17 | 883 |
| 04:45 PM | --- | 05:45 PM | 10 | 16 | 25 | 52 | 36 | 28 | 162 | 354 | 10 | 11 | 189 | 15 | 908 |
| 05:00 PM | --- | 06:00 PM | 12 | 18 | 22 | 50 | 37 | 33 | 169 | 362 | 8 | 13 | 178 | 15 | 917 |

Tel : (510) 232-1271
Fax: (510) 232-1272

APPENDIX G.2

Intersection LOS Calculation Worksheets

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 5.3 Worst Case Level Of Service: C [16.9]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 867 0 0 0 402 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 867 0 0 0 402 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 867 0 0 0 402 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.91 1.00 1.00 1.00 0.93 1.00 1.00 1.00

PHF Volume: 0 0 0 0 953 0 0 0 432 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 953 0 0 0 432 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 318 xxxxx xxxx xxxxx

Potent Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 728 xxxxx xxxx xxxxx

Move Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 728 xxxxx xxxx xxxxx

Volume/Cap: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 0.59 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 4.0 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 16.9 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * C * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 16.9 xxxxxx

ApproachLOS: * * C *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis

2: I-580 EB On-Ramp & Oakland Avenue

Existing AM
Kaiser Center Transportation Study
























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 383 | 135 | 821 | 345 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1733 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1733 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.97 | 0.83 | 0.89 | 0.91 | 0.58 |
| Adj. Flow (vph) | 395 | 163 | 922 | 379 | 40 |
| RTOR Reduction (vph) | 119 | 48 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 157 | 234 | 922 | 419 | 0 |
| Confl. Peds. (#/hr) | | | | | 2 |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 11.8 | 11.8 | 40.7 | 17.7 | |
| Effective Green, g (s) | 11.8 | 11.8 | 40.7 | 17.7 | |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.68 | 0.30 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 331 | 341 | 2401 | 467 | |
| v/s Ratio Prot | | | c0.26 | c0.26 | |
| v/s Ratio Perm | 0.09 | 0.13 | | | |
| v/c Ratio | 0.47 | 0.69 | 0.38 | 0.90 | |
| Uniform Delay, d1 | 21.4 | 22.4 | 4.2 | 20.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.4 | 4.5 | 0.5 | 19.1 | |
| Delay (s) | 21.7 | 26.9 | 4.7 | 39.4 | |
| Level of Service | C | C | A | D | |
| Approach Delay (s) | | 24.3 | 15.5 | | |
| Approach LOS | | C | B | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 18.1 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | 0.62 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 43.6% | | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |  |  | | |  |  |  | |  |  |  |
| Volume (vph) | 32 | 94 | 63 | 17 | 38 | 13 | 128 | 114 | 12 | 200 | 261 | 22 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | | | 1.00 | 1.00 | 0.91 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1480 | | | 1770 | 1863 | 1448 | | 3433 | 3495 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1480 | | | 1770 | 1863 | 1448 | | 3433 | 3495 | |
| Peak-hour factor, PHF | 0.67 | 0.65 | 0.88 | 0.53 | 0.56 | 0.65 | 0.70 | 0.95 | 0.60 | 0.81 | 0.75 | 0.79 |
| Adj. Flow (vph) | 48 | 145 | 72 | 32 | 68 | 20 | 183 | 120 | 20 | 247 | 348 | 28 |
| RTOR Reduction (vph) | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 99 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 48 | 145 | 84 | 0 | 0 | 88 | 183 | 21 | 0 | 267 | 371 | 0 |
| Confl. Peds. (#/hr) | 21 | | 21 | | | | | 27 | | 9 | | 8 |
| Confl. Bikes (#/hr) | | | 8 | | | | | 24 | | | | 1 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 5.5 | 13.3 | 13.3 | | | 8.0 | 15.8 | 15.8 | | 12.2 | 43.3 | |
| Effective Green, g (s) | 5.5 | 13.3 | 13.3 | | | 8.0 | 15.8 | 15.8 | | 12.2 | 43.3 | |
| Actuated g/C Ratio | 0.06 | 0.15 | 0.15 | | | 0.09 | 0.18 | 0.18 | | 0.14 | 0.48 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 108 | 523 | 219 | | | 157 | 327 | 254 | | 465 | 1681 | |
| v/s Ratio Prot | 0.03 | 0.04 | | | | 0.05 | c0.10 | | | c0.08 | c0.11 | |
| v/s Ratio Perm | | | c0.06 | | | | | 0.01 | | | | |
| v/c Ratio | 0.44 | 0.28 | 0.38 | | | 0.56 | 0.56 | 0.08 | | 0.57 | 0.22 | |
| Uniform Delay, d1 | 40.8 | 34.1 | 34.6 | | | 39.3 | 33.9 | 31.0 | | 36.5 | 13.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.9 | 0.3 | 1.1 | | | 4.5 | 2.1 | 0.1 | | 1.7 | 0.3 | |
| Delay (s) | 43.7 | 34.4 | 35.7 | | | 43.8 | 36.0 | 31.2 | | 38.2 | 13.9 | |
| Level of Service | D | C | D | | | D | D | C | | D | B | |
| Approach Delay (s) | | 36.4 | | | | | 36.3 | | | | 24.0 | |
| Approach LOS | | D | | | | | D | | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 27.6 | | | | HCM Level of Service | | C | | | | |
| HCM Volume to Capacity ratio | | 0.63 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 90.0 | | | | Sum of lost time (s) | | 16.0 | | | | |
| Intersection Capacity Utilization | | 60.6% | | | | ICU Level of Service | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing AM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|------|------|------|
| Lane Configurations | ← | ↑↑ | ← | ← |
| Volume (vph) | 82 | 798 | 81 | 80 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3441 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3441 | | |
| Peak-hour factor, PHF | 0.76 | 0.89 | 0.84 | 0.74 |
| Adj. Flow (vph) | 108 | 897 | 96 | 108 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 |
| Lane Group Flow (vph) | 108 | 1094 | 0 | 0 |
| Confl. Peds. (#/hr) | 18 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 9.4 | 40.5 | | |
| Effective Green, g (s) | 9.4 | 40.5 | | |
| Actuated g/C Ratio | 0.10 | 0.45 | | |
| Clearance Time (s) | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 185 | 1548 | | |
| v/s Ratio Prot | 0.06 | 0.32 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.58 | 0.71 | | |
| Uniform Delay, d1 | 38.4 | 20.0 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 4.6 | 2.7 | | |
| Delay (s) | 43.1 | 22.7 | | |
| Level of Service | D | C | | |
| Approach Delay (s) | | 24.5 | | |
| Approach LOS | | C | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑ | ↑ | ↑ | ↑↑ | | ↑ | ↑↑ | |
| Volume (vph) | 48 | 137 | 66 | 28 | 239 | 247 | 41 | 387 | 31 | 80 | 433 | 36 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | | 0.91 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.96 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | | 0.99 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 4773 | | | 3506 | 1543 | 1758 | 3481 | | 1765 | 3472 | |
| Flt Permitted | | 0.79 | | | 0.85 | 1.00 | 0.41 | 1.00 | | 0.48 | 1.00 | |
| Satd. Flow (perm) | | 3835 | | | 3020 | 1543 | 766 | 3481 | | 895 | 3472 | |
| Peak-hour factor, PHF | 0.60 | 0.93 | 0.92 | 0.58 | 0.95 | 0.85 | 0.68 | 0.97 | 0.86 | 0.71 | 0.91 | 0.60 |
| Adj. Flow (vph) | 80 | 147 | 72 | 48 | 252 | 291 | 60 | 399 | 36 | 113 | 476 | 60 |
| RTOR Reduction (vph) | 0 | 42 | 0 | 0 | 0 | 168 | 0 | 8 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 257 | 0 | 0 | 300 | 123 | 60 | 427 | 0 | 113 | 524 | 0 |
| Confl. Peds. (#/hr) | 25 | | 25 | 18 | | 13 | 19 | | 13 | 6 | | 6 |
| Confl. Bikes (#/hr) | | 16 | 16 | 59 | | 5 | | 5 | 59 | | | 6 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | | 1624 | | | 1279 | 654 | 342 | 1556 | | 400 | 1552 | |
| v/s Ratio Prot | | | | | | | | 0.12 | | | c0.15 | |
| v/s Ratio Perm | | 0.07 | | | c0.10 | 0.08 | 0.08 | | | 0.13 | | |
| v/c Ratio | | 0.16 | | | 0.23 | 0.19 | 0.18 | 0.27 | | 0.28 | 0.34 | |
| Uniform Delay, d1 | | 15.1 | | | 15.7 | 15.3 | 14.1 | 14.8 | | 14.9 | 15.3 | |
| Progression Factor | | 0.80 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.4 | 0.6 | 1.1 | 0.4 | | 1.8 | 0.6 | |
| Delay (s) | | 12.3 | | | 16.1 | 16.0 | 15.2 | 15.2 | | 16.6 | 15.9 | |
| Level of Service | | B | | | B | B | B | B | | B | B | |
| Approach Delay (s) | | 12.3 | | | 16.1 | | | 15.2 | | | 16.0 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 15.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.29 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 93.8% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 293 | 302 | 114 | 37 | 208 | 91 | 69 | 305 | 19 | 39 | 277 | 113 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.96 | | 1.00 | 0.99 | | 1.00 | 0.95 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 3388 | | 1766 | 3368 | | 1760 | 3483 | | 1764 | 3343 | |
| Flt Permitted | 0.47 | 1.00 | | 0.48 | 1.00 | | 0.30 | 1.00 | | 0.43 | 1.00 | |
| Satd. Flow (perm) | 880 | 3388 | | 892 | 3368 | | 547 | 3483 | | 797 | 3343 | |
| Peak-hour factor, PHF | 0.81 | 0.86 | 0.92 | 0.84 | 0.79 | 0.88 | 0.96 | 0.91 | 0.68 | 0.70 | 0.87 | 0.76 |
| Adj. Flow (vph) | 362 | 351 | 124 | 44 | 263 | 103 | 72 | 335 | 28 | 56 | 318 | 149 |
| RTOR Reduction (vph) | 0 | 23 | 0 | 0 | 33 | 0 | 0 | 10 | 0 | 0 | 88 | 0 |
| Lane Group Flow (vph) | 362 | 452 | 0 | 44 | 333 | 0 | 72 | 353 | 0 | 56 | 379 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | | pm+pt | | | Perm | | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 61.5 | 53.6 | | 48.9 | 45.5 | | 14.5 | 14.5 | | 14.5 | 14.5 | |
| Effective Green, g (s) | 61.5 | 53.6 | | 48.9 | 45.5 | | 14.5 | 14.5 | | 14.5 | 14.5 | |
| Actuated g/C Ratio | 0.72 | 0.63 | | 0.58 | 0.54 | | 0.17 | 0.17 | | 0.17 | 0.17 | |
| Clearance Time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 757 | 2136 | | 548 | 1803 | | 93 | 594 | | 136 | 570 | |
| v/s Ratio Prot | c0.06 | 0.13 | | 0.00 | 0.10 | | | 0.10 | | | 0.11 | |
| v/s Ratio Perm | c0.28 | | | 0.04 | | | c0.13 | | | 0.07 | | |
| v/c Ratio | 0.48 | 0.21 | | 0.08 | 0.18 | | 0.77 | 0.59 | | 0.41 | 0.67 | |
| Uniform Delay, d1 | 4.4 | 6.7 | | 7.9 | 10.2 | | 33.7 | 32.5 | | 31.4 | 33.0 | |
| Progression Factor | 1.00 | 1.00 | | 0.63 | 0.72 | | 0.91 | 0.90 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.2 | | 0.0 | 0.2 | | 28.8 | 1.0 | | 0.7 | 2.3 | |
| Delay (s) | 4.6 | 6.9 | | 5.0 | 7.5 | | 59.3 | 30.3 | | 32.2 | 35.3 | |
| Level of Service | A | A | | A | A | | E | C | | C | D | |
| Approach Delay (s) | | 5.9 | | | 7.2 | | | 35.1 | | | 34.9 | |
| Approach LOS | | A | | | A | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 18.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 68.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

6: 27th Street & I-980 On Ramp

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↰↰↰ | | | ↰↰↰ | ↰ | | ↰↰↰ | | | | |
| Volume (vph) | 132 | 702 | 0 | 0 | 127 | 244 | 4 | 219 | 21 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.86 | 0.86 | | | 0.86 | 0.86 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 0.92 | 0.85 | | 0.98 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1520 | 4801 | | | 4426 | 1362 | | 4973 | | | | |
| Flt Permitted | 0.54 | 0.93 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 871 | 4478 | | | 4426 | 1362 | | 4973 | | | | |
| Peak-hour factor, PHF | 0.89 | 0.89 | 0.92 | 0.92 | 0.86 | 0.74 | 0.50 | 0.88 | 0.58 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 148 | 789 | 0 | 0 | 148 | 330 | 8 | 249 | 36 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 99 | 99 | 0 | 22 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 133 | 804 | 0 | 0 | 214 | 66 | 0 | 271 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 6 | | 6 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 4 | | | 3 |
| Turn Type | Perm | | | Perm | | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 348 | 1791 | | | 1770 | 545 | | 1989 | | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | 0.15 | 0.18 | | | | 0.05 | | 0.05 | | | | |
| v/c Ratio | 0.38 | 0.45 | | | 0.12 | 0.12 | | 0.14 | | | | |
| Uniform Delay, d1 | 8.5 | 8.8 | | | 7.6 | 7.6 | | 7.6 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 3.2 | 0.8 | | | 0.1 | 0.5 | | 0.1 | | | | |
| Delay (s) | 11.7 | 9.6 | | | 7.7 | 8.0 | | 7.8 | | | | |
| Level of Service | B | A | | | A | A | | A | | | | |
| Approach Delay (s) | | 9.9 | | | 7.8 | | | 7.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 8.9 | | | HCM Level of Service | | | A | | | | |
| HCM Volume to Capacity ratio | | 0.29 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 47.0% | | | ICU Level of Service | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑↑ | | | | | ↘ | ↗↑ | ↗ |
| Volume (vph) | 0 | 239 | 23 | 9 | 135 | 0 | 0 | 0 | 0 | 577 | 838 | 297 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.91 | | | 0.91 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (prot) | | 4984 | | | 5060 | | | | | 1610 | 3366 | 1583 |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (perm) | | 4984 | | | 4613 | | | | | 1610 | 3366 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.91 | 0.64 | 0.56 | 0.82 | 0.92 | 0.92 | 0.92 | 0.92 | 0.88 | 0.93 | 0.77 |
| Adj. Flow (vph) | 0 | 263 | 36 | 16 | 165 | 0 | 0 | 0 | 0 | 656 | 901 | 386 |
| RTOR Reduction (vph) | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 |
| Lane Group Flow (vph) | 0 | 276 | 0 | 0 | 181 | 0 | 0 | 0 | 0 | 505 | 1052 | 199 |
| Confl. Peds. (#/hr) | 2 | | 2 | 10 | | 10 | 6 | | 6 | | | |
| Confl. Bikes (#/hr) | | | 3 | | | 4 | | | 1 | | | |
| Turn Type | | | Perm | | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1744 | | | 1615 | | | | | 832 | 1739 | 818 |
| v/s Ratio Prot | | c0.06 | | | | | | | | | | |
| v/s Ratio Perm | | | | | 0.04 | | | | | c0.31 | 0.31 | 0.13 |
| v/c Ratio | | 0.16 | | | 0.11 | | | | | 0.61 | 0.60 | 0.24 |
| Uniform Delay, d1 | | 13.4 | | | 13.2 | | | | | 10.2 | 10.2 | 8.0 |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.2 | | | 0.1 | | | | | 3.3 | 1.6 | 0.7 |
| Delay (s) | | 13.6 | | | 13.3 | | | | | 13.5 | 11.8 | 8.7 |
| Level of Service | | B | | | B | | | | | B | B | A |
| Approach Delay (s) | | 13.6 | | | 13.3 | | | 0.0 | | | 11.6 | |
| Approach LOS | | B | | | B | | | A | | | B | |

Intersection Summary

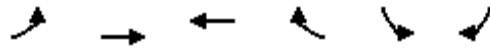
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 12.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.43 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 51.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 166 | 483 | 568 | 104 | 648 | 167 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.97 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3419 | | 3431 | 1414 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3419 | | 3431 | 1414 |
| Peak-hour factor, PHF | 0.91 | 0.86 | 0.89 | 0.70 | 0.90 | 0.89 |
| Adj. Flow (vph) | 182 | 562 | 638 | 149 | 720 | 188 |
| RTOR Reduction (vph) | 0 | 0 | 21 | 0 | 3 | 123 |
| Lane Group Flow (vph) | 182 | 562 | 766 | 0 | 736 | 46 |
| Confl. Peds. (#/hr) | 14 | | | 11 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 10 | | 1 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 5 | 2 | 6 | | 4 | |
| Permitted Phases | | | | | | 4 |
| Actuated Green, G (s) | 12.0 | 50.3 | 34.3 | | 21.7 | 21.7 |
| Effective Green, g (s) | 12.0 | 50.3 | 34.3 | | 21.7 | 21.7 |
| Actuated g/C Ratio | 0.15 | 0.63 | 0.43 | | 0.27 | 0.27 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 266 | 2225 | 1466 | | 931 | 384 |
| v/s Ratio Prot | c0.10 | 0.16 | c0.22 | | c0.21 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.68 | 0.25 | 0.52 | | 0.79 | 0.12 |
| Uniform Delay, d1 | 32.2 | 6.6 | 16.8 | | 27.0 | 22.0 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.7 | 0.3 | 1.3 | | 4.3 | 0.1 |
| Delay (s) | 37.9 | 6.8 | 18.2 | | 31.4 | 22.0 |
| Level of Service | D | A | B | | C | C |
| Approach Delay (s) | | 14.4 | 18.2 | | 29.6 | |
| Approach LOS | | B | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 21.3 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.64 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 58.7% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|-------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 92 | 659 | 303 | 58 | 356 | 55 | 170 | 217 | 26 | 73 | 300 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1766 | 3427 | 1553 | 1767 | 3339 | | 1768 | 3448 | | 1756 | 3414 | |
| Flt Permitted | 0.33 | 1.00 | 1.00 | 0.19 | 1.00 | | 0.45 | 1.00 | | 0.59 | 1.00 | |
| Satd. Flow (perm) | 615 | 3427 | 1553 | 361 | 3339 | | 839 | 3448 | | 1084 | 3414 | |
| Peak-hour factor, PHF | 0.77 | 0.96 | 0.85 | 0.85 | 0.83 | 0.72 | 0.82 | 0.95 | 0.65 | 0.87 | 0.92 | 0.77 |
| Adj. Flow (vph) | 119 | 686 | 356 | 68 | 429 | 76 | 207 | 228 | 40 | 84 | 326 | 84 |
| RTOR Reduction (vph) | 0 | 0 | 258 | 0 | 17 | 0 | 0 | 16 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 119 | 686 | 98 | 68 | 488 | 0 | 207 | 252 | 0 | 84 | 386 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | 5 | 2 | | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 51.0 | 51.0 | | | 37.5 | 37.5 | |
| Effective Green, g (s) | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 51.0 | 51.0 | | | 37.5 | 37.5 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.60 | 0.60 | | | 0.44 | 0.44 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 6.0 | | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 170 | 947 | 429 | 100 | 923 | 602 | 2069 | | | 478 | 1506 | |
| v/s Ratio Prot | | c0.20 | | | 0.15 | c0.04 | 0.07 | | | | 0.11 | |
| v/s Ratio Perm | 0.19 | | 0.06 | 0.19 | | c0.17 | | | | 0.08 | | |
| v/c Ratio | 0.70 | 0.72 | 0.23 | 0.68 | 0.53 | 0.34 | 0.12 | | | 0.18 | 0.26 | |
| Uniform Delay, d1 | 27.6 | 27.8 | 23.8 | 27.4 | 26.1 | 7.9 | 7.3 | | | 14.4 | 15.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.08 | 1.10 | |
| Incremental Delay, d2 | 21.3 | 4.8 | 1.2 | 31.4 | 2.2 | 0.1 | 0.1 | | | 0.8 | 0.4 | |
| Delay (s) | 48.9 | 32.6 | 25.0 | 58.8 | 28.2 | 8.0 | 7.5 | | | 16.4 | 16.9 | |
| Level of Service | D | C | C | E | C | A | A | | | B | B | |
| Approach Delay (s) | | 32.0 | | | 31.9 | | 7.7 | | | | 16.8 | |
| Approach LOS | | C | | | C | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 24.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.45 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 69.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 74 | 555 | 53 | 80 | 411 | 61 | 85 | 352 | 76 | 51 | 305 | 66 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1750 | 3355 | | | 3321 | | 1762 | 3539 | 1532 | 1760 | 3424 | |
| Flt Permitted | 0.27 | 1.00 | | | 0.64 | | 0.49 | 1.00 | 1.00 | 0.52 | 1.00 | |
| Satd. Flow (perm) | 501 | 3355 | | | 2152 | | 917 | 3539 | 1532 | 968 | 3424 | |
| Peak-hour factor, PHF | 0.71 | 0.92 | 0.74 | 0.83 | 0.90 | 0.90 | 0.63 | 0.92 | 0.66 | 0.55 | 0.88 | 0.83 |
| Adj. Flow (vph) | 104 | 603 | 72 | 96 | 457 | 68 | 135 | 383 | 115 | 93 | 347 | 80 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 14 | 0 | 0 | 0 | 48 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 104 | 661 | 0 | 0 | 607 | 0 | 135 | 383 | 67 | 93 | 409 | 0 |
| Confl. Peds. (#/hr) | 34 | | 34 | 37 | | 37 | 8 | | 8 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 11 | | | 8 | | | 35 | | | 7 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | Perm | Perm | |
| Protected Phases | 4 | | 8 | | 8 | | 2 | | 2 | 6 | 6 | |
| Permitted Phases | 4 | | 8 | | 8 | | 2 | | 2 | 6 | 6 | |
| Actuated Green, G (s) | 25.6 | 25.6 | | | 25.6 | | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | |
| Effective Green, g (s) | 25.6 | 25.6 | | | 25.6 | | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | |
| Actuated g/C Ratio | 0.32 | 0.32 | | | 0.32 | | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 160 | 1074 | | | 689 | | 532 | 2053 | 889 | 561 | 1986 | |
| v/s Ratio Prot | 0.20 | | | | | | 0.11 | | | | 0.12 | |
| v/s Ratio Perm | 0.21 | | c0.28 | | c0.15 | | 0.04 | | 0.10 | | | |
| v/c Ratio | 0.65 | 0.62 | | | 0.88 | | 0.25 | 0.19 | 0.08 | 0.17 | 0.21 | |
| Uniform Delay, d1 | 23.4 | 23.0 | | | 25.8 | | 8.3 | 7.9 | 7.4 | 7.8 | 8.0 | |
| Progression Factor | 1.00 | 1.00 | | | 1.07 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 7.0 | 0.7 | | | 12.2 | | 1.1 | 0.2 | 0.2 | 0.6 | 0.2 | |
| Delay (s) | 30.4 | 23.8 | | | 39.7 | | 9.4 | 8.1 | 7.5 | 8.4 | 8.2 | |
| Level of Service | C | C | | | D | | A | A | A | A | A | |
| Approach Delay (s) | 24.7 | | 39.7 | | 8.3 | | 8.3 | | | | | |
| Approach LOS | C | | D | | A | | | | | | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 20.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.48 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 80.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 0 | 328 | 265 | 101 | 373 | 0 | 0 | 0 | 0 | 8 | 127 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frpb, ped/bikes | | 0.97 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Frt | | 0.93 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 3114 | | 1765 | 3427 | | | | | | 3370 | |
| Flt Permitted | | 1.00 | | 0.27 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 3114 | | 510 | 3427 | | | | | | 3370 | |
| Peak-hour factor, PHF | 0.25 | 0.93 | 0.92 | 0.84 | 0.91 | 0.25 | 0.92 | 0.92 | 0.92 | 0.50 | 0.91 | 0.63 |
| Adj. Flow (vph) | 0 | 353 | 288 | 120 | 410 | 0 | 0 | 0 | 0 | 16 | 140 | 24 |
| RTOR Reduction (vph) | 0 | 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 |
| Lane Group Flow (vph) | 0 | 469 | 0 | 120 | 410 | 0 | 0 | 0 | 0 | 0 | 165 | 0 |
| Confl. Peds. (#/hr) | 26 | | 26 | 28 | | 28 | 21 | | 21 | 101 | | 101 |
| Confl. Bikes (#/hr) | | | 4 | | | 4 | | | 3 | | | 6 |
| Turn Type | Perm | | pm+pt | | pm+pt | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 31.8 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Effective Green, g (s) | 31.8 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Actuated g/C Ratio | 0.40 | | 0.54 | | 0.54 | | | | 0.36 | | | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | 3.0 | | | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | 2.0 | | | |
| Lane Grp Cap (vph) | 1238 | | 371 | | 1842 | | | | 1222 | | | |
| v/s Ratio Prot | c0.15 | | c0.03 | | 0.12 | | | | | | | |
| v/s Ratio Perm | | | 0.15 | | | | | | 0.05 | | | |
| v/c Ratio | 0.38 | | 0.32 | | 0.22 | | | | 0.13 | | | |
| Uniform Delay, d1 | 17.1 | | 10.2 | | 9.7 | | | | 17.1 | | | |
| Progression Factor | 2.78 | | 1.00 | | 1.00 | | | | 1.00 | | | |
| Incremental Delay, d2 | 0.8 | | 0.2 | | 0.3 | | | | 0.2 | | | |
| Delay (s) | 48.4 | | 10.4 | | 10.0 | | | | 17.3 | | | |
| Level of Service | D | | B | | A | | | | B | | | |
| Approach Delay (s) | 48.4 | | | | 10.1 | | 0.0 | | | | 17.3 | |
| Approach LOS | D | | | | B | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 29.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.27 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 62.0% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↔↔↔ | ↗ | | ↔↔↔ | |
| Volume (vph) | 53 | 126 | 65 | 345 | 465 | 101 | 103 | 630 | 290 | 28 | 583 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 1.00 | 0.94 | | 1.00 | 0.90 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 5032 | 1419 | | 4940 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.69 | 1.00 | | 0.80 | |
| Satd. Flow (perm) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 3506 | 1419 | | 3947 | |
| Peak-hour factor, PHF | 0.74 | 0.81 | 0.65 | 0.89 | 0.80 | 0.52 | 0.83 | 0.88 | 0.82 | 0.50 | 0.93 | 0.79 |
| Adj. Flow (vph) | 72 | 156 | 100 | 388 | 581 | 194 | 124 | 716 | 354 | 56 | 627 | 96 |
| RTOR Reduction (vph) | 0 | 0 | 48 | 0 | 0 | 108 | 0 | 0 | 227 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 72 | 156 | 52 | 388 | 581 | 86 | 0 | 840 | 127 | 0 | 760 | 0 |
| Confl. Peds. (#/hr) | 38 | | 38 | 34 | | 34 | 60 | | 60 | 28 | | 28 |
| Confl. Bikes (#/hr) | | | 12 | | | 18 | | | 39 | | | 9 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 5.6 | 34.5 | 34.5 | 14.5 | 44.4 | 44.4 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 5.6 | 34.5 | 34.5 | 14.5 | 44.4 | 44.4 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.06 | 0.34 | 0.34 | 0.14 | 0.44 | 0.44 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 192 | 1221 | 510 | 498 | 1571 | 659 | | 1262 | 511 | | 1421 | |
| v/s Ratio Prot | 0.02 | 0.04 | | c0.11 | c0.16 | | | | | | | |
| v/s Ratio Perm | | | 0.04 | | | 0.06 | | c0.24 | 0.09 | | 0.19 | |
| v/c Ratio | 0.38 | 0.13 | 0.10 | 0.78 | 0.37 | 0.13 | | 0.67 | 0.25 | | 0.54 | |
| Uniform Delay, d1 | 45.5 | 22.4 | 22.2 | 41.2 | 18.5 | 16.4 | | 26.9 | 22.5 | | 25.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.2 | 0.4 | 6.9 | 0.7 | 0.4 | | 2.8 | 1.2 | | 1.4 | |
| Delay (s) | 46.0 | 22.7 | 22.6 | 48.1 | 19.2 | 16.8 | | 29.7 | 23.7 | | 26.8 | |
| Level of Service | D | C | C | D | B | B | | C | C | | C | |
| Approach Delay (s) | | 27.8 | | | 28.4 | | | 27.9 | | | 26.8 | |
| Approach LOS | | C | | | C | | | C | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 27.8 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 88.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Existing AM
Kaiser Center Transportation Study

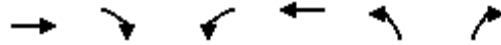


| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|-------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 50 | 32 | 84 | 805 | 925 | 266 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.97 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.94 | | 1.00 | 1.00 | 0.97 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3208 | | 1762 | 3725 | 6190 | |
| Flt Permitted | 0.97 | | 0.18 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3208 | | 334 | 3725 | 6190 | |
| Peak-hour factor, PHF | 0.83 | 0.89 | 0.84 | 0.96 | 0.93 | 0.91 |
| Adj. Flow (vph) | 60 | 36 | 100 | 839 | 995 | 292 |
| RTOR Reduction (vph) | 33 | 0 | 0 | 0 | 29 | 0 |
| Lane Group Flow (vph) | 63 | 0 | 100 | 839 | 1258 | 0 |
| Confl. Peds. (#/hr) | 36 | 36 | 109 | | | |
| Confl. Bikes (#/hr) | | 14 | | | | |
| Turn Type | pm+pt | | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 6.0 | | 60.5 | 54.7 | 54.7 | |
| Effective Green, g (s) | 6.0 | | 60.5 | 54.7 | 54.7 | |
| Actuated g/C Ratio | 0.08 | | 0.76 | 0.68 | 0.68 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 241 | | 356 | 2547 | 4232 | |
| v/s Ratio Prot | c0.02 | | c0.02 | c0.23 | 0.20 | |
| v/s Ratio Perm | | | 0.19 | | | |
| v/c Ratio | 0.26 | | 0.28 | 0.33 | 0.30 | |
| Uniform Delay, d1 | 34.9 | | 2.6 | 5.2 | 5.0 | |
| Progression Factor | 1.00 | | 1.97 | 1.18 | 1.00 | |
| Incremental Delay, d2 | 0.6 | | 0.4 | 0.3 | 0.2 | |
| Delay (s) | 35.5 | | 5.5 | 6.4 | 5.2 | |
| Level of Service | D | | A | A | A | |
| Approach Delay (s) | 35.5 | | | 6.3 | 5.2 | |
| Approach LOS | D | | | A | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 6.9 | | HCM Level of Service | A |
| HCM Volume to Capacity ratio | | | 0.32 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | | | 52.5% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

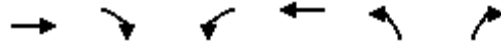
Existing AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ➡ | | | ➡ | ➡ | ➡ |
| Volume (veh/h) | 81 | 29 | 85 | 263 | 1 | 1 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.84 | 0.66 | 0.82 | 0.83 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 96 | 44 | 104 | 317 | 4 | 4 |
| Pedestrians | 7 | | | 7 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 142 | | 652 | 127 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 142 | | 652 | 127 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 93 | | 99 | 100 |
| cM capacity (veh/h) | | | 1438 | | 399 | 916 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 140 | 421 | 8 | | | |
| Volume Left | 0 | 104 | 4 | | | |
| Volume Right | 44 | 0 | 4 | | | |
| cSH | 1700 | 1438 | 555 | | | |
| Volume to Capacity | 0.08 | 0.07 | 0.01 | | | |
| Queue Length 95th (ft) | 0 | 6 | 1 | | | |
| Control Delay (s) | 0.0 | 2.4 | 11.6 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 2.4 | 11.6 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.9 | | | |
| Intersection Capacity Utilization | | 37.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

Existing AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | ➡ | | | ➡ | ➡ | ➡ |
| Volume (veh/h) | 108 | 100 | 124 | 140 | 2 | 2 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.75 | 0.83 | 0.88 | 0.76 | 0.50 | 0.50 |
| Hourly flow rate (vph) | 144 | 120 | 141 | 184 | 4 | 4 |
| Pedestrians | 24 | | | 24 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 2 | | | 2 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 266 | | 696 | 230 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 266 | | 696 | 230 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 89 | | 99 | 99 |
| cM capacity (veh/h) | | | 1295 | | 355 | 791 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 264 | 325 | 8 | | | |
| Volume Left | 0 | 141 | 4 | | | |
| Volume Right | 120 | 0 | 4 | | | |
| cSH | 1700 | 1295 | 490 | | | |
| Volume to Capacity | 0.16 | 0.11 | 0.02 | | | |
| Queue Length 95th (ft) | 0 | 9 | 1 | | | |
| Control Delay (s) | 0.0 | 4.1 | 12.5 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 4.1 | 12.5 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | | | 45.1% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

16: 21st Street & Garage Entrance West

Existing AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩↪ | ↩↪ |
| Volume (veh/h) | 75 | 8 | 38 | 319 | 24 | 15 |
| Sign Control | Free | | Free | | Yield | |
| Grade | 0% | | 0% | | 0% | |
| Peak Hour Factor | 0.85 | 1.00 | 0.73 | 0.85 | 0.86 | 0.75 |
| Hourly flow rate (vph) | 88 | 8 | 52 | 375 | 28 | 20 |
| Pedestrians | 16 | | | 16 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 98 | | 590 | 110 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 98 | | 590 | 110 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 97 | | 94 | 98 |
| cM capacity (veh/h) | | | 1492 | | 447 | 929 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 96 | 427 | 14 | 14 | 10 | 10 |
| Volume Left | 0 | 52 | 14 | 14 | 0 | 0 |
| Volume Right | 8 | 0 | 0 | 0 | 10 | 10 |
| cSH | 1700 | 1492 | 447 | 447 | 929 | 929 |
| Volume to Capacity | 0.06 | 0.03 | 0.03 | 0.03 | 0.01 | 0.01 |
| Queue Length 95th (ft) | 0 | 3 | 2 | 2 | 1 | 1 |
| Control Delay (s) | 0.0 | 1.2 | 13.3 | 13.3 | 8.9 | 8.9 |
| Lane LOS | | A | B | B | A | A |
| Approach Delay (s) | 0.0 | 1.2 | 11.5 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.9 | | | |
| Intersection Capacity Utilization | | 39.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Signalized Intersection Capacity Analysis

17: 21st Street & Webster Street

Existing AM
Kaiser Center Transportation Study

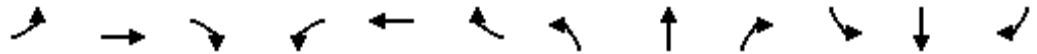


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 153 | 45 | 40 | 41 | 0 | 0 | 0 | 0 | 124 | 322 | 24 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.93 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.97 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1340 | | 1695 | | | | | | 4787 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.65 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1340 | | 1130 | | | | | | 4787 | |
| Peak-hour factor, PHF | 0.92 | 0.87 | 0.80 | 0.77 | 0.85 | 0.92 | 0.92 | 0.92 | 0.92 | 0.91 | 0.90 | 0.75 |
| Adj. Flow (vph) | 0 | 176 | 56 | 52 | 48 | 0 | 0 | 0 | 0 | 136 | 358 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 176 | 9 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 523 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | 2 | |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 13.2 | 13.2 | | 13.2 | | | | | | 58.8 | |
| Effective Green, g (s) | | 13.2 | 13.2 | | 13.2 | | | | | | 58.8 | |
| Actuated g/C Ratio | | 0.16 | 0.16 | | 0.16 | | | | | | 0.74 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 307 | 221 | | 186 | | | | | | 3518 | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.09 | | | | | | 0.11 | |
| v/c Ratio | | 0.57 | 0.04 | | 0.54 | | | | | | 0.15 | |
| Uniform Delay, d1 | | 30.8 | 28.1 | | 30.6 | | | | | | 3.2 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.57 | |
| Incremental Delay, d2 | | 2.6 | 0.1 | | 3.0 | | | | | | 0.1 | |
| Delay (s) | | 33.4 | 28.2 | | 33.6 | | | | | | 1.9 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 32.1 | | | 33.6 | | | 0.0 | | | 1.9 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.8 | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | | 0.23 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | | 54.7% | | | ICU Level of Service | | A | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰↱ | ↱ | | | |
| Volume (vph) | 6 | 146 | 3 | 0 | 33 | 29 | 8 | 163 | 65 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 0.99 | | | 0.94 | | | 1.00 | 0.87 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 0.99 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1824 | | | 1652 | | | 3501 | 1376 | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1809 | | | 1652 | | | 3501 | 1376 | | | |
| Peak-hour factor, PHF | 0.50 | 0.89 | 0.25 | 0.92 | 0.75 | 0.81 | 0.50 | 0.77 | 0.86 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 12 | 164 | 12 | 0 | 44 | 36 | 16 | 212 | 76 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 12 | 0 | 0 | 0 | 64 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 185 | 0 | 0 | 68 | 0 | 0 | 228 | 12 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 29.7 | | | 29.7 | | | 7.3 | 7.3 | | | |
| Effective Green, g (s) | | 29.7 | | | 29.7 | | | 7.3 | 7.3 | | | |
| Actuated g/C Ratio | | 0.66 | | | 0.66 | | | 0.16 | 0.16 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1194 | | | 1090 | | | 568 | 223 | | | |
| v/s Ratio Prot | | | | | 0.04 | | | | | | | |
| v/s Ratio Perm | | c0.10 | | | | | | 0.07 | 0.01 | | | |
| v/c Ratio | | 0.15 | | | 0.06 | | | 0.40 | 0.06 | | | |
| Uniform Delay, d1 | | 2.9 | | | 2.7 | | | 16.9 | 15.9 | | | |
| Progression Factor | | 0.74 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.1 | | | 0.2 | 0.0 | | | |
| Delay (s) | | 2.4 | | | 2.8 | | | 17.1 | 16.0 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 2.4 | | | 2.8 | | | 16.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.1 | | | | | | HCM Level of Service | B | | | |
| HCM Volume to Capacity ratio | | 0.20 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 33.0% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 9 | 92 | 14 | 19 | 0 | 28 | 0 | 257 | 31 | 34 | 285 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.92 | | | 0.98 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1751 | 1818 | | | 1647 | | | 3446 | | | 3505 | |
| Flt Permitted | 0.72 | 1.00 | | | 0.90 | | | 1.00 | | | 0.89 | |
| Satd. Flow (perm) | 1323 | 1818 | | | 1515 | | | 3446 | | | 3128 | |
| Peak-hour factor, PHF | 0.56 | 0.92 | 0.88 | 0.79 | 0.92 | 0.78 | 0.92 | 0.85 | 0.78 | 0.85 | 0.89 | 0.92 |
| Adj. Flow (vph) | 16 | 100 | 16 | 24 | 0 | 36 | 0 | 302 | 40 | 40 | 320 | 0 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 21 | 0 | 0 | 23 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 16 | 107 | 0 | 0 | 39 | 0 | 0 | 319 | 0 | 0 | 360 | 0 |
| Confl. Peds. (#/hr) | 16 | | 16 | 17 | | 17 | 43 | | 43 | 44 | | 44 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | 16 |
| Turn Type | Perm | | | Perm | | | | Perm | | | | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 559 | 768 | | | 640 | | | 1302 | | | 1182 | |
| v/s Ratio Prot | c0.06 | | | | | | | 0.09 | | | | |
| v/s Ratio Perm | 0.01 | | | | 0.03 | | | | | | c0.12 | |
| v/c Ratio | 0.03 | 0.14 | | | 0.06 | | | 0.24 | | | 0.30 | |
| Uniform Delay, d1 | 7.6 | 8.0 | | | 7.7 | | | 9.6 | | | 9.8 | |
| Progression Factor | 1.00 | 1.00 | | | 1.31 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.4 | | | 0.2 | | | 0.4 | | | 0.7 | |
| Delay (s) | 7.7 | 8.4 | | | 10.3 | | | 10.0 | | | 10.5 | |
| Level of Service | A | A | | | B | | | B | | | B | |
| Approach Delay (s) | | 8.3 | | | 10.3 | | | 10.0 | | | 10.5 | |
| Approach LOS | | A | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.0 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.22 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 55.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | ↕ | ↕↕ | |
| Volume (vph) | 15 | 62 | 16 | 10 | 158 | 80 | 27 | 369 | 19 | 127 | 131 | 47 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | 0.94 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3403 | | | 3295 | | | 3489 | | 1768 | 3385 | |
| Flt Permitted | | 0.86 | | | 0.94 | | | 0.91 | | 0.43 | 1.00 | |
| Satd. Flow (perm) | | 2957 | | | 3101 | | | 3185 | | 805 | 3385 | |
| Peak-hour factor, PHF | 0.75 | 0.78 | 0.80 | 0.83 | 0.94 | 0.74 | 0.61 | 0.98 | 0.79 | 0.91 | 0.76 | 0.78 |
| Adj. Flow (vph) | 20 | 79 | 20 | 12 | 168 | 108 | 44 | 377 | 24 | 140 | 172 | 60 |
| RTOR Reduction (vph) | 0 | 17 | 0 | 0 | 92 | 0 | 0 | 5 | 0 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 0 | 102 | 0 | 0 | 196 | 0 | 0 | 440 | 0 | 140 | 214 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 8.9 | | | 8.9 | | | 31.6 | | 42.1 | 42.1 | |
| Effective Green, g (s) | | 8.9 | | | 8.9 | | | 31.6 | | 42.1 | 42.1 | |
| Actuated g/C Ratio | | 0.15 | | | 0.15 | | | 0.53 | | 0.70 | 0.70 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 439 | | | 460 | | | 1677 | | 661 | 2375 | |
| v/s Ratio Prot | | | | | | | | | | c0.02 | 0.06 | |
| v/s Ratio Perm | | 0.03 | | | c0.06 | | | c0.14 | | 0.13 | | |
| v/c Ratio | | 0.23 | | | 0.43 | | | 0.26 | | 0.21 | 0.09 | |
| Uniform Delay, d1 | | 22.5 | | | 23.2 | | | 7.8 | | 3.1 | 2.9 | |
| Progression Factor | | 1.00 | | | 0.97 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.6 | | | 0.4 | | 0.2 | 0.1 | |
| Delay (s) | | 22.8 | | | 23.1 | | | 8.2 | | 3.3 | 2.9 | |
| Level of Service | | C | | | C | | | A | | A | A | |
| Approach Delay (s) | | 22.8 | | | 23.1 | | | 8.2 | | | 3.1 | |
| Approach LOS | | C | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 11.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.29 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 54.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕↕ | |
| Volume (vph) | 7 | 129 | 52 | 41 | 130 | 94 | 51 | 405 | 58 | 53 | 350 | 22 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.98 | | | 0.96 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.96 | | | 0.95 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3308 | | | 3143 | | | 3409 | | | 4967 | |
| Flt Permitted | | 0.94 | | | 0.87 | | | 0.88 | | | 0.81 | |
| Satd. Flow (perm) | | 3128 | | | 2768 | | | 3004 | | | 4034 | |
| Peak-hour factor, PHF | 0.88 | 0.81 | 0.76 | 0.79 | 0.90 | 0.87 | 0.91 | 0.93 | 0.91 | 0.78 | 0.89 | 0.79 |
| Adj. Flow (vph) | 8 | 159 | 68 | 52 | 144 | 108 | 56 | 435 | 64 | 68 | 393 | 28 |
| RTOR Reduction (vph) | 0 | 43 | 0 | 0 | 68 | 0 | 0 | 17 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 192 | 0 | 0 | 236 | 0 | 0 | 538 | 0 | 0 | 478 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 99 | | 99 | 72 | | 72 | 49 | | 49 |
| Confl. Bikes (#/hr) | | | 7 | | | 33 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1147 | | | 1015 | | | 1499 | | | 1210 | |
| v/s Ratio Prot | | | | | | | | c0.04 | | | | |
| v/s Ratio Perm | | 0.06 | | | c0.09 | | | c0.13 | | | 0.12 | |
| v/c Ratio | | 0.17 | | | 0.23 | | | 0.36 | | | 0.39 | |
| Uniform Delay, d1 | | 12.8 | | | 13.2 | | | 9.7 | | | 16.7 | |
| Progression Factor | | 0.83 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.5 | | | 0.7 | | | 1.0 | |
| Delay (s) | | 11.0 | | | 13.7 | | | 10.4 | | | 17.6 | |
| Level of Service | | B | | | B | | | B | | | B | |
| Approach Delay (s) | | 11.0 | | | 13.7 | | | 10.4 | | | 17.6 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.30 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 74.3% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕↕ | ↗ | | | |
| Volume (vph) | 23 | 223 | 0 | 0 | 203 | 69 | 26 | 153 | 76 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.99 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3511 | | | 3364 | 1337 | | 5006 | 1456 | | | |
| Flt Permitted | | 0.92 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3257 | | | 3364 | 1337 | | 5006 | 1456 | | | |
| Peak-hour factor, PHF | 0.96 | 0.91 | 0.92 | 0.92 | 0.92 | 0.91 | 0.72 | 0.74 | 0.91 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 24 | 245 | 0 | 0 | 221 | 76 | 36 | 207 | 84 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 14 | 0 | 0 | 74 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 269 | 0 | 0 | 228 | 54 | 0 | 243 | 10 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 63.7 | | | 63.7 | 63.7 | | 9.3 | 9.3 | | | |
| Effective Green, g (s) | | 63.7 | | | 63.7 | 63.7 | | 9.3 | 9.3 | | | |
| Actuated g/C Ratio | | 0.80 | | | 0.80 | 0.80 | | 0.12 | 0.12 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2593 | | | 2679 | 1065 | | 582 | 169 | | | |
| v/s Ratio Prot | | | | | 0.07 | | | | | | | |
| v/s Ratio Perm | | c0.08 | | | | 0.04 | | 0.05 | 0.01 | | | |
| v/c Ratio | | 0.10 | | | 0.09 | 0.05 | | 0.42 | 0.06 | | | |
| Uniform Delay, d1 | | 1.8 | | | 1.8 | 1.7 | | 32.8 | 31.5 | | | |
| Progression Factor | | 1.00 | | | 0.72 | 0.46 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.5 | 0.1 | | | |
| Delay (s) | | 1.9 | | | 1.3 | 0.9 | | 33.3 | 31.6 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 1.9 | | | 1.2 | | | 32.9 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.14 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 55.7% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

23: 20th Street & Webster Street

Existing AM
Kaiser Center Transportation Study

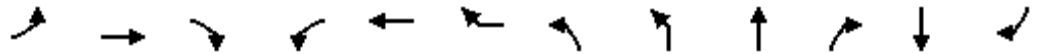


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 182 | 121 | 127 | 201 | 0 | 0 | 0 | 0 | 54 | 274 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.90 | 1.00 | 1.00 | | | | | | 0.94 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 0.99 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1422 | 1610 | 3354 | | | | | | 4397 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.95 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1422 | 1610 | 3184 | | | | | | 4397 | |
| Peak-hour factor, PHF | 0.92 | 0.83 | 0.95 | 0.91 | 0.88 | 0.25 | 0.92 | 0.92 | 0.92 | 0.84 | 0.91 | 0.78 |
| Adj. Flow (vph) | 0 | 219 | 127 | 140 | 228 | 0 | 0 | 0 | 0 | 64 | 301 | 92 |
| RTOR Reduction (vph) | 0 | 0 | 94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 0 |
| Lane Group Flow (vph) | 0 | 219 | 33 | 119 | 249 | 0 | 0 | 0 | 0 | 0 | 402 | 0 |
| Confl. Peds. (#/hr) | 53 | | 53 | 86 | | 86 | 105 | | 105 | 331 | | 331 |
| Confl. Bikes (#/hr) | | | 16 | | | 2 | | | 1 | | | 14 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Effective Green, g (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | 0.20 | 0.51 | | | | | | 0.39 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 929 | 373 | 322 | 1666 | | | | | | 1704 | |
| v/s Ratio Prot | | c0.06 | | c0.07 | 0.03 | | | | | | | |
| v/s Ratio Perm | | | 0.02 | | 0.05 | | | | | | 0.09 | |
| v/c Ratio | | 0.24 | 0.09 | 0.37 | 0.15 | | | | | | 0.24 | |
| Uniform Delay, d1 | | 23.2 | 22.3 | 27.6 | 10.3 | | | | | | 16.5 | |
| Progression Factor | | 1.10 | 1.82 | 0.96 | 0.95 | | | | | | 1.02 | |
| Incremental Delay, d2 | | 0.6 | 0.5 | 0.3 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 26.2 | 41.0 | 26.9 | 9.8 | | | | | | 16.9 | |
| Level of Service | | C | D | C | A | | | | | | B | |
| Approach Delay (s) | | 31.6 | | | 15.3 | | | 0.0 | | | 16.9 | |
| Approach LOS | | C | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 20.8 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.27 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | 12.0 | | | |
| Intersection Capacity Utilization | | | 87.5% | | | ICU Level of Service | | | E | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR | SBT | SBR |
|------------------------|--------|------|------|-------|-------|------|-------|-------|-------|------|--------|-------|
| Lane Configurations | ↔↔ | ↕ | | ↔ | ↕↕ | | | | ↕↕ | | ↕↕ | ↔ |
| Volume (vph) | 83 | 31 | 122 | 11 | 104 | 34 | 50 | 29 | 249 | 15 | 311 | 168 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.91 | | 1.00 | 0.95 | | | | 0.95 | | 0.91 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.89 | | 1.00 | 0.96 | | | | 0.99 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | | 0.99 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 3221 | 1500 | | 1770 | 3410 | | | | 3470 | | 3366 | 1441 |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | | | | 0.99 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 3221 | 1500 | | 1770 | 3410 | | | | 3470 | | 3366 | 1441 |
| Peak-hour factor, PHF | 0.79 | 0.82 | 0.83 | 0.69 | 0.84 | 0.84 | 0.94 | 0.94 | 0.96 | 0.75 | 0.85 | 0.96 |
| Adj. Flow (vph) | 105 | 38 | 147 | 16 | 124 | 40 | 53 | 31 | 259 | 20 | 366 | 175 |
| RTOR Reduction (vph) | 0 | 116 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 94 | 80 | 0 | 16 | 164 | 0 | 0 | 0 | 357 | 0 | 384 | 157 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | |
| Confl. Bikes (#/hr) | | 2 | | | | | | | 6 | | | |
| Turn Type | custom | | | Split | | | Split | Split | | | custom | |
| Protected Phases | 1 | 1 | | 7 | 7 | | 8 | 8 | 8 | | 2 | 6 |
| Permitted Phases | 1 | | | | | | | | | | | 6 |
| Actuated Green, G (s) | 16.6 | 16.6 | | 7.4 | 7.4 | | | | 24.0 | | 16.0 | 36.6 |
| Effective Green, g (s) | 16.6 | 16.6 | | 7.4 | 7.4 | | | | 24.0 | | 16.0 | 36.6 |
| Actuated g/C Ratio | 0.21 | 0.21 | | 0.09 | 0.09 | | | | 0.30 | | 0.20 | 0.46 |
| Clearance Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | | | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 668 | 311 | | 164 | 315 | | | | 1041 | | 673 | 659 |
| v/s Ratio Prot | 0.03 | 0.05 | | 0.01 | c0.05 | | | | c0.10 | | c0.11 | c0.11 |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.14 | 0.26 | | 0.10 | 0.52 | | | | 0.34 | | 0.57 | 0.24 |
| Uniform Delay, d1 | 25.9 | 26.5 | | 33.2 | 34.6 | | | | 21.9 | | 28.9 | 13.2 |
| Progression Factor | 0.97 | 0.94 | | 1.22 | 1.11 | | | | 1.00 | | 0.84 | 0.62 |
| Incremental Delay, d2 | 0.4 | 2.0 | | 0.1 | 0.7 | | | | 0.1 | | 0.7 | 0.8 |
| Delay (s) | 25.5 | 26.8 | | 40.7 | 39.2 | | | | 21.9 | | 24.9 | 9.1 |
| Level of Service | C | C | | D | D | | | | C | | C | A |
| Approach Delay (s) | | 26.4 | | | 39.3 | | | | 21.9 | | 19.6 | |
| Approach LOS | | C | | | D | | | | C | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 58.0% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis
24: 20th Street & Harrison Street

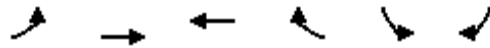
Existing AM
Kaiser Center Transportation Study










| Movement | SBR2 |
|------------------------|--------|
| Lane Configurations | |
| Volume (vph) | 23 |
| Ideal Flow (vphpl) | 1900 |
| Total Lost time (s) | 4.0 |
| Lane Util. Factor | 1.00 |
| Frpb, ped/bikes | 1.00 |
| Flpb, ped/bikes | 1.00 |
| Frt | 0.85 |
| Flt Protected | 1.00 |
| Satd. Flow (prot) | 1583 |
| Flt Permitted | 1.00 |
| Satd. Flow (perm) | 1583 |
| Peak-hour factor, PHF | 0.96 |
| Adj. Flow (vph) | 24 |
| RTOR Reduction (vph) | 13 |
| Lane Group Flow (vph) | 11 |
| Confl. Peds. (#/hr) | 102 |
| Confl. Bikes (#/hr) | 10 |
| Turn Type | custom |
| Protected Phases | 6 |
| Permitted Phases | |
| Actuated Green, G (s) | 36.6 |
| Effective Green, g (s) | 36.6 |
| Actuated g/C Ratio | 0.46 |
| Clearance Time (s) | 4.0 |
| Vehicle Extension (s) | 2.0 |
| Lane Grp Cap (vph) | 724 |
| v/s Ratio Prot | 0.01 |
| v/s Ratio Perm | |
| v/c Ratio | 0.02 |
| Uniform Delay, d1 | 11.9 |
| Progression Factor | 0.28 |
| Incremental Delay, d2 | 0.0 |
| Delay (s) | 3.4 |
| Level of Service | A |
| Approach Delay (s) | |
| Approach LOS | |
| Intersection Summary | |

HCM Unsignalized Intersection Capacity Analysis 25: 20th Street & Access Road Exit

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR | |
|-----------------------------------|---|---|---|------|----------------------|---|------|
| Lane Configurations |  |    |   | | |  | |
| Volume (veh/h) | 27 | 236 | 321 | 0 | 0 | 36 | |
| Sign Control | | Free | Free | | Stop | | |
| Grade | | 0% | 0% | | 0% | | |
| Peak Hour Factor | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.47 | |
| Hourly flow rate (vph) | 108 | 944 | 1284 | 0 | 0 | 77 | |
| Pedestrians | | | | | | | |
| Lane Width (ft) | | | | | | | |
| Walking Speed (ft/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | None | None | | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (ft) | | 431 | 98 | | | | |
| pX, platoon unblocked | 0.97 | | | | 0.97 | 0.97 | |
| vC, conflicting volume | 1284 | | | | 1815 | 642 | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 1236 | | | | 1781 | 576 | |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 | |
| p0 queue free % | 80 | | | | 100 | 83 | |
| cM capacity (veh/h) | 544 | | | | 57 | 448 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | EB 4 | WB 1 | WB 2 | SB 1 |
| Volume Total | 108 | 315 | 315 | 315 | 642 | 642 | 77 |
| Volume Left | 108 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 77 |
| cSH | 544 | 1700 | 1700 | 1700 | 1700 | 1700 | 448 |
| Volume to Capacity | 0.20 | 0.19 | 0.19 | 0.19 | 0.38 | 0.38 | 0.17 |
| Queue Length 95th (ft) | 18 | 0 | 0 | 0 | 0 | 0 | 15 |
| Control Delay (s) | 13.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.7 |
| Lane LOS | B | | | | | | B |
| Approach Delay (s) | 1.4 | | | | 0.0 | | 14.7 |
| Approach LOS | | | | | | | B |
| Intersection Summary | | | | | | | |
| Average Delay | | | 1.1 | | | | |
| Intersection Capacity Utilization | | 18.9% | | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | | |
| | | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: Harrison Street & Lakeside Drive

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|------|------|-------|------|------|
| Lane Configurations | ←←← | | | ↑↑↑ | ↑↑ | →→→ |
| Volume (vph) | 332 | 0 | 0 | 654 | 378 | 499 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.94 | | | 0.91 | 0.95 | 0.76 |
| Frpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 0.97 |
| Flpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (prot) | 4990 | | | 5085 | 3539 | 3510 |
| Flt Permitted | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 4990 | | | 5085 | 3539 | 3510 |
| Peak-hour factor, PHF | 0.90 | 0.92 | 0.92 | 0.97 | 0.96 | 0.90 |
| Adj. Flow (vph) | 369 | 0 | 0 | 674 | 394 | 554 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 369 | 0 | 0 | 674 | 394 | 554 |
| Confl. Peds. (#/hr) | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | | | 2 |
| Turn Type | | | | | | Free |
| Protected Phases | 1 | | | 2 | 2 | |
| Permitted Phases | | | | | | Free |
| Actuated Green, G (s) | 11.4 | | | 59.6 | 59.6 | 80.0 |
| Effective Green, g (s) | 11.4 | | | 59.6 | 59.6 | 80.0 |
| Actuated g/C Ratio | 0.14 | | | 0.74 | 0.74 | 1.00 |
| Clearance Time (s) | 5.0 | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 711 | | | 3788 | 2637 | 3510 |
| v/s Ratio Prot | c0.07 | | | c0.13 | 0.11 | |
| v/s Ratio Perm | | | | | | 0.16 |
| v/c Ratio | 0.52 | | | 0.18 | 0.15 | 0.16 |
| Uniform Delay, d1 | 31.8 | | | 3.0 | 2.9 | 0.0 |
| Progression Factor | 0.75 | | | 1.00 | 0.98 | 1.00 |
| Incremental Delay, d2 | 0.6 | | | 0.1 | 0.1 | 0.1 |
| Delay (s) | 24.4 | | | 3.1 | 3.0 | 0.1 |
| Level of Service | C | | | A | A | A |
| Approach Delay (s) | 24.4 | | | 3.1 | 1.3 | |
| Approach LOS | C | | | A | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 6.2 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.23 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 27.1% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

27: Lakeside Drive & 20th Street

Existing AM
Kaiser Center Transportation Study



| Movement | NBL | NBT | SBT | SBR | SEL | SER |
|-----------------------------------|------|-------|-------|----------------------|------|------|
| Lane Configurations | ←←← | ↑↑ | ↑↑ | | | ←← |
| Volume (vph) | 149 | 654 | 378 | 0 | 0 | 53 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Util. Factor | 0.94 | 0.95 | 0.95 | | | 0.88 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Frt | 1.00 | 1.00 | 1.00 | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 4990 | 3539 | 3539 | | | 2787 |
| Flt Permitted | 0.94 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 4938 | 3539 | 3539 | | | 2787 |
| Peak-hour factor, PHF | 0.85 | 0.94 | 0.82 | 0.92 | 0.92 | 0.88 |
| Adj. Flow (vph) | 175 | 696 | 461 | 0 | 0 | 60 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 17 |
| Lane Group Flow (vph) | 175 | 696 | 461 | 0 | 0 | 43 |
| Confl. Bikes (#/hr) | | | | 8 | | 4 |
| Turn Type | Perm | | | custom | | |
| Protected Phases | | 2 | 1 | | | 2 |
| Permitted Phases | 2 | 1 | | | | 2 |
| Actuated Green, G (s) | 57.7 | 74.0 | 16.3 | | | 57.7 |
| Effective Green, g (s) | 57.7 | 74.0 | 16.3 | | | 57.7 |
| Actuated g/C Ratio | 0.72 | 0.92 | 0.20 | | | 0.72 |
| Clearance Time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 3562 | 3539 | 721 | | | 2010 |
| v/s Ratio Prot | | c0.14 | c0.13 | | | 0.02 |
| v/s Ratio Perm | 0.04 | 0.05 | | | | |
| v/c Ratio | 0.05 | 0.20 | 0.64 | | | 0.02 |
| Uniform Delay, d1 | 3.2 | 0.3 | 29.2 | | | 3.2 |
| Progression Factor | 1.00 | 1.00 | 1.06 | | | 1.00 |
| Incremental Delay, d2 | 0.0 | 0.0 | 1.9 | | | 0.0 |
| Delay (s) | 3.2 | 0.3 | 32.9 | | | 3.2 |
| Level of Service | A | A | C | | | A |
| Approach Delay (s) | | 0.9 | 32.9 | | 3.2 | |
| Approach LOS | | A | C | | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 11.6 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.29 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | 3.0 |
| Intersection Capacity Utilization | | 21.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱↱↱ | |
| Volume (vph) | 0 | 0 | 0 | 82 | 110 | 0 | 0 | 0 | 0 | 0 | 2315 | 9 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1770 | 3539 | | | | | | 6398 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1770 | 3539 | | | | | | 6398 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.83 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.45 |
| Adj. Flow (vph) | 0 | 0 | 0 | 88 | 133 | 0 | 0 | 0 | 0 | 0 | 2411 | 20 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 88 | 133 | 0 | 0 | 0 | 0 | 0 | 2431 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Effective Green, g (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Actuated g/C Ratio | | | | 0.12 | 0.12 | | | | | | 0.76 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 217 | 434 | | | | | | 4845 | |
| v/s Ratio Prot | | | | | 0.04 | | | | | | c0.38 | |
| v/s Ratio Perm | | | | c0.05 | | | | | | | | |
| v/c Ratio | | | | 0.41 | 0.31 | | | | | | 0.50 | |
| Uniform Delay, d1 | | | | 30.4 | 30.0 | | | | | | 3.6 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.92 | |
| Incremental Delay, d2 | | | | 5.5 | 1.8 | | | | | | 0.1 | |
| Delay (s) | | | | 35.9 | 31.8 | | | | | | 3.4 | |
| Level of Service | | | | D | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 33.4 | | | 0.0 | | | 3.4 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 5.9 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.49 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 47.0% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|------|-------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 219 | 1172 | 410 | 53 | 377 | 83 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.98 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 4946 | | 3372 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 4946 | | 3372 | |
| Peak-hour factor, PHF | 0.86 | 0.96 | 0.95 | 0.74 | 0.94 | 0.86 |
| Adj. Flow (vph) | 255 | 1221 | 432 | 72 | 401 | 97 |
| RTOR Reduction (vph) | 81 | 0 | 37 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 174 | 1221 | 467 | 0 | 498 | 0 |
| Confl. Peds. (#/hr) | | | | 22 | | |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 35.6 | 35.6 | 12.6 | | 14.8 | |
| Effective Green, g (s) | 35.6 | 35.6 | 12.6 | | 14.8 | |
| Actuated g/C Ratio | 0.47 | 0.47 | 0.17 | | 0.20 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 840 | 2414 | 831 | | 665 | |
| v/s Ratio Prot | | c0.24 | c0.09 | | c0.15 | |
| v/s Ratio Perm | 0.10 | | | | | |
| v/c Ratio | 0.21 | 0.51 | 0.56 | | 0.75 | |
| Uniform Delay, d1 | 11.5 | 13.6 | 28.7 | | 28.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.6 | 0.8 | 0.9 | | 4.6 | |
| Delay (s) | 12.0 | 14.4 | 29.5 | | 33.0 | |
| Level of Service | B | B | C | | C | |
| Approach Delay (s) | | 14.0 | 29.5 | | 33.0 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 21.0 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.57 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 58.7% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th St. & Castro Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 128 | 200 | 272 | 273 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.99 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.99 | 1.00 | | | | |
| Frt | | | | | 0.93 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3141 | 1423 | 1425 | 5920 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3141 | 1423 | 1425 | 5920 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.89 | 0.87 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 136 | 225 | 313 | 297 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 42 | 41 | 124 | 125 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 207 | 71 | 32 | 329 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 5 | | 5 | | | |
| Confl. Bikes (#/hr) | | | 6 | | | 2 | | | 5 | | | |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 37.8 | 37.8 | 12.2 | 12.2 | | | | |
| Effective Green, g (s) | | | | | 37.8 | 37.8 | 12.2 | 12.2 | | | | |
| Actuated g/C Ratio | | | | | 0.63 | 0.63 | 0.20 | 0.20 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1979 | 896 | 290 | 1204 | | | | |
| v/s Ratio Prot | | | | | c0.07 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.05 | 0.02 | 0.06 | | | | |
| v/c Ratio | | | | | 0.10 | 0.08 | 0.11 | 0.27 | | | | |
| Uniform Delay, d1 | | | | | 4.4 | 4.3 | 19.5 | 20.2 | | | | |
| Progression Factor | | | | | 4.38 | 7.63 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.1 | 0.1 | 0.2 | 0.1 | | | | |
| Delay (s) | | | | | 19.3 | 33.1 | 19.6 | 20.3 | | | | |
| Level of Service | | | | | B | C | B | C | | | | |
| Approach Delay (s) | | 0.0 | | | 23.6 | | | 20.1 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 21.4 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.15 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 27.0% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 141 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 954 | 1071 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.96 | | | | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3393 | | | | | | | | 1522 | 4717 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3393 | | | | | | | | 1522 | 4717 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.65 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.86 | 0.90 | 0.75 |
| Adj. Flow (vph) | 0 | 152 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 1109 | 1190 | 40 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 337 | 67 | 0 |
| Lane Group Flow (vph) | 0 | 189 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 240 | 1696 | 0 |
| Confl. Peds. (#/hr) | 6 | | 6 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 1 | | | 1 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Effective Green, g (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Actuated g/C Ratio | | 0.52 | | | | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1753 | | | | | | | | 634 | 1965 | |
| v/s Ratio Prot | | c0.06 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.16 | 0.36 | |
| v/c Ratio | | 0.11 | | | | | | | | 0.38 | 0.86 | |
| Uniform Delay, d1 | | 14.8 | | | | | | | | 24.2 | 31.9 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | | | | | | | | 1.7 | 5.3 | |
| Delay (s) | | 15.0 | | | | | | | | 26.0 | 37.2 | |
| Level of Service | | B | | | | | | | | C | D | |
| Approach Delay (s) | | 15.0 | | | 0.0 | | | 0.0 | | | 34.4 | |
| Approach LOS | | B | | | A | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 32.9 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.44 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 53.1% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔ | ↔ | | | |
| Volume (vph) | 34 | 261 | 0 | 0 | 547 | 480 | 116 | 505 | 23 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | | 1.00 | 0.97 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3513 | | | 3539 | 1548 | | 3488 | 1531 | | | |
| Flt Permitted | | 0.83 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2945 | | | 3539 | 1548 | | 3488 | 1531 | | | |
| Peak-hour factor, PHF | 0.85 | 0.89 | 0.92 | 0.96 | 0.88 | 0.96 | 0.85 | 0.96 | 0.72 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 40 | 293 | 0 | 0 | 622 | 500 | 136 | 526 | 32 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 186 | 0 | 0 | 15 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 333 | 0 | 0 | 622 | 314 | 0 | 662 | 17 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 35 | | 35 | 6 | | 6 | 26 | | 26 | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 33 | | | 6 | | 10 | | | | 5 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | Perm | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 884 | | | 1062 | 464 | | 1860 | 817 | | | |
| v/s Ratio Prot | | | | | 0.18 | | | | | | | |
| v/s Ratio Perm | | 0.11 | | | | c0.20 | | 0.19 | 0.01 | | | |
| v/c Ratio | | 0.38 | | | 0.59 | 0.68 | | 0.36 | 0.02 | | | |
| Uniform Delay, d1 | | 16.6 | | | 17.8 | 18.4 | | 8.1 | 6.6 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 1.2 | | | 2.4 | 7.7 | | 0.5 | 0.0 | | | |
| Delay (s) | | 17.8 | | | 20.2 | 26.1 | | 8.6 | 6.7 | | | |
| Level of Service | | B | | | C | C | | A | A | | | |
| Approach Delay (s) | | 17.8 | | | 22.8 | | | 8.5 | | | 0.0 | |
| Approach LOS | | B | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 17.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.47 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 76.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 233 | 39 | 21 | 621 | 0 | 0 | 0 | 0 | 50 | 308 | 17 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frbp, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.99 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3435 | | | 3529 | | | | | 1746 | 3496 | |
| Flt Permitted | | 1.00 | | | 0.93 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3435 | | | 3292 | | | | | 1746 | 3496 | |
| Peak-hour factor, PHF | 0.92 | 0.75 | 0.70 | 0.66 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.74 | 0.96 | 0.71 |
| Adj. Flow (vph) | 0 | 311 | 56 | 32 | 647 | 0 | 0 | 0 | 0 | 68 | 321 | 24 |
| RTOR Reduction (vph) | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 335 | 0 | 0 | 679 | 0 | 0 | 0 | 0 | 68 | 333 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 28 | | 28 | 18 | | | 18 | 16 | 16 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | | 3 | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | 6 | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1450 | | | 1390 | | | | | 737 | 1476 | |
| v/s Ratio Prot | | 0.10 | | | | | | | | | c0.10 | |
| v/s Ratio Perm | | | | | c0.21 | | | | | 0.04 | | |
| v/c Ratio | | 0.23 | | | 0.49 | | | | | 0.09 | 0.23 | |
| Uniform Delay, d1 | | 8.3 | | | 9.5 | | | | | 7.8 | 8.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 1.2 | | | | | 0.2 | 0.4 | |
| Delay (s) | | 8.7 | | | 10.7 | | | | | 8.1 | 8.7 | |
| Level of Service | | A | | | B | | | | | A | A | |
| Approach Delay (s) | | 8.7 | | | 10.7 | | | 0.0 | | | 8.6 | |
| Approach LOS | | A | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.6 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 52.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕ | |
| Volume (vph) | 38 | 141 | 10 | 7 | 340 | 84 | 56 | 353 | 23 | 25 | 63 | 24 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | 0.97 | | | 0.99 | | | 0.97 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3424 | | | 3364 | | | 3439 | | | 3358 | |
| Flt Permitted | | 0.85 | | | 0.95 | | | 0.89 | | | 0.80 | |
| Satd. Flow (perm) | | 2923 | | | 3202 | | | 3068 | | | 2734 | |
| Peak-hour factor, PHF | 0.79 | 0.80 | 0.36 | 0.88 | 0.91 | 0.75 | 0.74 | 0.90 | 0.52 | 0.63 | 0.72 | 0.86 |
| Adj. Flow (vph) | 48 | 176 | 28 | 8 | 374 | 112 | 76 | 392 | 44 | 40 | 88 | 28 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 51 | 0 | 0 | 18 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 0 | 239 | 0 | 0 | 443 | 0 | 0 | 494 | 0 | 0 | 137 | 0 |
| Confl. Peds. (#/hr) | 30 | | 30 | 55 | | 55 | 41 | | 41 | 40 | | 40 |
| Confl. Bikes (#/hr) | | | 7 | | | 19 | | | 6 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 23.6 | | | 23.6 | | | 13.9 | | | 13.9 | |
| Effective Green, g (s) | | 23.6 | | | 23.6 | | | 13.9 | | | 13.9 | |
| Actuated g/C Ratio | | 0.52 | | | 0.52 | | | 0.31 | | | 0.31 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1533 | | | 1679 | | | 948 | | | 845 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | 0.14 | | | 0.16 | | | 0.05 | |
| v/c Ratio | | 0.16 | | | 0.26 | | | 0.52 | | | 0.16 | |
| Uniform Delay, d1 | | 5.5 | | | 5.9 | | | 12.8 | | | 11.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.4 | | | 0.5 | | | 0.1 | |
| Delay (s) | | 5.8 | | | 6.3 | | | 13.3 | | | 11.4 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 5.8 | | | 6.3 | | | 13.3 | | | 11.4 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.3 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 59.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

35: 12th St. & Madison Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 353 | 1277 | 0 | 0 | 0 | 0 | 0 | 316 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.97 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6290 | | | | | | 4893 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6290 | | | | | | 4893 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.91 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.81 |
| Adj. Flow (vph) | 0 | 0 | 0 | 388 | 1316 | 0 | 0 | 0 | 0 | 0 | 322 | 80 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1616 | 0 | 0 | 0 | 0 | 0 | 394 | 0 |
| Confl. Peds. (#/hr) | 48 | | 48 | 30 | | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | 9 | | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2726 | | | | | | 2161 | |
| v/s Ratio Prot | | | | | | | | | | | c0.08 | |
| v/s Ratio Perm | | | | | 0.26 | | | | | | | |
| v/c Ratio | | | | | 0.59 | | | | | | 0.18 | |
| Uniform Delay, d1 | | | | | 13.0 | | | | | | 10.2 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.8 | | | | | | 0.2 | |
| Delay (s) | | | | | 7.1 | | | | | | 10.4 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 7.1 | | | 0.0 | | | 10.4 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.7 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.39 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 46.6% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th St. & Oak St.

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1431 | 66 | 275 | 668 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6338 | | | 6163 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6338 | | | 6163 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.87 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1475 | 76 | 296 | 726 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 8 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1539 | 0 | 0 | 1014 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | 1 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3158 | | | 2116 | | | | |
| v/s Ratio Prot | | | | | 0.24 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.16 | | | | |
| v/c Ratio | | | | | 0.49 | | | 0.48 | | | | |
| Uniform Delay, d1 | | | | | 10.0 | | | 15.5 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.5 | | | 0.8 | | | | |
| Delay (s) | | | | | 10.5 | | | 16.3 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 10.5 | | | 16.3 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.8 | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | | 0.48 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | Sum of lost time (s) | | | 9.5 | |
| Intersection Capacity Utilization | | | 51.9% | | | | | ICU Level of Service | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 56 | 0 | 0 | 903 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.88 | 0.92 | 0.92 | 0.99 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 64 | 0 | 0 | 912 | 0 | 0 |
| Pedestrians | 12 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 1 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 240 | 12 | 12 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 240 | 12 | 12 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 91 | 100 | 100 | | | |
| cM capacity (veh/h) | 720 | 1055 | 1589 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 64 | 228 | 228 | 228 | 228 | |
| Volume Left | 64 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 720 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.09 | 0.13 | 0.13 | 0.13 | 0.13 | |
| Queue Length 95th (ft) | 7 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 10.5 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 10.5 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 23.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------------------------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 338 | 121 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 656 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6067 | | | | | | | | | 5067 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6067 | | | | | | | | | 5067 | |
| Peak-hour factor, PHF | 0.92 | 0.86 | 0.84 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.55 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 393 | 144 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | 691 | 0 |
| RTOR Reduction (vph) | 0 | 74 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 463 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 720 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2326 | | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.08 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.14 | |
| v/c Ratio | | 0.20 | | | | | | | | | 0.33 | |
| Uniform Delay, d1 | | 12.4 | | | | | | | | | 11.2 | |
| Progression Factor | | 0.77 | | | | | | | | | 1.21 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | | 0.4 | |
| Delay (s) | | 9.7 | | | | | | | | | 14.0 | |
| Level of Service | | A | | | | | | | | | B | |
| Approach Delay (s) | | 9.7 | | | 0.0 | | | 0.0 | | | 14.0 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.2 | | | | | | | | | HCM Level of Service B |
| HCM Volume to Capacity ratio | | | 0.27 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 11.0 | Sum of lost time (s) |
| Intersection Capacity Utilization | | | 38.3% | | | | | | | | | ICU Level of Service A |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTL | | | | | | 4TTL | | | | |
| Volume (vph) | 73 | 342 | 0 | 0 | 0 | 0 | 0 | 279 | 50 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6292 | | | | | | 6249 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6292 | | | | | | 6249 | | | | |
| Peak-hour factor, PHF | 0.79 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.74 | 0.83 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 92 | 368 | 0 | 0 | 0 | 0 | 0 | 377 | 60 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 80 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 380 | 0 | 0 | 0 | 0 | 0 | 422 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | 56 | 21 | | 21 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 5 | | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 8.1 | | | | | | 44.9 | | | | |
| Effective Green, g (s) | | 8.1 | | | | | | 44.9 | | | | |
| Actuated g/C Ratio | | 0.13 | | | | | | 0.75 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 849 | | | | | | 4676 | | | | |
| v/s Ratio Prot | | | | | | | | c0.07 | | | | |
| v/s Ratio Perm | | 0.06 | | | | | | | | | | |
| v/c Ratio | | 0.45 | | | | | | 0.09 | | | | |
| Uniform Delay, d1 | | 23.9 | | | | | | 2.0 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.0 | | | | |
| Delay (s) | | 24.0 | | | | | | 2.1 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 24.0 | | | 0.0 | | | 2.1 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.3 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.14 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.5% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 115 | 483 | 0 | 0 | 0 | 0 | 0 | 938 | 247 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6328 | | | | | | 4877 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6328 | | | | | | 4877 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.91 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.85 | 0.71 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 124 | 531 | 0 | 0 | 0 | 0 | 0 | 1104 | 348 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 99 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 641 | 0 | 0 | 0 | 0 | 0 | 1353 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 59 | | 59 | 12 | | 12 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 2 | | | 1 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2531 | | | | | | 1951 | | | | |
| v/s Ratio Prot | | | | | | | | c0.28 | | | | |
| v/s Ratio Perm | | 0.10 | | | | | | | | | | |
| v/c Ratio | | 0.25 | | | | | | 0.69 | | | | |
| Uniform Delay, d1 | | 9.0 | | | | | | 11.2 | | | | |
| Progression Factor | | 0.81 | | | | | | 0.75 | | | | |
| Incremental Delay, d2 | | 0.2 | | | | | | 1.8 | | | | |
| Delay (s) | | 7.5 | | | | | | 10.2 | | | | |
| Level of Service | | A | | | | | | B | | | | |
| Approach Delay (s) | | 7.5 | | | 0.0 | | | 10.2 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.4 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.47 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 46.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑↑ | | | | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 469 | 240 | 0 | 0 | 0 | 0 | 0 | 0 | 125 | 524 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.95 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6035 | | | | | | | | | 5025 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6035 | | | | | | | | | 5025 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.86 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.89 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 510 | 279 | 0 | 0 | 0 | 0 | 0 | 0 | 140 | 535 | 0 |
| RTOR Reduction (vph) | 0 | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 78 | 0 |
| Lane Group Flow (vph) | 0 | 662 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 597 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 10 | | 10 | 8 | | 8 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 7 | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2414 | | | | | | | | | 2233 | |
| v/s Ratio Prot | | c0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.12 | |
| v/c Ratio | | 0.27 | | | | | | | | | 0.27 | |
| Uniform Delay, d1 | | 9.1 | | | | | | | | | 7.9 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | | 0.3 | |
| Delay (s) | | 9.4 | | | | | | | | | 8.2 | |
| Level of Service | | A | | | | | | | | | A | |
| Approach Delay (s) | | 9.4 | | | 0.0 | | | 0.0 | | | 8.2 | |
| Approach LOS | | A | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.8 | | | | HCM Level of Service | | | A | | |
| HCM Volume to Capacity ratio | | | 0.27 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | Sum of lost time (s) | | | 7.0 | | |
| Intersection Capacity Utilization | | | 38.3% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↰ | | ↕ | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 20 | 296 | 45 | 192 | 240 | 0 | 0 | 142 | 1510 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frbp, ped/bikes | | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1736 | 1863 | 1503 | | 1820 | | | 1863 | 1558 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.77 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1736 | 1863 | 1503 | | 1435 | | | 1863 | 1558 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.71 | 0.96 | 0.87 | 0.84 | 0.87 | 0.92 | 0.92 | 0.81 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 28 | 308 | 52 | 229 | 276 | 0 | 0 | 175 | 1589 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 | 0 | 118 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 28 | 308 | 13 | 0 | 505 | 0 | 0 | 175 | 1471 |
| Confl. Peds. (#/hr) | 1 | | 1 | 23 | | 23 | 2 | | 2 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 11.6 | 11.6 | 11.6 | | 22.4 | | | 22.4 | 22.4 |
| Effective Green, g (s) | | | | 11.6 | 11.6 | 11.6 | | 22.4 | | | 22.4 | 22.4 |
| Actuated g/C Ratio | | | | 0.26 | 0.26 | 0.26 | | 0.50 | | | 0.50 | 0.50 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 448 | 480 | 387 | | 714 | | | 927 | 776 |
| v/s Ratio Prot | | | | c0.17 | | | | | | | 0.09 | |
| v/s Ratio Perm | | | | 0.02 | | 0.01 | | 0.35 | | | | c0.94 |
| v/c Ratio | | | | 0.06 | 0.64 | 0.03 | | 0.71 | | | 0.19 | 1.90 |
| Uniform Delay, d1 | | | | 12.6 | 14.9 | 12.5 | | 8.8 | | | 6.3 | 11.3 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.1 | 2.9 | 0.0 | | 5.8 | | | 0.5 | 408.2 |
| Delay (s) | | | | 12.7 | 17.8 | 12.5 | | 14.6 | | | 6.7 | 419.5 |
| Level of Service | | | | B | B | B | | B | | | A | F |
| Approach Delay (s) | | 0.0 | | | 16.7 | | | 14.6 | | | 378.5 | |
| Approach LOS | | A | | | B | | | B | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 256.5 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.47 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 146.6% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Existing AM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|------------------------|--------|------|------|------|------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 123 | 429 | 120 | 48 | 737 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3491 | | 3201 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3491 | | 3201 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.75 | 0.96 | 0.77 | 0.86 | 0.89 |
| Adj. Flow (vph) | 0 | 164 | 447 | 156 | 56 | 828 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 611 | 0 | 626 | 414 |
| Confl. Peds. (#/hr) | 51 | 2 | | | | |
| Confl. Bikes (#/hr) | 2 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1265 | | 1152 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.18 | | 0.20 | 0.29 |
| v/c Ratio | | | 0.48 | | 0.54 | 0.80 |
| Uniform Delay, d1 | | | 11.1 | | 11.5 | 12.9 |
| Progression Factor | | | 0.81 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.6 | | 1.8 | 12.1 |
| Delay (s) | | | 9.6 | | 13.3 | 25.0 |
| Level of Service | | | A | | B | C |
| Approach Delay (s) | | | 9.6 | | 18.0 | |
| Approach LOS | | | A | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 14.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 59.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 303 | 551 | 152 | 0 | 0 | 0 | 0 | 230 | 68 | 3 | 117 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.97 | | | | | | 0.97 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4847 | | | | | | 1795 | | | 1858 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.98 | |
| Satd. Flow (perm) | | 1850 | | | | | | 1500 | | | 1600 | |
| Peak-hour factor, PHF | 0.95 | 0.89 | 0.81 | 0.92 | 0.92 | 0.92 | 0.92 | 0.82 | 0.74 | 0.38 | 0.77 | 0.92 |
| Adj. Flow (vph) | 319 | 619 | 188 | 0 | 0 | 0 | 0 | 280 | 92 | 8 | 152 | 0 |
| RTOR Reduction (vph) | 0 | 67 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1059 | 0 | 0 | 0 | 0 | 0 | 346 | 0 | 0 | 160 | 0 |
| Confl. Peds. (#/hr) | 14 | | 14 | 52 | | 52 | 1 | | 1 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 5 | | | 2 | | | | | | |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 925 | | | | | | 618 | | | 551 | |
| v/s Ratio Prot | | | | | | | | c0.19 | | | | |
| v/s Ratio Perm | | c0.57 | | | | | | | | | 0.10 | |
| v/c Ratio | | 1.14 | | | | | | 0.56 | | | 0.29 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 12.0 | | | 10.7 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.98 | |
| Incremental Delay, d2 | | 78.0 | | | | | | 3.6 | | | 1.1 | |
| Delay (s) | | 89.3 | | | | | | 15.6 | | | 11.7 | |
| Level of Service | | F | | | | | | B | | | B | |
| Approach Delay (s) | | 89.3 | | | 0.0 | | | 15.6 | | | 11.7 | |
| Approach LOS | | F | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 65.3 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.91 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 46.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Existing AM
Kaiser Center Transportation Study



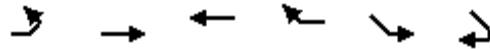
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|------|------|-------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 443 | 302 | 459 | 292 | 155 | 1088 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3340 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3340 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.89 | 0.92 | 0.83 | 0.88 | 0.90 | 0.85 |
| Adj. Flow (vph) | 498 | 328 | 553 | 332 | 172 | 1280 |
| RTOR Reduction (vph) | 0 | 233 | 94 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 498 | 95 | 791 | 0 | 172 | 1280 |
| Turn Type | Perm | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 26.0 | 26.0 | 38.7 | | 13.3 | 56.0 |
| Effective Green, g (s) | 26.0 | 26.0 | 38.7 | | 13.3 | 56.0 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.43 | | 0.15 | 0.62 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 511 | 457 | 1436 | | 262 | 2202 |
| v/s Ratio Prot | c0.28 | | 0.24 | | c0.10 | c0.36 |
| v/s Ratio Perm | | 0.06 | | | | |
| v/c Ratio | 0.97 | 0.21 | 0.55 | | 0.66 | 0.58 |
| Uniform Delay, d1 | 31.7 | 24.2 | 19.2 | | 36.2 | 10.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 33.0 | 0.2 | 1.5 | | 12.2 | 1.1 |
| Delay (s) | 64.7 | 24.4 | 20.7 | | 48.4 | 11.2 |
| Level of Service | E | C | C | | D | B |
| Approach Delay (s) | 48.7 | | 20.7 | | | 15.6 |
| Approach LOS | D | | C | | | B |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 25.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.71 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 65.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 46: Lakeshore Drive & El Embarcadero (WB)

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | ↱↱ | ↰↱ | | ↰ | ↰ |
| Volume (vph) | 471 | 447 | 572 | 262 | 180 | 261 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3370 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3370 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.94 | 0.92 | 0.91 | 0.89 | 0.85 | 0.92 |
| Adj. Flow (vph) | 501 | 486 | 629 | 294 | 212 | 284 |
| RTOR Reduction (vph) | 0 | 0 | 79 | 0 | 0 | 219 |
| Lane Group Flow (vph) | 501 | 486 | 844 | 0 | 212 | 65 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.1 | 33.2 | 15.1 | | 12.2 | 12.2 |
| Effective Green, g (s) | 14.1 | 33.2 | 15.1 | | 12.2 | 12.2 |
| Actuated g/C Ratio | 0.26 | 0.62 | 0.28 | | 0.23 | 0.23 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 467 | 2200 | 953 | | 404 | 362 |
| v/s Ratio Prot | c0.28 | 0.14 | c0.25 | | c0.12 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 1.07 | 0.22 | 0.89 | | 0.52 | 0.18 |
| Uniform Delay, d1 | 19.6 | 4.4 | 18.3 | | 18.1 | 16.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 62.5 | 0.1 | 9.9 | | 1.2 | 0.2 |
| Delay (s) | 82.2 | 4.5 | 28.2 | | 19.3 | 16.8 |
| Level of Service | F | A | C | | B | B |
| Approach Delay (s) | | 43.9 | 28.2 | | 17.9 | |
| Approach LOS | | D | C | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 32.5 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.84 | | | |
| Actuated Cycle Length (s) | | | 53.4 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 70.3% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Existing AM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|----------------------|------|------|-------|------|
| Lane Configurations | | | | 3 3 3 | | | ↑↑ | ↑ | ↑ | ↑↑ | |
| Volume (vph) | 0 | 0 | 395 | 626 | 270 | 0 | 571 | 182 | 277 | 980 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.96 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4877 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4877 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.78 | 0.88 | 0.69 | 0.92 | 0.93 | 0.76 | 0.80 | 0.84 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 506 | 711 | 391 | 0 | 614 | 239 | 346 | 1167 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 167 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1560 | 0 | 0 | 614 | 72 | 346 | 1167 | 0 |
| Turn Type | | | Split | | | | | Perm | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 1 | 2 |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1679 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.32 | | | c0.17 | | 0.20 | c0.33 | |
| v/s Ratio Perm | | | | | | | | 0.05 | | | |
| v/c Ratio | | | | 0.93 | | | 1.05 | 0.28 | 0.53 | 0.58 | |
| Uniform Delay, d1 | | | | 33.5 | | | 44.3 | 38.7 | 26.3 | 14.6 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 9.5 | | | 51.5 | 2.6 | 3.1 | 1.2 | |
| Delay (s) | | | | 43.0 | | | 95.7 | 41.3 | 29.4 | 15.8 | |
| Level of Service | | | | D | | | F | D | C | B | |
| Approach Delay (s) | 0.0 | | | 43.0 | | | 80.5 | | | 18.9 | |
| Approach LOS | A | | | D | | | F | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 41.9 | | | | HCM Level of Service | | D | | |
| HCM Volume to Capacity ratio | | | 0.81 | | | | | | | | |
| Actuated Cycle Length (s) | | | 106.0 | | | | Sum of lost time (s) | | 13.0 | | |
| Intersection Capacity Utilization | | | 67.0% | | | | ICU Level of Service | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Existing AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 260 | 443 | 196 | 184 | 340 | 259 | 30 | 229 | 31 | 654 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.99 | 0.85 | 0.85 | 0.93 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3173 | 1441 | 1583 | 3282 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3173 | 1441 | 1583 | 3282 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.81 | 0.88 | 0.89 | 0.88 | 0.94 | 0.85 | 0.83 | 0.91 | 0.78 | 0.82 |
| Adj. Flow (vph) | 321 | 503 | 220 | 209 | 362 | 305 | 36 | 252 | 40 | 798 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 76 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 276 | 570 | 198 | 133 | 700 | 0 | 0 | 0 | 292 | 798 |
| Turn Type | Split | | Prot | Perm | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | 4 | | | | | | |
| Actuated Green, G (s) | 28.8 | 28.8 | 28.8 | 28.8 | 42.0 | | | | 22.7 | 68.2 |
| Effective Green, g (s) | 28.8 | 28.8 | 28.8 | 28.8 | 42.0 | | | | 22.7 | 68.2 |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.27 | 0.27 | 0.40 | | | | 0.21 | 0.64 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 437 | 862 | 392 | 430 | 1300 | | | | 379 | 2277 |
| v/s Ratio Prot | 0.17 | c0.18 | 0.14 | | c0.21 | | | | c0.17 | 0.23 |
| v/s Ratio Perm | | | | 0.08 | | | | | | |
| v/c Ratio | 0.63 | 0.66 | 0.51 | 0.31 | 0.54 | | | | 0.77 | 0.35 |
| Uniform Delay, d1 | 33.9 | 34.3 | 32.6 | 30.7 | 24.6 | | | | 39.2 | 8.7 |
| Progression Factor | 0.77 | 0.77 | 0.77 | 0.65 | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.9 | 1.2 | 0.7 | 0.3 | 1.6 | | | | 9.3 | 0.4 |
| Delay (s) | 28.2 | 27.7 | 25.9 | 20.3 | 26.2 | | | | 48.5 | 9.1 |
| Level of Service | C | C | C | C | C | | | | D | A |
| Approach Delay (s) | | 26.3 | | | 26.2 | | | | | 19.7 |
| Approach LOS | | C | | | C | | | | | B |

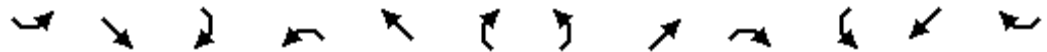
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 23.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 58.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Existing AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2104 | 103 | 381 | 333 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4789 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4789 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.78 | 0.93 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2192 | 132 | 410 | 351 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 69 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2192 | 63 | 0 | 760 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | 0.48 | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2415 | 752 | | 2035 | | | | |
| v/s Ratio Prot | | | | | c0.43 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.04 | | 0.16 | | | | |
| v/c Ratio | | | | | 0.91 | 0.08 | | 0.37 | | | | |
| Uniform Delay, d1 | | | | | 19.4 | 11.5 | | 15.7 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 6.4 | 0.2 | | 0.5 | | | | |
| Delay (s) | | | | | 25.7 | 11.7 | | 16.2 | | | | |
| Level of Service | | | | | C | B | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 24.9 | | | 16.2 | | | 0.0 | |
| Approach LOS | | A | | | C | | | B | | | A | |

Intersection Summary

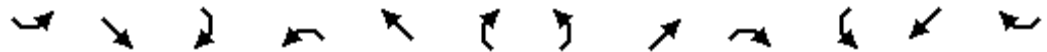
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 22.8 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 75.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

50: MacArthur Blvd (WB) & Harrison Street


















Existing AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 973 | 1418 | 0 | 0 | 0 | 0 | 0 | 990 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4759 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4759 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1003 | 1541 | 0 | 0 | 0 | 0 | 0 | 1053 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 616 | 1916 | 0 | 0 | 0 | 0 | 0 | 1082 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2736 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.31 | |
| v/s Ratio Perm | | | | c0.41 | 0.40 | | | | | | | |
| v/c Ratio | | | | 0.70 | 0.70 | | | | | | 0.95 | |
| Uniform Delay, d1 | | | | 12.1 | 12.1 | | | | | | 26.3 | |
| Progression Factor | | | | 1.45 | 1.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 2.6 | 0.8 | | | | | | 16.3 | |
| Delay (s) | | | | 20.3 | 18.7 | | | | | | 42.6 | |
| Level of Service | | | | C | B | | | | | | D | |
| Approach Delay (s) | | 0.0 | | | 19.1 | | | 0.0 | | | 42.6 | |
| Approach LOS | | A | | | B | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 26.1 | | | HCM Level of Service | | | | | C | |
| HCM Volume to Capacity ratio | | | 0.79 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 75.7% | | | ICU Level of Service | | | | D | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Existing AM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 74 | 189 | 6 | 9 | 391 | 13 | 9 | 6 | 8 | 18 | 14 | 13 |
| Peak Hour Factor | 0.90 | 0.94 | 0.67 | 0.81 | 0.84 | 0.63 | 0.75 | 0.75 | 0.79 | 0.74 | 0.77 | 0.69 |
| Hourly flow rate (vph) | 82 | 201 | 9 | 11 | 465 | 21 | 12 | 8 | 10 | 24 | 18 | 19 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 82 | 210 | 497 | 30 | 61 | | | | | | | |
| Volume Left (vph) | 82 | 0 | 11 | 12 | 24 | | | | | | | |
| Volume Right (vph) | 0 | 9 | 21 | 10 | 19 | | | | | | | |
| Hadj (s) | 0.53 | 0.00 | 0.01 | -0.09 | -0.07 | | | | | | | |
| Departure Headway (s) | 5.7 | 5.2 | 4.6 | 5.7 | 5.7 | | | | | | | |
| Degree Utilization, x | 0.13 | 0.30 | 0.64 | 0.05 | 0.10 | | | | | | | |
| Capacity (veh/h) | 613 | 672 | 762 | 533 | 552 | | | | | | | |
| Control Delay (s) | 8.4 | 9.2 | 15.5 | 9.0 | 9.3 | | | | | | | |
| Approach Delay (s) | 9.0 | | 15.5 | 9.0 | 9.3 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 12.7 | | | | | | | | | |
| HCM Level of Service | | | B | | | | | | | | | |
| Intersection Capacity Utilization | | | 45.5% | ICU Level of Service | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 4.0 Worst Case Level Of Service: B[11.9]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 574 0 0 0 252 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 574 0 0 0 252 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 574 0 0 0 252 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.91 1.00 1.00 1.00 0.80 1.00 1.00 1.00

PHF Volume: 0 0 0 0 631 0 0 0 315 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 631 0 0 0 315 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 210 xxxxx xxxx xxxxx

Potent Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 835 xxxxx xxxx xxxxx

Move Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 835 xxxxx xxxx xxxxx

Volume/Cap: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 0.38 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 1.8 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 11.9 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * B * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 11.9 xxxxxx

ApproachLOS: * * B *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis

2: Oakland Avenue & I-580 Off-ramp

Existing PM
Kaiser Center Transportation Study

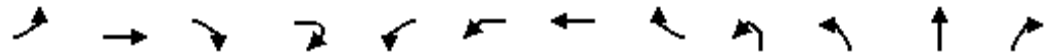


| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 543 | 257 | 915 | 549 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1740 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1740 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.88 | 0.83 | 0.89 | 0.92 | 0.75 |
| Adj. Flow (vph) | 617 | 310 | 1028 | 597 | 96 |
| RTOR Reduction (vph) | 86 | 31 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 371 | 439 | 1028 | 684 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Effective Green, g (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.61 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 448 | 464 | 2153 | 356 | |
| v/s Ratio Prot | | | c0.29 | c0.43 | |
| v/s Ratio Perm | 0.22 | 0.25 | | | |
| v/c Ratio | 0.83 | 0.95 | 0.48 | 1.92 | |
| Uniform Delay, d1 | 20.7 | 21.6 | 6.5 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 11.4 | 28.2 | 0.8 | 424.5 | |
| Delay (s) | 32.1 | 49.8 | 7.2 | 447.8 | |
| Level of Service | C | D | A | F | |
| Approach Delay (s) | | 41.1 | 184.6 | | |
| Approach LOS | | D | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 134.4 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 0.98 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 67.1% | | ICU Level of Service | C |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
|------------------------|-------|------|------|------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 182 | 365 | 85 | 17 | 45 | 14 | 155 | 177 | 8 | 286 | 942 | 86 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1520 | | 3433 | 3484 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1520 | | 3433 | 3484 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 194 | 388 | 90 | 18 | 53 | 16 | 182 | 208 | 9 | 311 | 1024 | 93 |
| RTOR Reduction (vph) | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 175 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 194 | 388 | 100 | 0 | 0 | 69 | 182 | 33 | 0 | 320 | 1109 | 0 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | 20 | | | | 9 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 19.5 | 26.3 | 26.3 | | | 7.5 | 14.3 | 14.3 | | 13.1 | 27.2 | |
| Effective Green, g (s) | 19.5 | 26.3 | 26.3 | | | 7.5 | 14.3 | 14.3 | | 13.1 | 27.2 | |
| Actuated g/C Ratio | 0.22 | 0.29 | 0.29 | | | 0.08 | 0.16 | 0.16 | | 0.15 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 384 | 1034 | 463 | | | 148 | 296 | 242 | | 500 | 1053 | |
| v/s Ratio Prot | c0.11 | 0.11 | | | | 0.04 | c0.10 | | | 0.09 | c0.32 | |
| v/s Ratio Perm | | | 0.06 | | | | | 0.02 | | | | |
| v/c Ratio | 0.51 | 0.38 | 0.22 | | | 0.47 | 0.61 | 0.14 | | 0.64 | 1.05 | |
| Uniform Delay, d1 | 31.0 | 25.3 | 24.1 | | | 39.3 | 35.3 | 32.5 | | 36.2 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.0 | 0.2 | 0.2 | | | 2.3 | 3.8 | 0.3 | | 2.8 | 42.9 | |
| Delay (s) | 32.1 | 25.5 | 24.3 | | | 41.7 | 39.0 | 32.8 | | 39.0 | 74.3 | |
| Level of Service | C | C | C | | | D | D | C | | D | E | |
| Approach Delay (s) | | 27.2 | | | | | 36.6 | | | | 66.5 | |
| Approach LOS | | C | | | | | D | | | | E | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 49.2 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 18.0 |
| Intersection Capacity Utilization | 72.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing PM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 185 | 397 | 39 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3429 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3429 | | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 199 | 427 | 42 | 70 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 |
| Lane Group Flow (vph) | 199 | 526 | 0 | 0 |
| Confl. Peds. (#/hr) | 26 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 11.0 | 24.1 | | |
| Effective Green, g (s) | 11.0 | 24.1 | | |
| Actuated g/C Ratio | 0.12 | 0.27 | | |
| Clearance Time (s) | 4.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 216 | 918 | | |
| v/s Ratio Prot | 0.11 | 0.15 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.92 | 0.57 | | |
| Uniform Delay, d1 | 39.1 | 28.5 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 40.0 | 2.6 | | |
| Delay (s) | 79.0 | 31.1 | | |
| Level of Service | E | C | | |
| Approach Delay (s) | | 44.0 | | |
| Approach LOS | | D | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑ | ↑ | ↑ | ↑↑ | | ↑ | ↑↑ | |
| Volume (vph) | 73 | 202 | 63 | 29 | 330 | 237 | 139 | 580 | 30 | 144 | 579 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | | 0.91 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | | 0.99 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 4790 | | | 3519 | 1536 | 1767 | 3502 | | 1767 | 3453 | |
| Flt Permitted | | 0.77 | | | 0.87 | 1.00 | 0.31 | 1.00 | | 0.33 | 1.00 | |
| Satd. Flow (perm) | | 3720 | | | 3073 | 1536 | 576 | 3502 | | 623 | 3453 | |
| Peak-hour factor, PHF | 0.68 | 0.86 | 0.66 | 0.73 | 0.96 | 0.87 | 0.83 | 0.92 | 0.75 | 0.82 | 0.92 | 0.86 |
| Adj. Flow (vph) | 107 | 235 | 95 | 40 | 344 | 272 | 167 | 630 | 40 | 176 | 629 | 88 |
| RTOR Reduction (vph) | 0 | 55 | 0 | 0 | 0 | 96 | 0 | 6 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 382 | 0 | 0 | 384 | 176 | 167 | 664 | 0 | 176 | 704 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 10 | | 10 | 6 | | 6 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 20 | | | 18 | | | 17 | | | 66 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | | 1576 | | | 1302 | 651 | 258 | 1566 | | 279 | 1544 | |
| v/s Ratio Prot | | | | | | | | 0.19 | | | 0.20 | |
| v/s Ratio Perm | | 0.10 | | | 0.12 | 0.11 | 0.29 | | | 0.28 | | |
| v/c Ratio | | 0.24 | | | 0.29 | 0.27 | 0.65 | 0.42 | | 0.63 | 0.46 | |
| Uniform Delay, d1 | | 15.7 | | | 16.1 | 16.0 | 18.3 | 16.0 | | 18.1 | 16.3 | |
| Progression Factor | | 0.84 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.6 | 1.0 | 11.9 | 0.8 | | 10.4 | 1.0 | |
| Delay (s) | | 13.5 | | | 16.7 | 17.0 | 30.2 | 16.9 | | 28.5 | 17.3 | |
| Level of Service | | B | | | B | B | C | B | | C | B | |
| Approach Delay (s) | | 13.5 | | | 16.8 | | | 19.5 | | | 19.5 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

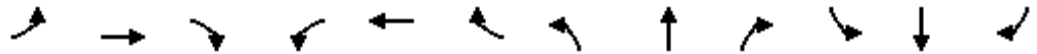
| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 18.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.48 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 103.8% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 180 | 346 | 117 | 55 | 455 | 98 | 147 | 403 | 39 | 112 | 386 | 294 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.97 | | 1.00 | 0.98 | | 1.00 | 0.93 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 3388 | | 1769 | 3415 | | 1761 | 3468 | | 1762 | 3253 | |
| Flt Permitted | 0.26 | 1.00 | | 0.45 | 1.00 | | 0.25 | 1.00 | | 0.39 | 1.00 | |
| Satd. Flow (perm) | 479 | 3388 | | 831 | 3415 | | 463 | 3468 | | 731 | 3253 | |
| Peak-hour factor, PHF | 0.85 | 0.90 | 0.89 | 0.81 | 0.88 | 0.72 | 0.88 | 0.87 | 0.70 | 0.80 | 0.92 | 0.91 |
| Adj. Flow (vph) | 212 | 384 | 131 | 68 | 517 | 136 | 167 | 463 | 56 | 140 | 420 | 323 |
| RTOR Reduction (vph) | 0 | 34 | 0 | 0 | 26 | 0 | 0 | 12 | 0 | 0 | 172 | 0 |
| Lane Group Flow (vph) | 212 | 481 | 0 | 68 | 627 | 0 | 167 | 507 | 0 | 140 | 571 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 17 | | | 28 |
| Turn Type | pm+pt | | | pm+pt | | | Perm | | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 45.5 | 36.1 | | 37.3 | 32.0 | | 30.1 | 30.1 | | 30.1 | 30.1 | |
| Effective Green, g (s) | 45.5 | 36.1 | | 37.3 | 32.0 | | 30.1 | 30.1 | | 30.1 | 30.1 | |
| Actuated g/C Ratio | 0.54 | 0.42 | | 0.44 | 0.38 | | 0.35 | 0.35 | | 0.35 | 0.35 | |
| Clearance Time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 399 | 1439 | | 423 | 1286 | | 164 | 1228 | | 259 | 1152 | |
| v/s Ratio Prot | c0.06 | 0.14 | | 0.01 | 0.18 | | | 0.15 | | | 0.18 | |
| v/s Ratio Perm | c0.23 | | | 0.06 | | | c0.36 | | | 0.19 | | |
| v/c Ratio | 0.53 | 0.33 | | 0.16 | 0.49 | | 1.02 | 0.41 | | 0.54 | 0.50 | |
| Uniform Delay, d1 | 11.8 | 16.4 | | 13.9 | 20.2 | | 27.4 | 20.8 | | 21.9 | 21.5 | |
| Progression Factor | 1.00 | 1.00 | | 1.54 | 1.47 | | 0.76 | 0.68 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.6 | | 0.1 | 1.3 | | 73.1 | 0.1 | | 1.2 | 0.1 | |
| Delay (s) | 12.5 | 17.0 | | 21.5 | 31.0 | | 93.8 | 14.1 | | 23.2 | 21.6 | |
| Level of Service | B | B | | C | C | | F | B | | C | C | |
| Approach Delay (s) | | 15.7 | | | 30.1 | | | 33.5 | | | 21.9 | |
| Approach LOS | | B | | | C | | | C | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 25.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.77 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 14.5 |
| Intersection Capacity Utilization | 73.8% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 6: 27th Street & Northgate Avenue (NB)

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 211 | 561 | 0 | 0 | 221 | 777 | 18 | 682 | 63 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.86 | 0.86 | | | 0.86 | 0.86 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 0.91 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1521 | 4783 | | | 4360 | 1362 | | 5000 | | | | |
| Flt Permitted | 0.38 | 0.84 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 607 | 4043 | | | 4360 | 1362 | | 5000 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.90 | 0.25 | 0.25 | 0.89 | 0.97 | 0.64 | 0.92 | 0.83 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 227 | 623 | 0 | 0 | 248 | 801 | 28 | 741 | 76 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 55 | 55 | 0 | 29 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 163 | 687 | 0 | 0 | 594 | 345 | 0 | 816 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 4 | | 4 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | 5 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 243 | 1617 | | | 1744 | 545 | | 2000 | | | | |
| v/s Ratio Prot | | | | | 0.14 | | | | | | | |
| v/s Ratio Perm | 0.27 | 0.17 | | | | 0.25 | | 0.16 | | | | |
| v/c Ratio | 0.67 | 0.42 | | | 0.34 | 0.63 | | 0.41 | | | | |
| Uniform Delay, d1 | 9.8 | 8.7 | | | 8.3 | 9.6 | | 8.6 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 13.8 | 0.8 | | | 0.5 | 5.5 | | 0.6 | | | | |
| Delay (s) | 23.6 | 9.5 | | | 8.9 | 15.2 | | 9.2 | | | | |
| Level of Service | C | A | | | A | B | | A | | | | |
| Approach Delay (s) | | 12.2 | | | 11.3 | | | 9.2 | | | 0.0 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.9 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.54 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 70.4% | | | ICU Level of Service | | | C | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑↑ | | | | | ↖ | ↑↑ | ↗ |
| Volume (vph) | 0 | 423 | 33 | 10 | 209 | 0 | 0 | 0 | 0 | 340 | 242 | 172 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.91 | | | 0.91 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (prot) | | 5014 | | | 5069 | | | | | 1605 | 3328 | 1558 |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (perm) | | 5014 | | | 4607 | | | | | 1605 | 3328 | 1558 |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.83 | 0.63 | 0.86 | 0.25 | 0.25 | 0.25 | 0.25 | 0.87 | 0.79 | 0.88 |
| Adj. Flow (vph) | 0 | 445 | 40 | 16 | 243 | 0 | 0 | 0 | 0 | 391 | 306 | 195 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 |
| Lane Group Flow (vph) | 0 | 467 | 0 | 0 | 259 | 0 | 0 | 0 | 0 | 227 | 470 | 101 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 1 | | | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 5 | | | 9 | | | | 1 | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1755 | | | 1612 | | | | | 829 | 1719 | 805 |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | | | 0.06 | | | | | c0.14 | 0.14 | 0.06 |
| v/c Ratio | | 0.27 | | | 0.16 | | | | | 0.27 | 0.27 | 0.13 |
| Uniform Delay, d1 | | 14.0 | | | 13.4 | | | | | 8.2 | 8.2 | 7.5 |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.4 | | | 0.2 | | | | | 0.8 | 0.4 | 0.3 |
| Delay (s) | | 14.4 | | | 13.6 | | | | | 9.0 | 8.6 | 7.8 |
| Level of Service | | B | | | B | | | | | A | A | A |
| Approach Delay (s) | | 14.4 | | | 13.6 | | | 0.0 | | | 8.5 | |
| Approach LOS | | B | | | B | | | A | | | A | |

Intersection Summary

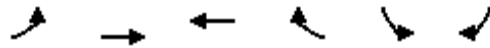
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.27 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 36.1% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 234 | 485 | 528 | 366 | 158 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.94 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3284 | | 3424 | 1421 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3284 | | 3424 | 1421 |
| Peak-hour factor, PHF | 0.74 | 0.93 | 0.90 | 0.97 | 0.72 | 0.86 |
| Adj. Flow (vph) | 316 | 522 | 587 | 377 | 219 | 103 |
| RTOR Reduction (vph) | 0 | 0 | 101 | 0 | 5 | 82 |
| Lane Group Flow (vph) | 316 | 522 | 863 | 0 | 224 | 11 |
| Confl. Peds. (#/hr) | 14 | | | 18 | | |
| Confl. Bikes (#/hr) | | | | 7 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 20.4 | 62.4 | 38.0 | | 9.6 | 9.6 |
| Effective Green, g (s) | 20.4 | 62.4 | 38.0 | | 9.6 | 9.6 |
| Actuated g/C Ratio | 0.26 | 0.78 | 0.48 | | 0.12 | 0.12 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 451 | 2760 | 1560 | | 411 | 171 |
| v/s Ratio Prot | c0.18 | 0.15 | c0.26 | | c0.07 | |
| v/s Ratio Perm | | | | | | 0.01 |
| v/c Ratio | 0.70 | 0.19 | 0.55 | | 0.54 | 0.07 |
| Uniform Delay, d1 | 27.0 | 2.3 | 15.0 | | 33.1 | 31.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 4.0 | 0.2 | 1.4 | | 0.8 | 0.1 |
| Delay (s) | 31.0 | 2.4 | 16.4 | | 33.9 | 31.3 |
| Level of Service | C | A | B | | C | C |
| Approach Delay (s) | | 13.2 | 16.4 | | 33.2 | |
| Approach LOS | | B | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 17.7 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.60 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 55.5% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|-------|-------|------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 23 | 579 | 27 | 16 | 693 | 99 | 80 | 447 | 28 | 115 | 361 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1765 | 3427 | 1532 | 1760 | 3342 | | 1769 | 3493 | | 1760 | 3378 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.40 | 1.00 | | 0.44 | 1.00 | |
| Satd. Flow (perm) | 311 | 3427 | 1532 | 322 | 3342 | | 751 | 3493 | | 811 | 3378 | |
| Peak-hour factor, PHF | 0.64 | 0.80 | 0.61 | 0.57 | 0.92 | 0.85 | 0.87 | 0.85 | 0.64 | 0.87 | 0.95 | 0.72 |
| Adj. Flow (vph) | 36 | 724 | 44 | 28 | 753 | 116 | 92 | 526 | 44 | 132 | 380 | 124 |
| RTOR Reduction (vph) | 0 | 0 | 32 | 0 | 14 | 0 | 0 | 7 | 0 | 0 | 31 | 0 |
| Lane Group Flow (vph) | 36 | 724 | 12 | 28 | 855 | 0 | 92 | 563 | 0 | 132 | 473 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | 5 | 2 | | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | 23.9 | 23.9 | 23.9 | 23.9 | 23.9 | 50.6 | 50.6 | | | 40.7 | 40.7 | |
| Effective Green, g (s) | 23.9 | 23.9 | 23.9 | 23.9 | 23.9 | 50.6 | 50.6 | | | 40.7 | 40.7 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.60 | 0.60 | | | 0.48 | 0.48 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 6.0 | | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 87 | 964 | 431 | 91 | 940 | 512 | 2079 | | | 388 | 1617 | |
| v/s Ratio Prot | | 0.21 | | | c0.26 | 0.01 | c0.16 | | | | 0.14 | |
| v/s Ratio Perm | 0.12 | | 0.01 | 0.09 | | 0.10 | | | | c0.16 | | |
| v/c Ratio | 0.41 | 0.75 | 0.03 | 0.31 | 0.91 | 0.18 | 0.27 | | | 0.34 | 0.29 | |
| Uniform Delay, d1 | 24.9 | 27.8 | 22.1 | 24.0 | 29.5 | 7.6 | 8.3 | | | 13.8 | 13.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.12 | 1.16 | |
| Incremental Delay, d2 | 13.9 | 5.4 | 0.1 | 8.6 | 14.2 | 0.1 | 0.3 | | | 2.2 | 0.4 | |
| Delay (s) | 38.7 | 33.2 | 22.3 | 32.6 | 43.7 | 7.7 | 8.6 | | | 17.7 | 16.0 | |
| Level of Service | D | C | C | C | D | A | A | | | B | B | |
| Approach Delay (s) | | 32.9 | | | 43.4 | | 8.5 | | | | 16.3 | |
| Approach LOS | | C | | | D | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 27.1 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 63.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 69 | 390 | 31 | 90 | 293 | 29 | 208 | 523 | 145 | 43 | 420 | 91 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3368 | | | 3320 | | 1764 | 3539 | 1551 | 1746 | 3407 | |
| Flt Permitted | 0.32 | 1.00 | | | 0.64 | | 0.42 | 1.00 | 1.00 | 0.43 | 1.00 | |
| Satd. Flow (perm) | 591 | 3368 | | | 2142 | | 771 | 3539 | 1551 | 787 | 3407 | |
| Peak-hour factor, PHF | 0.72 | 0.91 | 0.65 | 0.63 | 0.90 | 0.52 | 0.87 | 0.95 | 0.79 | 0.57 | 0.90 | 0.84 |
| Adj. Flow (vph) | 96 | 429 | 48 | 143 | 326 | 56 | 239 | 551 | 184 | 75 | 467 | 108 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 14 | 0 | 0 | 0 | 71 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 96 | 463 | 0 | 0 | 511 | 0 | 239 | 551 | 113 | 75 | 558 | 0 |
| Confl. Peds. (#/hr) | 8 | | 8 | 2 | | 2 | 8 | | 8 | 32 | | 32 |
| Confl. Bikes (#/hr) | | | 6 | | | 6 | | | 4 | | | 28 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | 2 | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 23.0 | 23.0 | | | 23.0 | | 49.0 | 49.0 | 49.0 | 49.0 | 49.0 | |
| Effective Green, g (s) | 23.0 | 23.0 | | | 23.0 | | 49.0 | 49.0 | 49.0 | 49.0 | 49.0 | |
| Actuated g/C Ratio | 0.29 | 0.29 | | | 0.29 | | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 170 | 968 | | | 616 | | 472 | 2168 | 950 | 482 | 2087 | |
| v/s Ratio Prot | | 0.14 | | | | | | 0.16 | | | 0.16 | |
| v/s Ratio Perm | 0.16 | | | | c0.24 | | c0.31 | | 0.07 | 0.10 | | |
| v/c Ratio | 0.56 | 0.48 | | | 0.83 | | 0.51 | 0.25 | 0.12 | 0.16 | 0.27 | |
| Uniform Delay, d1 | 24.2 | 23.5 | | | 26.7 | | 8.7 | 7.1 | 6.5 | 6.6 | 7.2 | |
| Progression Factor | 1.00 | 1.00 | | | 1.05 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.5 | 0.1 | | | 8.6 | | 3.8 | 0.3 | 0.3 | 0.7 | 0.3 | |
| Delay (s) | 26.8 | 23.7 | | | 36.6 | | 12.6 | 7.4 | 6.7 | 7.3 | 7.5 | |
| Level of Service | C | C | | | D | | B | A | A | A | A | |
| Approach Delay (s) | | 24.2 | | | 36.6 | | | 8.5 | | | 7.5 | |
| Approach LOS | | C | | | D | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 17.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 73.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | ↔ | ↔↔ | | | | | | ↔↔ | |
| Volume (vph) | 5 | 570 | 163 | 100 | 319 | 2 | 0 | 0 | 0 | 62 | 192 | 55 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frpb, ped/bikes | | 0.95 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | 0.96 | | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3135 | | 1770 | 3413 | | | | | | 3356 | |
| Flt Permitted | | 0.95 | | 0.21 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 2972 | | 393 | 3413 | | | | | | 3356 | |
| Peak-hour factor, PHF | 0.42 | 0.99 | 0.87 | 0.93 | 0.88 | 0.25 | 0.25 | 0.25 | 0.25 | 0.74 | 0.94 | 0.69 |
| Adj. Flow (vph) | 12 | 576 | 187 | 108 | 362 | 8 | 0 | 0 | 0 | 84 | 204 | 80 |
| RTOR Reduction (vph) | 0 | 33 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 0 | 742 | 0 | 108 | 368 | 0 | 0 | 0 | 0 | 0 | 336 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 8 | | 8 | 36 | | 36 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 18 | | | 14 | | | 2 | | | 8 |
| Turn Type | Perm | | pm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 32.0 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Effective Green, g (s) | 32.0 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Actuated g/C Ratio | 0.40 | | 0.54 | | 0.54 | | | | 0.36 | | | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | 3.0 | | | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | 2.0 | | | |
| Lane Grp Cap (vph) | 1189 | | 315 | | 1834 | | | | 1217 | | | |
| v/s Ratio Prot | | | c0.03 | | 0.11 | | | | | | | |
| v/s Ratio Perm | c0.25 | | 0.16 | | | | | | 0.10 | | | |
| v/c Ratio | 0.62 | | 0.34 | | 0.20 | | | | 0.28 | | | |
| Uniform Delay, d1 | 19.2 | | 10.7 | | 9.6 | | | | 18.1 | | | |
| Progression Factor | 1.67 | | 1.00 | | 1.00 | | | | 1.00 | | | |
| Incremental Delay, d2 | 2.4 | | 0.2 | | 0.2 | | | | 0.6 | | | |
| Delay (s) | 34.5 | | 11.0 | | 9.8 | | | | 18.6 | | | |
| Level of Service | C | | B | | A | | | | B | | | |
| Approach Delay (s) | 34.5 | | | | 10.1 | | 0.0 | | | | 18.6 | |
| Approach LOS | C | | | | B | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 23.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.45 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 65.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|------|-------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↑↑↑ | ↗ | | ↔↔↔ | |
| Volume (vph) | 114 | 538 | 110 | 279 | 724 | 36 | 9 | 1086 | 707 | 2 | 504 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1484 | 3433 | 3539 | 1459 | | 5081 | 1466 | | 4912 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.93 | 1.00 | | 0.93 | |
| Satd. Flow (perm) | 3433 | 3539 | 1484 | 3433 | 3539 | 1459 | | 4709 | 1466 | | 4580 | |
| Peak-hour factor, PHF | 0.63 | 0.92 | 0.83 | 0.98 | 0.93 | 0.75 | 0.56 | 0.92 | 0.86 | 0.50 | 0.96 | 0.50 |
| Adj. Flow (vph) | 181 | 585 | 133 | 285 | 778 | 48 | 16 | 1180 | 822 | 4 | 525 | 100 |
| RTOR Reduction (vph) | 0 | 0 | 74 | 0 | 0 | 29 | 0 | 0 | 262 | 0 | 28 | 0 |
| Lane Group Flow (vph) | 181 | 585 | 59 | 285 | 778 | 19 | 0 | 1196 | 560 | 0 | 601 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | 4 | | |
| Actuated Green, G (s) | 9.6 | 36.5 | 36.5 | 12.5 | 40.4 | 40.4 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 9.6 | 36.5 | 36.5 | 12.5 | 40.4 | 40.4 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.10 | 0.36 | 0.36 | 0.12 | 0.40 | 0.40 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 330 | 1292 | 542 | 429 | 1430 | 589 | | 1695 | 528 | | 1649 | |
| v/s Ratio Prot | 0.05 | 0.17 | | c0.08 | c0.22 | | | | | | | |
| v/s Ratio Perm | | | 0.04 | | | 0.01 | | 0.25 | c0.38 | | 0.13 | |
| v/c Ratio | 0.55 | 0.45 | 0.11 | 0.66 | 0.54 | 0.03 | | 0.71 | 1.06 | | 0.36 | |
| Uniform Delay, d1 | 43.1 | 24.2 | 21.0 | 41.7 | 22.8 | 18.0 | | 27.5 | 32.0 | | 23.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 1.0 | 1.1 | 0.4 | 3.0 | 1.5 | 0.1 | | 2.5 | 56.0 | | 0.6 | |
| Delay (s) | 44.1 | 25.3 | 21.4 | 44.7 | 24.3 | 18.1 | | 30.0 | 88.0 | | 24.2 | |
| Level of Service | D | C | C | D | C | B | | C | F | | C | |
| Approach Delay (s) | | 28.5 | | | 29.2 | | | 53.6 | | | 24.2 | |
| Approach LOS | | C | | | C | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 39.0 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 15.0 |
| Intersection Capacity Utilization | 100.6% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Existing PM
Kaiser Center Transportation Study

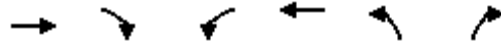





| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 258 | 69 | 84 | 1263 | 766 | 74 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.98 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 0.99 | 1.00 | 1.00 | |
| Frt | 0.93 | | 1.00 | 1.00 | 0.99 | |
| Flt Protected | 0.98 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3204 | | 1748 | 3725 | 6321 | |
| Flt Permitted | 0.98 | | 0.27 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3204 | | 496 | 3725 | 6321 | |
| Peak-hour factor, PHF | 0.90 | 0.25 | 0.91 | 0.96 | 0.90 | 0.88 |
| Adj. Flow (vph) | 287 | 276 | 92 | 1316 | 851 | 84 |
| RTOR Reduction (vph) | 229 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 334 | 0 | 92 | 1316 | 923 | 0 |
| Confl. Peds. (#/hr) | 30 | 30 | 106 | | | |
| Confl. Bikes (#/hr) | | 2 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 13.6 | | 52.9 | 47.1 | 47.1 | |
| Effective Green, g (s) | 13.6 | | 52.9 | 47.1 | 47.1 | |
| Actuated g/C Ratio | 0.17 | | 0.66 | 0.59 | 0.59 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 545 | | 419 | 2193 | 3721 | |
| v/s Ratio Prot | c0.10 | | c0.02 | c0.35 | 0.15 | |
| v/s Ratio Perm | | | 0.13 | | | |
| v/c Ratio | 0.61 | | 0.22 | 0.60 | 0.25 | |
| Uniform Delay, d1 | 30.8 | | 4.9 | 10.5 | 7.9 | |
| Progression Factor | 1.00 | | 0.58 | 0.88 | 1.00 | |
| Incremental Delay, d2 | 2.0 | | 0.3 | 1.2 | 0.2 | |
| Delay (s) | 32.8 | | 3.1 | 10.3 | 8.1 | |
| Level of Service | C | | A | B | A | |
| Approach Delay (s) | 32.8 | | | 9.9 | 8.1 | |
| Approach LOS | C | | | A | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 13.7 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.57 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | | | 47.8% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

Existing PM
Kaiser Center Transportation Study

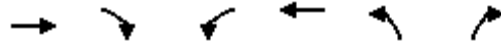


| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 232 | 10 | 21 | 139 | 11 | 54 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.63 | 0.66 | 0.91 | 0.69 | 0.84 |
| Hourly flow rate (vph) | 247 | 16 | 32 | 153 | 16 | 64 |
| Pedestrians | 18 | | | 18 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 263 | | 489 | 273 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 263 | | 489 | 273 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 98 | | 97 | 91 |
| cM capacity (veh/h) | | | 1302 | | 517 | 754 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 263 | 185 | 80 | | | |
| Volume Left | 0 | 32 | 16 | | | |
| Volume Right | 16 | 0 | 64 | | | |
| cSH | 1700 | 1302 | 691 | | | |
| Volume to Capacity | 0.15 | 0.02 | 0.12 | | | |
| Queue Length 95th (ft) | 0 | 2 | 10 | | | |
| Control Delay (s) | 0.0 | 1.5 | 10.9 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.5 | 10.9 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.2 | | | |
| Intersection Capacity Utilization | 40.3% | | | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

15: 21st Street & Garage Entrance East

Existing PM
Kaiser Center Transportation Study

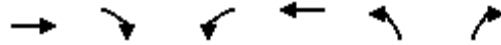






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 182 | 9 | 9 | 141 | 29 | 60 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.75 | 0.31 | 0.83 | 0.73 | 0.75 |
| Hourly flow rate (vph) | 202 | 12 | 29 | 170 | 40 | 80 |
| Pedestrians | 27 | | | 27 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 214 | | 463 | 235 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 214 | | 463 | 235 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 98 | | 93 | 90 |
| cM capacity (veh/h) | | | 1356 | | 533 | 786 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 214 | 199 | 120 | | | |
| Volume Left | 0 | 29 | 40 | | | |
| Volume Right | 12 | 0 | 80 | | | |
| cSH | 1700 | 1356 | 679 | | | |
| Volume to Capacity | 0.13 | 0.02 | 0.18 | | | |
| Queue Length 95th (ft) | 0 | 2 | 16 | | | |
| Control Delay (s) | 0.0 | 1.3 | 11.4 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.3 | 11.4 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.0 | | | |
| Intersection Capacity Utilization | | 32.2% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

16: 21st Street & Garage Entrance West

Existing PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 282 | 3 | 15 | 116 | 45 | 82 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.38 | 0.63 | 0.94 | 0.80 | 0.82 |
| Hourly flow rate (vph) | 291 | 8 | 24 | 123 | 56 | 100 |
| Pedestrians | 20 | | | 20 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.92 | | 0.92 | 0.92 |
| vC, conflicting volume | | | 299 | | 486 | 315 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 197 | | 400 | 215 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 98 | | 90 | 87 |
| cM capacity (veh/h) | | | 1268 | | 539 | 748 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 299 | 147 | 28 | 28 | 50 | 50 |
| Volume Left | 0 | 24 | 28 | 28 | 0 | 0 |
| Volume Right | 8 | 0 | 0 | 0 | 50 | 50 |
| cSH | 1700 | 1268 | 539 | 539 | 748 | 748 |
| Volume to Capacity | 0.18 | 0.02 | 0.05 | 0.05 | 0.07 | 0.07 |
| Queue Length 95th (ft) | 0 | 1 | 4 | 4 | 5 | 5 |
| Control Delay (s) | 0.0 | 1.4 | 12.0 | 12.0 | 10.2 | 10.2 |
| Lane LOS | | A | B | B | B | B |
| Approach Delay (s) | 0.0 | 1.4 | 10.8 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.2 | | | |
| Intersection Capacity Utilization | | | 33.6% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 157 | 79 | 58 | 131 | 0 | 0 | 0 | 0 | 39 | 402 | 22 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | | 0.98 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.97 | | | | | | 0.98 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1434 | | 1774 | | | | | | 4808 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.80 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1434 | | 1442 | | | | | | 4808 | |
| Peak-hour factor, PHF | 0.92 | 0.91 | 0.79 | 0.76 | 0.84 | 0.92 | 0.25 | 0.25 | 0.25 | 0.75 | 0.97 | 0.69 |
| Adj. Flow (vph) | 0 | 173 | 100 | 76 | 156 | 0 | 0 | 0 | 0 | 52 | 414 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 173 | 59 | 0 | 232 | 0 | 0 | 0 | 0 | 0 | 494 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 18.6 | 18.6 | | 18.6 | | | | | | 53.4 | |
| Effective Green, g (s) | | 18.6 | 18.6 | | 18.6 | | | | | | 53.4 | |
| Actuated g/C Ratio | | 0.23 | 0.23 | | 0.23 | | | | | | 0.67 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 433 | 333 | | 335 | | | | | | 3209 | |
| v/s Ratio Prot | | 0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.04 | | 0.16 | | | | | | 0.10 | |
| v/c Ratio | | 0.40 | 0.18 | | 0.69 | | | | | | 0.15 | |
| Uniform Delay, d1 | | 26.0 | 24.6 | | 28.1 | | | | | | 4.9 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 1.29 | |
| Incremental Delay, d2 | | 0.6 | 0.3 | | 6.1 | | | | | | 0.1 | |
| Delay (s) | | 26.6 | 24.8 | | 34.2 | | | | | | 6.5 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 25.9 | | | 34.2 | | | 0.0 | | | 6.5 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 18.2 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.29 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 54.0% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰↱ | ↱ | | | |
| Volume (vph) | 11 | 91 | 1 | 0 | 87 | 62 | 16 | 264 | 140 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 1.00 | 0.80 | | | |
| Flpb, ped/bikes | | 0.99 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1827 | | | 1699 | | | 3502 | 1269 | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1782 | | | 1699 | | | 3502 | 1269 | | | |
| Peak-hour factor, PHF | 0.69 | 0.84 | 0.25 | 0.25 | 0.87 | 0.82 | 0.80 | 0.93 | 0.88 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 16 | 108 | 4 | 0 | 100 | 76 | 20 | 284 | 159 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 28 | 0 | 0 | 0 | 129 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 127 | 0 | 0 | 148 | 0 | 0 | 304 | 30 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | | 40 | | | 1 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 28.6 | | | 28.6 | | | 8.4 | 8.4 | | | |
| Effective Green, g (s) | | 28.6 | | | 28.6 | | | 8.4 | 8.4 | | | |
| Actuated g/C Ratio | | 0.64 | | | 0.64 | | | 0.19 | 0.19 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1133 | | | 1080 | | | 654 | 237 | | | |
| v/s Ratio Prot | | | | | c0.09 | | | | | | | |
| v/s Ratio Perm | | 0.07 | | | | | | 0.09 | 0.02 | | | |
| v/c Ratio | | 0.11 | | | 0.14 | | | 0.46 | 0.13 | | | |
| Uniform Delay, d1 | | 3.2 | | | 3.3 | | | 16.3 | 15.2 | | | |
| Progression Factor | | 0.44 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.3 | | | 0.2 | 0.1 | | | |
| Delay (s) | | 1.6 | | | 3.5 | | | 16.5 | 15.3 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 1.6 | | | 3.5 | | | 16.1 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.8 | | | | | | HCM Level of Service | B | | | |
| HCM Volume to Capacity ratio | | 0.21 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 36.6% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 11 | 36 | 17 | 49 | 0 | 49 | 0 | 423 | 35 | 25 | 368 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.98 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.93 | | | 0.99 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1746 | 1759 | | | 1651 | | | 3474 | | | 3519 | |
| Flt Permitted | 0.68 | 1.00 | | | 0.87 | | | 1.00 | | | 0.90 | |
| Satd. Flow (perm) | 1250 | 1759 | | | 1474 | | | 3474 | | | 3179 | |
| Peak-hour factor, PHF | 0.69 | 0.82 | 0.85 | 0.88 | 0.92 | 0.77 | 0.25 | 0.89 | 0.88 | 0.89 | 0.99 | 0.92 |
| Adj. Flow (vph) | 16 | 44 | 20 | 56 | 0 | 64 | 0 | 475 | 40 | 28 | 372 | 0 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 37 | 0 | 0 | 14 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 16 | 52 | 0 | 0 | 83 | 0 | 0 | 501 | 0 | 0 | 400 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 24 | | 24 | 40 | | 40 | 48 | | 48 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | 17 | | | 7 |
| Turn Type | Perm | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 528 | 743 | | | 622 | | | 1312 | | | 1201 | |
| v/s Ratio Prot | | 0.03 | | | | | | c0.14 | | | | |
| v/s Ratio Perm | 0.01 | | | | c0.06 | | | | | | 0.13 | |
| v/c Ratio | 0.03 | 0.07 | | | 0.13 | | | 0.38 | | | 0.33 | |
| Uniform Delay, d1 | 7.6 | 7.7 | | | 8.0 | | | 10.2 | | | 10.0 | |
| Progression Factor | 1.00 | 1.00 | | | 1.17 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.2 | | | 0.4 | | | 0.8 | | | 0.7 | |
| Delay (s) | 7.7 | 7.9 | | | 9.8 | | | 11.0 | | | 10.7 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 7.9 | | | 9.8 | | | 11.0 | | | 10.7 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.25 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 52.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|------|-------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | ↕ | ↕↕ | |
| Volume (vph) | 22 | 127 | 23 | 9 | 151 | 149 | 20 | 507 | 21 | 31 | 139 | 49 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.98 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | 0.93 | | | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3374 | | | 3208 | | | 3495 | | 1766 | 3281 | |
| Flt Permitted | | 0.75 | | | 0.94 | | | 0.93 | | 0.35 | 1.00 | |
| Satd. Flow (perm) | | 2541 | | | 3013 | | | 3273 | | 654 | 3281 | |
| Peak-hour factor, PHF | 0.55 | 0.84 | 0.52 | 0.56 | 0.70 | 0.65 | 0.71 | 0.91 | 0.66 | 0.97 | 0.85 | 0.44 |
| Adj. Flow (vph) | 40 | 151 | 44 | 16 | 216 | 229 | 28 | 557 | 32 | 32 | 164 | 111 |
| RTOR Reduction (vph) | 0 | 36 | 0 | 0 | 187 | 0 | 0 | 5 | 0 | 0 | 37 | 0 |
| Lane Group Flow (vph) | 0 | 199 | 0 | 0 | 274 | 0 | 0 | 613 | 0 | 32 | 238 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 3 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 10.9 | | | 10.9 | | | 33.0 | | 40.1 | 40.1 | |
| Effective Green, g (s) | | 10.9 | | | 10.9 | | | 33.0 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | | 0.18 | | | 0.18 | | | 0.55 | | 0.67 | 0.67 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 462 | | | 547 | | | 1800 | | 485 | 2193 | |
| v/s Ratio Prot | | | | | | | | | | 0.00 | c0.07 | |
| v/s Ratio Perm | | 0.08 | | | c0.09 | | | c0.19 | | 0.04 | | |
| v/c Ratio | | 0.43 | | | 0.50 | | | 0.34 | | 0.07 | 0.11 | |
| Uniform Delay, d1 | | 21.8 | | | 22.1 | | | 7.5 | | 3.7 | 3.6 | |
| Progression Factor | | 1.00 | | | 0.85 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | 0.7 | | | 0.5 | | 0.1 | 0.1 | |
| Delay (s) | | 22.4 | | | 19.5 | | | 8.0 | | 3.7 | 3.7 | |
| Level of Service | | C | | | B | | | A | | A | A | |
| Approach Delay (s) | | 22.4 | | | 19.5 | | | 8.0 | | | 3.7 | |
| Approach LOS | | C | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 12.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.37 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 59.0% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔↔ | |
| Volume (vph) | 19 | 128 | 80 | 51 | 199 | 86 | 92 | 675 | 95 | 37 | 466 | 33 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.97 | | | 0.96 | | | 0.99 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | | 0.96 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Satd. Flow (prot) | | 3216 | | | 3209 | | | 3411 | | | 4956 | |
| Flt Permitted | | 0.91 | | | 0.87 | | | 0.78 | | | 0.81 | |
| Satd. Flow (perm) | | 2937 | | | 2828 | | | 2672 | | | 4024 | |
| Peak-hour factor, PHF | 0.79 | 0.82 | 0.83 | 0.91 | 0.89 | 0.80 | 0.92 | 0.92 | 0.95 | 0.71 | 0.88 | 0.63 |
| Adj. Flow (vph) | 24 | 156 | 96 | 56 | 224 | 108 | 100 | 734 | 100 | 52 | 530 | 52 |
| RTOR Reduction (vph) | 0 | 61 | 0 | 0 | 65 | 0 | 0 | 16 | 0 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 0 | 215 | 0 | 0 | 323 | 0 | 0 | 919 | 0 | 0 | 617 | 0 |
| Confl. Peds. (#/hr) | 74 | | 74 | 120 | | 120 | 85 | | 85 | 65 | | 65 |
| Confl. Bikes (#/hr) | | | 30 | | | 13 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1077 | | | 1037 | | | 1378 | | | 1207 | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.07 | | | c0.11 | | | c0.24 | | | 0.15 | |
| v/c Ratio | | 0.20 | | | 0.31 | | | 0.67 | | | 0.51 | |
| Uniform Delay, d1 | | 13.0 | | | 13.6 | | | 11.8 | | | 17.4 | |
| Progression Factor | | 1.92 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 0.8 | | | 2.6 | | | 1.5 | |
| Delay (s) | | 25.3 | | | 14.4 | | | 14.4 | | | 18.9 | |
| Level of Service | | C | | | B | | | B | | | B | |
| Approach Delay (s) | | 25.3 | | | 14.4 | | | 14.4 | | | 18.9 | |
| Approach LOS | | C | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 17.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 84.1% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 29 | 255 | 0 | 0 | 300 | 75 | 50 | 302 | 198 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3500 | | | 3371 | 1319 | | 4998 | 1456 | | | |
| Flt Permitted | | 0.88 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3103 | | | 3371 | 1319 | | 4998 | 1456 | | | |
| Peak-hour factor, PHF | 0.66 | 0.87 | 0.92 | 0.92 | 0.92 | 0.94 | 0.83 | 0.91 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 44 | 293 | 0 | 0 | 326 | 80 | 60 | 332 | 213 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 17 | 0 | 0 | 181 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 337 | 0 | 0 | 333 | 55 | 0 | 392 | 32 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | 12 | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | Perm | | | Perm | Perm | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 60.8 | | | 60.8 | 60.8 | | 12.2 | 12.2 | | | |
| Effective Green, g (s) | | 60.8 | | | 60.8 | 60.8 | | 12.2 | 12.2 | | | |
| Actuated g/C Ratio | | 0.76 | | | 0.76 | 0.76 | | 0.15 | 0.15 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2358 | | | 2562 | 1002 | | 762 | 222 | | | |
| v/s Ratio Prot | | | | | 0.10 | | | | | | | |
| v/s Ratio Perm | | c0.11 | | | | 0.04 | | 0.08 | 0.02 | | | |
| v/c Ratio | | 0.14 | | | 0.13 | 0.05 | | 0.51 | 0.15 | | | |
| Uniform Delay, d1 | | 2.6 | | | 2.6 | 2.4 | | 31.2 | 29.4 | | | |
| Progression Factor | | 1.00 | | | 0.72 | 0.36 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.6 | 0.3 | | | |
| Delay (s) | | 2.7 | | | 1.9 | 1.0 | | 31.8 | 29.7 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 2.7 | | | 1.8 | | | 31.0 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 15.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.20 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 56.7% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

23: 20th Street & Webster Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 315 | 137 | 109 | 282 | 0 | 0 | 0 | 0 | 63 | 403 | 92 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.91 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1439 | 1610 | 3372 | | | | | | 4487 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.95 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1439 | 1610 | 3200 | | | | | | 4487 | |
| Peak-hour factor, PHF | 0.92 | 0.88 | 0.90 | 0.83 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.72 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 358 | 152 | 131 | 307 | 0 | 0 | 0 | 0 | 88 | 438 | 100 |
| RTOR Reduction (vph) | 0 | 0 | 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 0 |
| Lane Group Flow (vph) | 0 | 358 | 93 | 118 | 320 | 0 | 0 | 0 | 0 | 0 | 591 | 0 |
| Confl. Peds. (#/hr) | 51 | | 51 | 114 | | 114 | 115 | | 115 | 333 | | 333 |
| Confl. Bikes (#/hr) | | | 8 | | | 3 | | | 17 | | | 6 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Effective Green, g (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Actuated g/C Ratio | | 0.35 | 0.35 | 0.12 | 0.52 | | | | | | 0.38 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1239 | 504 | 201 | 1702 | | | | | | 1683 | |
| v/s Ratio Prot | | c0.10 | | c0.07 | 0.02 | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | 0.08 | | | | | | 0.13 | |
| v/c Ratio | | 0.29 | 0.18 | 0.59 | 0.19 | | | | | | 0.35 | |
| Uniform Delay, d1 | | 18.8 | 18.1 | 33.1 | 10.0 | | | | | | 18.0 | |
| Progression Factor | | 1.16 | 1.34 | 0.97 | 0.93 | | | | | | 1.25 | |
| Incremental Delay, d2 | | 0.6 | 0.8 | 2.8 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 22.5 | 25.0 | 34.9 | 9.3 | | | | | | 22.6 | |
| Level of Service | | C | C | C | A | | | | | | C | |
| Approach Delay (s) | | 23.2 | | | 16.2 | | | 0.0 | | | 22.6 | |
| Approach LOS | | C | | | B | | | A | | | C | |

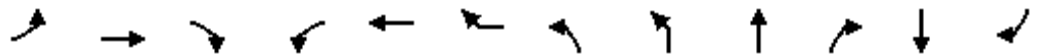
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 21.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 93.3% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR | SBT | SBR |
|------------------------|--------|-------|-------|------|-------|------|-------|--------|-------|-------|------|------|
| Lane Configurations | ↔↔ | ↔ | | ↔ | ↔↔ | | | | ↔↔ | | ↔↔ | ↔ |
| Volume (vph) | 256 | 89 | 35 | 7 | 111 | 14 | 75 | 21 | 629 | 20 | 138 | 96 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.91 | | 1.00 | 0.95 | | | | 0.95 | | 0.91 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.96 | | 1.00 | 0.98 | | | | 1.00 | | 0.98 | 0.85 |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | | | 0.99 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 3221 | 1614 | | 1770 | 3481 | | | | 3495 | | 3334 | 1441 |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | | | 0.99 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 3221 | 1614 | | 1770 | 3481 | | | | 3495 | | 3334 | 1441 |
| Peak-hour factor, PHF | 0.91 | 0.86 | 0.73 | 0.63 | 0.86 | 0.86 | 0.71 | 0.71 | 0.88 | 0.71 | 0.78 | 0.89 |
| Adj. Flow (vph) | 281 | 103 | 48 | 11 | 129 | 16 | 106 | 30 | 715 | 28 | 177 | 108 |
| RTOR Reduction (vph) | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 253 | 164 | 0 | 11 | 145 | 0 | 0 | 0 | 876 | 0 | 199 | 86 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | |
| Confl. Bikes (#/hr) | 12 | | | | | | | | | 7 | | |
| Turn Type | custom | | Split | | Split | | Split | custom | | | | |
| Protected Phases | 1 | 1 | 7 | | 7 | 8 | | 8 | 8 | 2 | | |
| Permitted Phases | 1 | | | | | | | | | 6 | | |
| Actuated Green, G (s) | 19.7 | 19.7 | 7.7 | | 7.7 | | | | 25.6 | 11.0 | | 34.7 |
| Effective Green, g (s) | 19.7 | 19.7 | 7.7 | | 7.7 | | | | 25.6 | 11.0 | | 34.7 |
| Actuated g/C Ratio | 0.25 | 0.25 | 0.10 | | 0.10 | | | | 0.32 | 0.14 | | 0.43 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | | | | 4.0 | 4.0 | | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | | | | 2.0 | 2.0 | | 2.0 |
| Lane Grp Cap (vph) | 793 | 397 | 170 | | 335 | | | | 1118 | 458 | | 625 |
| v/s Ratio Prot | 0.08 | c0.10 | 0.01 | | c0.04 | | | | c0.25 | c0.06 | | 0.06 |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.32 | 0.41 | 0.06 | | 0.43 | | | | 0.78 | 0.43 | | 0.14 |
| Uniform Delay, d1 | 24.7 | 25.3 | 32.9 | | 34.1 | | | | 24.7 | 31.6 | | 13.6 |
| Progression Factor | 0.85 | 0.83 | 0.80 | | 0.83 | | | | 1.00 | 1.14 | | 1.18 |
| Incremental Delay, d2 | 1.1 | 3.1 | 0.1 | | 0.3 | | | | 3.4 | 0.2 | | 0.5 |
| Delay (s) | 22.0 | 24.3 | 26.2 | | 28.7 | | | | 28.1 | 36.3 | | 16.5 |
| Level of Service | C | C | C | | C | | | | C | D | | B |
| Approach Delay (s) | 22.9 | | | | 28.6 | | | | 28.1 | 29.7 | | |
| Approach LOS | C | | | | C | | | | C | C | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 27.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 57.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Existing PM
Kaiser Center Transportation Study

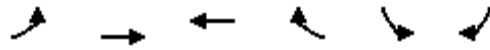









| Movement | SBR2 |
|------------------------|--------|
| Lane Configurations | |
| Volume (vph) | 36 |
| Ideal Flow (vphpl) | 1900 |
| Total Lost time (s) | 4.0 |
| Lane Util. Factor | 1.00 |
| Frpb, ped/bikes | 1.00 |
| Flpb, ped/bikes | 1.00 |
| Frt | 0.85 |
| Flt Protected | 1.00 |
| Satd. Flow (prot) | 1583 |
| Flt Permitted | 1.00 |
| Satd. Flow (perm) | 1583 |
| Peak-hour factor, PHF | 0.89 |
| Adj. Flow (vph) | 40 |
| RTOR Reduction (vph) | 23 |
| Lane Group Flow (vph) | 17 |
| Confl. Peds. (#/hr) | 74 |
| Confl. Bikes (#/hr) | 8 |
| Turn Type | custom |
| Protected Phases | 6 |
| Permitted Phases | |
| Actuated Green, G (s) | 34.7 |
| Effective Green, g (s) | 34.7 |
| Actuated g/C Ratio | 0.43 |
| Clearance Time (s) | 4.0 |
| Vehicle Extension (s) | 2.0 |
| Lane Grp Cap (vph) | 687 |
| v/s Ratio Prot | 0.01 |
| v/s Ratio Perm | |
| v/c Ratio | 0.03 |
| Uniform Delay, d1 | 13.0 |
| Progression Factor | 1.95 |
| Incremental Delay, d2 | 0.1 |
| Delay (s) | 25.3 |
| Level of Service | C |
| Approach Delay (s) | |
| Approach LOS | |
| Intersection Summary | |

HCM Unsignalized Intersection Capacity Analysis

25: 20th Street & Access Road Exit

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR | |
|-----------------------------------|---|---|---|------|----------------------|---|------|
| Lane Configurations |  |    |   | | |  | |
| Volume (veh/h) | 0 | 380 | 282 | 0 | 0 | 94 | |
| Sign Control | | Free | Free | | Stop | | |
| Grade | | 0% | 0% | | 0% | | |
| Peak Hour Factor | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.66 | |
| Hourly flow rate (vph) | 0 | 1520 | 1128 | 0 | 0 | 142 | |
| Pedestrians | | | | | | | |
| Lane Width (ft) | | | | | | | |
| Walking Speed (ft/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | None | None | | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (ft) | | 420 | 110 | | | | |
| pX, platoon unblocked | 0.97 | | | | 0.97 | 0.97 | |
| vC, conflicting volume | 1128 | | | | 1635 | 564 | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 1073 | | | | 1594 | 492 | |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 | |
| p0 queue free % | 100 | | | | 100 | 72 | |
| cM capacity (veh/h) | 627 | | | | 95 | 507 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | EB 4 | WB 1 | WB 2 | SB 1 |
| Volume Total | 0 | 507 | 507 | 507 | 564 | 564 | 142 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 142 |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 | 507 |
| Volume to Capacity | 0.00 | 0.30 | 0.30 | 0.30 | 0.33 | 0.33 | 0.28 |
| Queue Length 95th (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 29 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.8 |
| Lane LOS | | | | | | | B |
| Approach Delay (s) | 0.0 | | | | 0.0 | | 14.8 |
| Approach LOS | | | | | | | B |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.8 | | | | |
| Intersection Capacity Utilization | | 20.3% | | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | | |
| | | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: Harrison Street & Lakeside Drive

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|------|------|------|-------|------|
| Lane Configurations | ←←← | | | →→→ | →→ | ←←← |
| Volume (vph) | 893 | 0 | 0 | 703 | 624 | 272 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.94 | | | 0.91 | 0.95 | 0.76 |
| Frpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (prot) | 4990 | | | 5085 | 3539 | 3481 |
| Flt Permitted | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 4990 | | | 5085 | 3539 | 3481 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.25 | 0.93 | 0.99 | 0.84 |
| Adj. Flow (vph) | 940 | 0 | 0 | 756 | 630 | 324 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 940 | 0 | 0 | 756 | 630 | 324 |
| Confl. Peds. (#/hr) | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | 16 |
| Turn Type | | | | | | Free |
| Protected Phases | 1 | | | 2 | 2 | |
| Permitted Phases | | | | | | Free |
| Actuated Green, G (s) | 21.9 | | | 49.1 | 49.1 | 80.0 |
| Effective Green, g (s) | 21.9 | | | 49.1 | 49.1 | 80.0 |
| Actuated g/C Ratio | 0.27 | | | 0.61 | 0.61 | 1.00 |
| Clearance Time (s) | 5.0 | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 1366 | | | 3121 | 2172 | 3481 |
| v/s Ratio Prot | c0.19 | | | 0.15 | c0.18 | |
| v/s Ratio Perm | | | | | | 0.09 |
| v/c Ratio | 0.69 | | | 0.24 | 0.29 | 0.09 |
| Uniform Delay, d1 | 26.0 | | | 7.0 | 7.3 | 0.0 |
| Progression Factor | 1.07 | | | 1.00 | 0.78 | 1.00 |
| Incremental Delay, d2 | 1.2 | | | 0.2 | 0.3 | 0.1 |
| Delay (s) | 29.0 | | | 7.2 | 6.0 | 0.1 |
| Level of Service | C | | | A | A | A |
| Approach Delay (s) | 29.0 | | | 7.2 | 4.0 | |
| Approach LOS | C | | | A | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 41.7% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

27: Lakeside Drive & 20th Street

Existing PM
Kaiser Center Transportation Study



| Movement | NBL | NBT | SBT | SBR | SEL | SER |
|-----------------------------------|------|-------|-------|----------------------|--------|------|
| Lane Configurations | ←←← | ↑↑ | ↑↑ | | | ↗↗ |
| Volume (vph) | 132 | 703 | 624 | 0 | 0 | 109 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Util. Factor | 0.94 | 0.95 | 0.95 | | | 0.88 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Frt | 1.00 | 1.00 | 1.00 | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 4990 | 3539 | 3539 | | | 2787 |
| Flt Permitted | 0.94 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 4938 | 3539 | 3539 | | | 2787 |
| Peak-hour factor, PHF | 0.69 | 0.88 | 0.92 | 0.92 | 0.92 | 0.71 |
| Adj. Flow (vph) | 191 | 799 | 678 | 0 | 0 | 154 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 53 |
| Lane Group Flow (vph) | 191 | 799 | 678 | 0 | 0 | 101 |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | custom | |
| Protected Phases | | 2 | 1 | | | 2 |
| Permitted Phases | 2 | 1 | | | | 2 |
| Actuated Green, G (s) | 52.6 | 74.0 | 21.4 | | | 52.6 |
| Effective Green, g (s) | 52.6 | 74.0 | 21.4 | | | 52.6 |
| Actuated g/C Ratio | 0.66 | 0.92 | 0.27 | | | 0.66 |
| Clearance Time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 3247 | 3539 | 947 | | | 1832 |
| v/s Ratio Prot | | c0.15 | c0.19 | | | 0.04 |
| v/s Ratio Perm | 0.04 | 0.08 | | | | |
| v/c Ratio | 0.06 | 0.23 | 0.72 | | | 0.06 |
| Uniform Delay, d1 | 4.9 | 0.3 | 26.5 | | | 4.9 |
| Progression Factor | 1.00 | 1.00 | 0.71 | | | 3.44 |
| Incremental Delay, d2 | 0.0 | 0.0 | 2.5 | | | 0.1 |
| Delay (s) | 4.9 | 0.3 | 21.5 | | | 16.8 |
| Level of Service | A | A | C | | | B |
| Approach Delay (s) | | 1.2 | 21.5 | | 16.8 | |
| Approach LOS | | A | C | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 10.1 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.36 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | 3.0 |
| Intersection Capacity Utilization | | 27.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↰↱↲ | |
| Volume (vph) | 0 | 0 | 0 | 146 | 151 | 0 | 0 | 0 | 0 | 0 | 986 | 114 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1766 | 3539 | | | | | | 6289 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1766 | 3539 | | | | | | 6289 | |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.91 | 0.90 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.89 |
| Adj. Flow (vph) | 0 | 0 | 0 | 160 | 168 | 0 | 0 | 0 | 0 | 0 | 1016 | 128 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 150 | 168 | 0 | 0 | 0 | 0 | 0 | 1120 | 0 |
| Confl. Peds. (#/hr) | 15 | | 15 | 2 | | 2 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 31.0 | 31.0 | | | | | | 35.0 | |
| Effective Green, g (s) | | | | 31.0 | 31.0 | | | | | | 35.0 | |
| Actuated g/C Ratio | | | | 0.41 | 0.41 | | | | | | 0.47 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 730 | 1463 | | | | | | 2935 | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | c0.18 | |
| v/s Ratio Perm | | | | c0.08 | | | | | | | | |
| v/c Ratio | | | | 0.21 | 0.11 | | | | | | 0.38 | |
| Uniform Delay, d1 | | | | 14.1 | 13.5 | | | | | | 13.0 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.62 | |
| Incremental Delay, d2 | | | | 0.6 | 0.2 | | | | | | 0.1 | |
| Delay (s) | | | | 14.7 | 13.7 | | | | | | 8.2 | |
| Level of Service | | | | B | B | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 14.2 | | | 0.0 | | | 8.2 | |
| Approach LOS | | A | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.5 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.30 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 41.2% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 200 | 396 | 947 | 59 | 269 | 32 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.99 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 5022 | | 3403 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 5022 | | 3403 | |
| Peak-hour factor, PHF | 0.82 | 0.93 | 0.93 | 0.82 | 0.91 | 0.89 |
| Adj. Flow (vph) | 244 | 426 | 1018 | 72 | 296 | 36 |
| RTOR Reduction (vph) | 7 | 0 | 11 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 237 | 426 | 1079 | 0 | 332 | 0 |
| Confl. Peds. (#/hr) | | | | 17 | | |
| Confl. Bikes (#/hr) | | | | 6 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 23.6 | 23.6 | 22.4 | | 17.0 | |
| Effective Green, g (s) | 23.6 | 23.6 | 22.4 | | 17.0 | |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.30 | | 0.23 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 557 | 1600 | 1500 | | 771 | |
| v/s Ratio Prot | | 0.08 | c0.21 | | c0.10 | |
| v/s Ratio Perm | c0.13 | | | | | |
| v/c Ratio | 0.43 | 0.27 | 0.72 | | 0.43 | |
| Uniform Delay, d1 | 20.3 | 19.2 | 23.5 | | 24.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 2.4 | 0.4 | 1.7 | | 0.4 | |
| Delay (s) | 22.7 | 19.6 | 25.2 | | 25.2 | |
| Level of Service | C | B | C | | C | |
| Approach Delay (s) | | 20.8 | 25.2 | | 25.2 | |
| Approach LOS | | C | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 23.8 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.53 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 50.3% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th Street & Castro Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 226 | 756 | 876 | 452 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.98 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.98 | 0.99 | | | | |
| Frt | | | | | 0.91 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3051 | 1417 | 1403 | 5826 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3051 | 1417 | 1403 | 5826 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.77 | 0.83 | 0.90 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 294 | 911 | 973 | 486 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 75 | 75 | 360 | 291 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 675 | 380 | 126 | 682 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 4 | | 4 | 14 | | 14 | | | |
| Confl. Bikes (#/hr) | | | | | | 1 | | | | | | 4 |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 45.6 | 45.6 | 19.4 | 19.4 | | | | |
| Effective Green, g (s) | | | | | 45.6 | 45.6 | 19.4 | 19.4 | | | | |
| Actuated g/C Ratio | | | | | 0.61 | 0.61 | 0.26 | 0.26 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1855 | 862 | 363 | 1507 | | | | |
| v/s Ratio Prot | | | | | 0.22 | | | | | | | |
| v/s Ratio Perm | | | | | | c0.27 | 0.09 | 0.12 | | | | |
| v/c Ratio | | | | | 0.36 | 0.44 | 0.35 | 0.45 | | | | |
| Uniform Delay, d1 | | | | | 7.4 | 7.9 | 22.6 | 23.3 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.6 | 1.6 | 0.6 | 0.2 | | | | |
| Delay (s) | | | | | 8.0 | 9.5 | 23.2 | 23.6 | | | | |
| Level of Service | | | | | A | A | C | C | | | | |
| Approach Delay (s) | | 0.0 | | | 8.5 | | | 23.4 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 16.7 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.44 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 64.2% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|----------------------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 214 | 62 | 0 | 0 | 0 | 0 | 0 | 0 | 480 | 777 | 47 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.96 | | | | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3396 | | | | | | | | 1522 | 4735 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3396 | | | | | | | | 1522 | 4735 | |
| Peak-hour factor, PHF | 0.92 | 0.89 | 0.82 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.89 | 0.82 | 0.84 |
| Adj. Flow (vph) | 0 | 240 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 539 | 948 | 56 |
| RTOR Reduction (vph) | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 216 | 34 | 0 |
| Lane Group Flow (vph) | 0 | 286 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 1132 | 0 |
| Confl. Peds. (#/hr) | 5 | | 5 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Effective Green, g (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Actuated g/C Ratio | | 0.47 | | | | | | | | 0.43 | 0.43 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1585 | | | | | | | | 649 | 2020 | |
| v/s Ratio Prot | | c0.08 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.11 | 0.24 | |
| v/c Ratio | | 0.18 | | | | | | | | 0.25 | 0.56 | |
| Uniform Delay, d1 | | 11.6 | | | | | | | | 13.8 | 16.2 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | 0.9 | 1.1 | |
| Delay (s) | | 11.9 | | | | | | | | 14.7 | 17.3 | |
| Level of Service | | B | | | | | | | | B | B | |
| Approach Delay (s) | | 11.9 | | | 0.0 | | | 0.0 | | | 16.7 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 15.9 | | | | | | | | HCM Level of Service | B | |
| HCM Volume to Capacity ratio | | 0.36 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | Sum of lost time (s) | 8.0 | |
| Intersection Capacity Utilization | | 41.9% | | | | | | | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕ | ↗ | | | |
| Volume (vph) | 53 | 767 | 0 | 0 | 355 | 218 | 171 | 528 | 35 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.96 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3518 | | | 3539 | 1461 | | 3467 | 1520 | | | |
| Flt Permitted | | 0.87 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3078 | | | 3539 | 1461 | | 3467 | 1520 | | | |
| Peak-hour factor, PHF | 0.63 | 0.86 | 0.25 | 0.99 | 0.96 | 0.96 | 0.84 | 0.92 | 0.73 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 84 | 892 | 0 | 0 | 370 | 227 | 204 | 574 | 48 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 158 | 0 | 0 | 6 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 976 | 0 | 0 | 370 | 70 | 0 | 778 | 42 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 52 | | 52 | 35 | | 35 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 5 | | | 21 | | | | | | 22 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 923 | | | 1062 | 438 | | 1849 | 811 | | | |
| v/s Ratio Prot | | | | | 0.10 | | | | | | | |
| v/s Ratio Perm | | c0.32 | | | | 0.05 | | 0.22 | 0.03 | | | |
| v/c Ratio | | 1.06 | | | 0.35 | 0.16 | | 0.42 | 0.05 | | | |
| Uniform Delay, d1 | | 21.0 | | | 16.4 | 15.4 | | 8.4 | 6.7 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 46.0 | | | 0.9 | 0.8 | | 0.7 | 0.1 | | | |
| Delay (s) | | 67.0 | | | 17.3 | 16.2 | | 9.1 | 6.8 | | | |
| Level of Service | | E | | | B | B | | A | A | | | |
| Approach Delay (s) | | 67.0 | | | 16.9 | | | 9.0 | | | 0.0 | |
| Approach LOS | | E | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 34.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 73.1% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↖ | ↑↑ | |
| Volume (vph) | 0 | 538 | 61 | 22 | 468 | 0 | 0 | 0 | 0 | 287 | 501 | 16 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frbp, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3451 | | | 3529 | | | | | 1734 | 3511 | |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3451 | | | 3233 | | | | | 1734 | 3511 | |
| Peak-hour factor, PHF | 0.25 | 0.91 | 0.76 | 0.79 | 0.91 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.67 |
| Adj. Flow (vph) | 0 | 591 | 80 | 28 | 514 | 0 | 0 | 0 | 0 | 305 | 522 | 24 |
| RTOR Reduction (vph) | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 647 | 0 | 0 | 542 | 0 | 0 | 0 | 0 | 305 | 538 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 25 | | 25 | 17 | | 17 | 24 | | 24 |
| Confl. Bikes (#/hr) | | | 16 | | | 17 | | | 2 | | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1457 | | | 1365 | | | | | 732 | 1482 | |
| v/s Ratio Prot | | c0.19 | | | | | | | | | 0.15 | |
| v/s Ratio Perm | | | | | 0.17 | | | | | c0.18 | | |
| v/c Ratio | | 0.44 | | | 0.40 | | | | | 0.42 | 0.36 | |
| Uniform Delay, d1 | | 9.2 | | | 9.0 | | | | | 9.1 | 8.9 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.0 | | | 0.9 | | | | | 1.7 | 0.7 | |
| Delay (s) | | 10.2 | | | 9.9 | | | | | 10.9 | 9.6 | |
| Level of Service | | B | | | A | | | | | B | A | |
| Approach Delay (s) | | 10.2 | | | 9.9 | | | 0.0 | | | 10.0 | |
| Approach LOS | | B | | | A | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.43 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 51.7% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| Volume (vph) | 61 | 359 | 7 | 16 | 335 | 37 | 58 | 372 | 21 | 95 | 149 | 42 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 0.99 | | | 1.00 | | | 1.00 | | | 0.99 | |
| Frt | | 1.00 | | | 0.98 | | | 0.99 | | | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Satd. Flow (prot) | | 3471 | | | 3446 | | | 3459 | | | 3347 | |
| Flt Permitted | | 0.84 | | | 0.93 | | | 0.87 | | | 0.66 | |
| Satd. Flow (perm) | | 2935 | | | 3223 | | | 3029 | | | 2254 | |
| Peak-hour factor, PHF | 0.80 | 0.92 | 0.58 | 0.80 | 0.83 | 0.71 | 0.85 | 0.86 | 0.58 | 0.82 | 0.97 | 0.81 |
| Adj. Flow (vph) | 76 | 390 | 12 | 20 | 404 | 52 | 68 | 433 | 36 | 116 | 154 | 52 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 18 | 0 | 0 | 13 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 0 | 475 | 0 | 0 | 458 | 0 | 0 | 524 | 0 | 0 | 286 | 0 |
| Confl. Peds. (#/hr) | 80 | | 80 | 58 | | 58 | 44 | | 44 | 41 | | 41 |
| Confl. Bikes (#/hr) | | | 14 | | | 10 | | | 7 | | | 4 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 23.5 | | | 23.5 | | | 14.0 | | | 14.0 | |
| Effective Green, g (s) | | 23.5 | | | 23.5 | | | 14.0 | | | 14.0 | |
| Actuated g/C Ratio | | 0.52 | | | 0.52 | | | 0.31 | | | 0.31 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1533 | | | 1683 | | | 942 | | | 701 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | c0.16 | | | 0.14 | | | c0.17 | | | 0.13 | |
| v/c Ratio | | 0.31 | | | 0.27 | | | 0.56 | | | 0.41 | |
| Uniform Delay, d1 | | 6.1 | | | 6.0 | | | 12.9 | | | 12.2 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 0.4 | | | 0.7 | | | 0.4 | |
| Delay (s) | | 6.7 | | | 6.4 | | | 13.6 | | | 12.6 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 6.7 | | | 6.4 | | | 13.6 | | | 12.6 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 65.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

35: 12th Street & Madison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 208 | 786 | 0 | 0 | 0 | 0 | 0 | 582 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6268 | | | | | | 5025 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6268 | | | | | | 5025 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.91 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.86 | 0.86 |
| Adj. Flow (vph) | 0 | 0 | 0 | 229 | 810 | 0 | 0 | 0 | 0 | 0 | 677 | 44 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 970 | 0 | 0 | 0 | 0 | 0 | 709 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 47 | | 47 | 36 | | 36 | 29 | | 29 |
| Confl. Bikes (#/hr) | | | 3 | | | 13 | | | 9 | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2716 | | | | | | 2219 | |
| v/s Ratio Prot | | | | | | | | | | | c0.14 | |
| v/s Ratio Perm | | | | | 0.15 | | | | | | | |
| v/c Ratio | | | | | 0.36 | | | | | | 0.32 | |
| Uniform Delay, d1 | | | | | 11.4 | | | | | | 10.9 | |
| Progression Factor | | | | | 0.45 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.4 | | | | | | 0.4 | |
| Delay (s) | | | | | 5.5 | | | | | | 11.3 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 5.5 | | | 0.0 | | | 11.3 | |
| Approach LOS | | A | | | A | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 7.8 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.34 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 38.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th Street & Oak St.

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 848 | 50 | 149 | 822 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6317 | | | 6222 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6317 | | | 6222 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.78 | 0.83 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 893 | 64 | 180 | 856 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 950 | 0 | 0 | 991 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | 121 | 69 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | | | | 15 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3148 | | | 2136 | | | | |
| v/s Ratio Prot | | | | | c0.15 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.16 | | | | |
| v/c Ratio | | | | | 0.30 | | | 0.46 | | | | |
| Uniform Delay, d1 | | | | | 8.9 | | | 15.4 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.2 | | | 0.7 | | | | |
| Delay (s) | | | | | 9.1 | | | 16.1 | | | | |
| Level of Service | | | | | A | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 9.1 | | | 16.1 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.8 | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | | 0.37 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | Sum of lost time (s) | | | 9.5 | |
| Intersection Capacity Utilization | | | 43.7% | | | | | ICU Level of Service | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 57 | 0 | 0 | 901 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.71 | 0.92 | 0.25 | 0.92 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 80 | 0 | 0 | 979 | 0 | 0 |
| Pedestrians | 6 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 251 | 6 | 6 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 251 | 6 | 6 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 712 | 1069 | 1605 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 80 | 245 | 245 | 245 | 245 | |
| Volume Left | 80 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 712 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.14 | 0.14 | 0.14 | 0.14 | |
| Queue Length 95th (ft) | 9 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 10.7 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 10.7 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.8 | | | | |
| Intersection Capacity Utilization | | 23.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 760 | 162 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 729 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.97 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6181 | | | | | | | | | 5061 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6181 | | | | | | | | | 5061 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.86 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.72 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 792 | 188 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 784 | 0 |
| RTOR Reduction (vph) | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 |
| Lane Group Flow (vph) | 0 | 925 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 829 | 0 |
| Confl. Peds. (#/hr) | 20 | | 20 | 30 | | 30 | 12 | | 12 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 5 | | | 7 | | | 3 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2369 | | | | | | | | | 2193 | |
| v/s Ratio Prot | | c0.15 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.16 | |
| v/c Ratio | | 0.39 | | | | | | | | | 0.38 | |
| Uniform Delay, d1 | | 13.4 | | | | | | | | | 11.5 | |
| Progression Factor | | 0.84 | | | | | | | | | 0.60 | |
| Incremental Delay, d2 | | 0.5 | | | | | | | | | 0.5 | |
| Delay (s) | | 11.7 | | | | | | | | | 7.4 | |
| Level of Service | | B | | | | | | | | | A | |
| Approach Delay (s) | | 11.7 | | | 0.0 | | | 0.0 | | | 7.4 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 9.7 | | | | | | | | | A | |
| HCM Volume to Capacity ratio | | 0.38 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | | | 11.0 | | |
| Intersection Capacity Utilization | | 38.3% | | | | | | | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTL | | | | | | 4TTL | | | | |
| Volume (vph) | 20 | 605 | 0 | 0 | 0 | 0 | 0 | 266 | 112 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6382 | | | | | | 6050 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6382 | | | | | | 6050 | | | | |
| Peak-hour factor, PHF | 0.63 | 0.87 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.86 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 32 | 695 | 0 | 0 | 0 | 0 | 0 | 309 | 115 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 713 | 0 | 0 | 0 | 0 | 0 | 398 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | 17 | 53 | | 53 | 68 | | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | 1 | | | 6 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 12.3 | | | | | | 40.7 | | | | |
| Effective Green, g (s) | | 12.3 | | | | | | 40.7 | | | | |
| Actuated g/C Ratio | | 0.20 | | | | | | 0.68 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1308 | | | | | | 4104 | | | | |
| v/s Ratio Prot | | | | | | | | c0.07 | | | | |
| v/s Ratio Perm | | 0.11 | | | | | | | | | | |
| v/c Ratio | | 0.54 | | | | | | 0.10 | | | | |
| Uniform Delay, d1 | | 21.3 | | | | | | 3.3 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 0.0 | | | | |
| Delay (s) | | 21.6 | | | | | | 3.4 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 21.6 | | | 0.0 | | | 3.4 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.9 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.20 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.6% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | ↑↑↑ | | | | |
| Volume (vph) | 149 | 897 | 0 | 0 | 0 | 0 | 0 | 785 | 329 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6340 | | | | | | 4830 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6340 | | | | | | 4830 | | | | |
| Peak-hour factor, PHF | 0.85 | 0.98 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 175 | 915 | 0 | 0 | 0 | 0 | 0 | 835 | 343 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1053 | 0 | 0 | 0 | 0 | 0 | 1152 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 50 | | 50 | 14 | | 14 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 16 | | | 1 | | | 2 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2536 | | | | | | 1932 | | | | |
| v/s Ratio Prot | | | | | | | | c0.24 | | | | |
| v/s Ratio Perm | | 0.17 | | | | | | | | | | |
| v/c Ratio | | 0.42 | | | | | | 0.60 | | | | |
| Uniform Delay, d1 | | 9.7 | | | | | | 10.6 | | | | |
| Progression Factor | | 0.99 | | | | | | 1.58 | | | | |
| Incremental Delay, d2 | | 0.4 | | | | | | 1.1 | | | | |
| Delay (s) | | 10.0 | | | | | | 18.0 | | | | |
| Level of Service | | B | | | | | | B | | | | |
| Approach Delay (s) | | 10.0 | | | 0.0 | | | 18.0 | | | 0.0 | |
| Approach LOS | | B | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 47.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑↑ | | | | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 812 | 238 | 0 | 0 | 0 | 0 | 0 | 0 | 362 | 1228 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6153 | | | | | | | | | 5014 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6153 | | | | | | | | | 5014 | |
| Peak-hour factor, PHF | 0.25 | 0.99 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.87 | 0.95 | 0.25 |
| Adj. Flow (vph) | 0 | 820 | 259 | 0 | 0 | 0 | 0 | 0 | 0 | 416 | 1293 | 0 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 0 |
| Lane Group Flow (vph) | 0 | 1068 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1671 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 8 | | 8 | 2 | | 2 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 2 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2461 | | | | | | | | | 2228 | |
| v/s Ratio Prot | | c0.17 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.33 | |
| v/c Ratio | | 0.43 | | | | | | | | | 0.75 | |
| Uniform Delay, d1 | | 9.8 | | | | | | | | | 10.4 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | | | | | | | 2.4 | |
| Delay (s) | | 10.4 | | | | | | | | | 12.8 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 10.4 | | | | 0.0 | | 0.0 | | | 12.8 | |
| Approach LOS | | B | | | | A | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 11.8 | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | | | 0.60 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | | | | 7.0 | | | |
| Intersection Capacity Utilization | | | 55.8% | | ICU Level of Service | | | | B | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|--------|------|-------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↱ | | ↕ | | | ↱ | ↱ |
| Volume (vph) | 0 | 0 | 0 | 6 | 308 | 47 | 293 | 294 | 0 | 0 | 180 | 1360 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | 0.93 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.97 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1726 | 1863 | 1471 | | 1815 | | | 1863 | 1559 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.74 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1726 | 1863 | 1471 | | 1373 | | | 1863 | 1559 |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.50 | 0.78 | 0.84 | 0.84 | 0.90 | 0.92 | 0.92 | 0.92 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 12 | 395 | 56 | 349 | 327 | 0 | 0 | 196 | 1388 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 42 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 12 | 395 | 13 | 0 | 676 | 0 | 0 | 196 | 1346 |
| Confl. Peds. (#/hr) | 4 | | 4 | 20 | | 20 | 1 | | 1 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 10 | | | 7 | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 14.3 | 14.3 | 14.3 | | 34.7 | | | 34.7 | 34.7 |
| Effective Green, g (s) | | | | 14.3 | 14.3 | 14.3 | | 34.7 | | | 34.7 | 34.7 |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | 0.24 | | 0.58 | | | 0.58 | 0.58 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 411 | 444 | 351 | | 794 | | | 1077 | 902 |
| v/s Ratio Prot | | | | c0.21 | | | | | | | 0.11 | |
| v/s Ratio Perm | | | | 0.01 | | 0.01 | | 0.49 | | | | c0.86 |
| v/c Ratio | | | | 0.03 | 0.89 | 0.04 | | 0.85 | | | 0.18 | 1.49 |
| Uniform Delay, d1 | | | | 17.5 | 22.1 | 17.6 | | 10.5 | | | 6.0 | 12.6 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 19.1 | 0.0 | | 11.1 | | | 0.4 | 227.3 |
| Delay (s) | | | | 17.6 | 41.2 | 17.6 | | 21.6 | | | 6.3 | 240.0 |
| Level of Service | | | | B | D | B | | C | | | A | F |
| Approach Delay (s) | | 0.0 | | | 37.7 | | | 21.6 | | | 211.1 | |
| Approach LOS | | A | | | D | | | C | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 134.6 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 1.32 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 146.5% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Existing PM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|-------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 154 | 524 | 55 | 47 | 608 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3501 | | 3192 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3501 | | 3192 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.90 | 0.86 | 0.60 | 0.84 | 0.94 |
| Adj. Flow (vph) | 0 | 171 | 609 | 92 | 56 | 647 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 780 | 0 | 472 | 323 |
| Confl. Peds. (#/hr) | 46 | | | | | |
| Confl. Bikes (#/hr) | 3 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1268 | | 1149 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.22 | | 0.15 | c0.22 |
| v/c Ratio | | | 0.62 | | 0.41 | 0.62 |
| Uniform Delay, d1 | | | 11.8 | | 10.8 | 11.9 |
| Progression Factor | | | 0.68 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.2 | | 1.1 | 5.5 |
| Delay (s) | | | 8.2 | | 11.9 | 17.4 |
| Level of Service | | | A | | B | B |
| Approach Delay (s) | | | 8.2 | | 14.1 | |
| Approach LOS | | | A | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 11.2 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.61 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 57.8% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 243 | 476 | 69 | 0 | 0 | 0 | 0 | 446 | 62 | 1 | 58 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.98 | | | 1.00 | |
| Flt Protected | | 0.98 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4897 | | | | | | 1830 | | | 1858 | |
| Flt Permitted | | 0.98 | | | | | | 1.00 | | | 0.71 | |
| Satd. Flow (perm) | | 1000 | | | | | | 1300 | | | 1300 | |
| Peak-hour factor, PHF | 0.86 | 0.93 | 0.72 | 0.25 | 0.25 | 0.25 | 0.25 | 0.75 | 0.70 | 0.25 | 0.76 | 0.25 |
| Adj. Flow (vph) | 283 | 512 | 96 | 0 | 0 | 0 | 0 | 595 | 89 | 4 | 76 | 0 |
| RTOR Reduction (vph) | 0 | 34 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 858 | 0 | 0 | 0 | 0 | 0 | 672 | 0 | 0 | 80 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | 4 | | | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 500 | | | | | | 630 | | | 448 | |
| v/s Ratio Prot | | | | | | | | c0.37 | | | | |
| v/s Ratio Perm | | c0.86 | | | | | | | | | 0.06 | |
| v/c Ratio | | 1.72 | | | | | | 1.07 | | | 0.18 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 14.8 | | | 10.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.03 | |
| Incremental Delay, d2 | | 330.2 | | | | | | 55.1 | | | 0.8 | |
| Delay (s) | | 341.4 | | | | | | 69.8 | | | 1.2 | |
| Level of Service | | F | | | | | | E | | | A | |
| Approach Delay (s) | | 341.4 | | | 0.0 | | | 69.8 | | | 1.2 | |
| Approach LOS | | F | | | A | | | E | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 212.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.45 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 54.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Existing PM
Kaiser Center Transportation Study



| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|--------|------|-------|------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 245 | 255 | 1000 | 700 | 235 | 713 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.93 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3306 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3306 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.91 | 0.78 | 0.94 | 0.84 | 0.92 | 0.88 |
| Adj. Flow (vph) | 269 | 327 | 1064 | 833 | 255 | 810 |
| RTOR Reduction (vph) | 0 | 97 | 154 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 269 | 230 | 1743 | 0 | 255 | 810 |
| Turn Type | custom | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 2 | | | | |
| Actuated Green, G (s) | 18.8 | 63.2 | 37.1 | | 22.1 | 63.2 |
| Effective Green, g (s) | 18.8 | 63.2 | 37.1 | | 22.1 | 63.2 |
| Actuated g/C Ratio | 0.21 | 0.70 | 0.41 | | 0.25 | 0.70 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 370 | 1112 | 1363 | | 435 | 2485 |
| v/s Ratio Prot | c0.15 | | c0.53 | | c0.14 | 0.23 |
| v/s Ratio Perm | | 0.15 | | | | |
| v/c Ratio | 0.73 | 0.21 | 1.28 | | 0.59 | 0.33 |
| Uniform Delay, d1 | 33.2 | 4.7 | 26.4 | | 29.9 | 5.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.76 | 1.05 |
| Incremental Delay, d2 | 7.0 | 0.4 | 131.2 | | 5.0 | 0.3 |
| Delay (s) | 40.2 | 5.1 | 157.7 | | 27.8 | 5.8 |
| Level of Service | D | A | F | | C | A |
| Approach Delay (s) | 20.9 | | 157.7 | | | 11.0 |
| Approach LOS | C | | F | | | B |

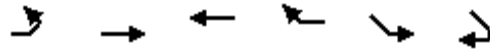
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 90.9 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.95 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 86.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

46: Lakeshore Drive & El Embarcadero (WB)

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|------|-------|
| Lane Configurations | ↰ | ↶↶ | ↰↶ | | ↰ | ↶ |
| Volume (vph) | 350 | 665 | 466 | 148 | 311 | 623 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.96 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3403 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3403 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.84 | 0.85 | 0.87 | 0.80 | 0.91 | 0.85 |
| Adj. Flow (vph) | 417 | 782 | 536 | 185 | 342 | 733 |
| RTOR Reduction (vph) | 0 | 0 | 52 | 0 | 0 | 380 |
| Lane Group Flow (vph) | 417 | 782 | 669 | 0 | 342 | 353 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.2 | 32.6 | 14.4 | | 18.3 | 18.3 |
| Effective Green, g (s) | 14.2 | 32.6 | 14.4 | | 18.3 | 18.3 |
| Actuated g/C Ratio | 0.24 | 0.55 | 0.24 | | 0.31 | 0.31 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 427 | 1959 | 832 | | 550 | 492 |
| v/s Ratio Prot | c0.24 | 0.22 | c0.20 | | 0.19 | |
| v/s Ratio Perm | | | | | | c0.22 |
| v/c Ratio | 0.98 | 0.40 | 0.80 | | 0.62 | 0.72 |
| Uniform Delay, d1 | 22.2 | 7.5 | 20.9 | | 17.3 | 18.0 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 37.1 | 0.1 | 5.7 | | 2.2 | 4.9 |
| Delay (s) | 59.2 | 7.7 | 26.6 | | 19.5 | 22.9 |
| Level of Service | E | A | C | | B | C |
| Approach Delay (s) | | 25.6 | 26.6 | | 21.8 | |
| Approach LOS | | C | C | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.82 | | |
| Actuated Cycle Length (s) | 58.9 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 64.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Existing PM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | 3TW | | | 2T | 2T | 2T | 2T | |
| Volume (vph) | 0 | 0 | 298 | 768 | 224 | 0 | 696 | 560 | 350 | 738 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4906 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4906 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.91 | 0.84 | 0.92 | 0.93 | 0.84 | 0.90 | 0.91 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 310 | 844 | 267 | 0 | 748 | 667 | 389 | 811 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 102 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1375 | 0 | 0 | 748 | 565 | 389 | 811 | 0 |
| Turn Type | | | Split | | | | | Perm | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 1 | 2 |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 29.4 | | | 20.8 | 20.8 | 26.8 | 51.6 | |
| Effective Green, g (s) | | | | 29.4 | | | 20.8 | 20.8 | 26.8 | 51.6 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.23 | 0.23 | 0.30 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1603 | | | 818 | 366 | 527 | 2029 | |
| v/s Ratio Prot | | | | c0.28 | | | 0.21 | | c0.22 | 0.23 | |
| v/s Ratio Perm | | | | | | | | c0.36 | | | |
| v/c Ratio | | | | 0.86 | | | 0.91 | 1.54 | 0.74 | 0.40 | |
| Uniform Delay, d1 | | | | 28.3 | | | 33.7 | 34.6 | 28.4 | 10.6 | |
| Progression Factor | | | | 1.00 | | | 1.43 | 1.62 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.8 | | | 2.0 | 245.6 | 5.4 | 0.1 | |
| Delay (s) | | | | 33.1 | | | 50.2 | 301.6 | 33.8 | 10.8 | |
| Level of Service | | | | C | | | D | F | C | B | |
| Approach Delay (s) | 0.0 | | | 33.1 | | | 168.7 | | | 18.2 | |
| Approach LOS | A | | | C | | | F | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 76.2 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 1.00 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 74.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Existing PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 329 | 761 | 424 | 163 | 444 | 483 | 72 | 263 | 19 | 456 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.99 | 0.85 | 0.85 | 0.92 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3154 | 1441 | 1583 | 3250 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3154 | 1441 | 1583 | 3250 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.70 | 0.94 | 0.87 | 0.74 | 0.81 | 0.84 | 0.90 | 0.83 | 0.68 | 0.91 |
| Adj. Flow (vph) | 470 | 810 | 487 | 220 | 548 | 575 | 80 | 317 | 28 | 501 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 43 | 6 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 423 | 940 | 404 | 177 | 1197 | 0 | 0 | 0 | 345 | 501 |
| Turn Type | Split | | Prot | Perm | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | 4 | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | 0.31 | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 981 | 448 | 492 | 1336 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.26 | c0.30 | 0.28 | | c0.37 | | | | c0.19 | 0.14 |
| v/s Ratio Perm | | | | 0.11 | | | | | | |
| v/c Ratio | 0.84 | 0.96 | 0.90 | 0.36 | 0.98 | dr | | | 1.46 | 0.24 |
| Uniform Delay, d1 | 29.0 | 30.4 | 29.7 | 24.0 | 24.7 | | | | 39.0 | 8.9 |
| Progression Factor | 0.80 | 0.81 | 0.80 | 0.69 | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.2 | 8.3 | 8.8 | 0.6 | 9.6 | | | | 229.7 | 0.3 |
| Delay (s) | 28.3 | 33.0 | 32.6 | 17.2 | 34.3 | | | | 268.7 | 9.1 |
| Level of Service | C | C | C | B | C | | | | F | A |
| Approach Delay (s) | | 30.2 | | | 34.3 | | | | | 115.0 |
| Approach LOS | | C | | | C | | | | | F |

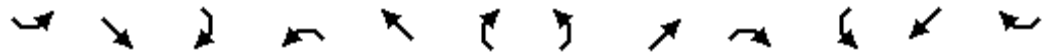
Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 49.2 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 1.01 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 80.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Existing PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1213 | 172 | 242 | 745 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4860 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4860 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.91 | 0.98 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1264 | 189 | 247 | 793 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 23 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1264 | 159 | 0 | 1017 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | 4 | | | | | |
| Actuated Green, G (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2543 | 792 | | 1782 | | | | |
| v/s Ratio Prot | | | | | c0.25 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.10 | | 0.21 | | | | |
| v/c Ratio | | | | | 0.50 | 0.20 | | 0.57 | | | | |
| Uniform Delay, d1 | | | | | 10.0 | 8.3 | | 15.2 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 0.88 | | | | |
| Incremental Delay, d2 | | | | | 0.7 | 0.6 | | 1.0 | | | | |
| Delay (s) | | | | | 10.7 | 8.9 | | 14.5 | | | | |
| Level of Service | | | | | B | A | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 10.4 | | | 14.5 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |

Intersection Summary

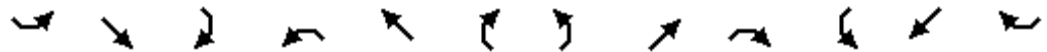
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 12.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 51.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

50: Santa Clara Avenue & Harrison Street


















Existing PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱↱↱ | | | | | | ↱↱ | |
| Volume (vph) | 0 | 0 | 0 | 475 | 1008 | 0 | 0 | 0 | 0 | 0 | 526 | 48 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4776 | | | | | | 3500 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4776 | | | | | | 3500 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.90 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.75 | 0.86 |
| Adj. Flow (vph) | 0 | 0 | 0 | 528 | 1039 | 0 | 0 | 0 | 0 | 0 | 701 | 56 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 50 | 28 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 330 | 1159 | 0 | 0 | 0 | 0 | 0 | 747 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2308 | | | | | | 1342 | |
| v/s Ratio Prot | | | | | | | | | | | c0.21 | |
| v/s Ratio Perm | | | | 0.22 | 0.24 | | | | | | | |
| v/c Ratio | | | | 0.45 | 0.50 | | | | | | 0.56 | |
| Uniform Delay, d1 | | | | 10.2 | 10.6 | | | | | | 14.5 | |
| Progression Factor | | | | 1.66 | 1.45 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 1.7 | 0.7 | | | | | | 1.7 | |
| Delay (s) | | | | 18.7 | 16.1 | | | | | | 16.2 | |
| Level of Service | | | | B | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 16.7 | | | 0.0 | | | 16.2 | |
| Approach LOS | | A | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 16.5 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.53 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 51.0% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Existing PM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 169 | 362 | 8 | 13 | 178 | 15 | 12 | 18 | 22 | 50 | 37 | 33 |
| Peak Hour Factor | 0.90 | 0.94 | 0.67 | 0.81 | 0.84 | 0.63 | 0.75 | 0.75 | 0.79 | 0.74 | 0.77 | 0.69 |
| Hourly flow rate (vph) | 188 | 385 | 12 | 16 | 212 | 24 | 16 | 24 | 28 | 68 | 48 | 48 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 188 | 397 | 252 | 68 | 163 | | | | | | | |
| Volume Left (vph) | 188 | 0 | 16 | 16 | 68 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 24 | 28 | 48 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | -0.01 | -0.17 | -0.06 | | | | | | | |
| Departure Headway (s) | 6.1 | 5.5 | 5.5 | 6.1 | 6.0 | | | | | | | |
| Degree Utilization, x | 0.32 | 0.61 | 0.38 | 0.11 | 0.27 | | | | | | | |
| Capacity (veh/h) | 573 | 636 | 628 | 510 | 550 | | | | | | | |
| Control Delay (s) | 10.7 | 15.7 | 11.8 | 9.9 | 11.1 | | | | | | | |
| Approach Delay (s) | 14.1 | | 11.8 | 9.9 | 11.1 | | | | | | | |
| Approach LOS | B | | B | A | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 12.8 | | | | | | | | | |
| HCM Level of Service | | | B | | | | | | | | | |
| Intersection Capacity Utilization | | | 52.3% | ICU Level of Service | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 6.2 Worst Case Level Of Service: C[22.1]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 1077 0 0 0 428 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 1077 0 0 0 428 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 1077 0 0 0 428 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.91 1.00 1.00 1.00 0.93 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1184 0 0 0 460 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1184 0 0 0 460 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 395 xxxx xxxx xxxxx

Potent Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 659 xxxx xxxx xxxxx

Move Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 659 xxxx xxxx xxxxx

Volume/Cap: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 0.70 xxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 5.7 xxxxx xxxx xxxxx

Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 22.1 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * C * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 22.1 xxxxxx

ApproachLOS: * * C *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: I-580 EB On-Ramp & Oakland Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

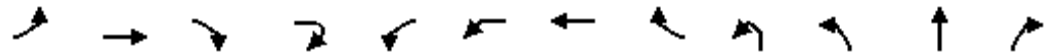


| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 383 | 135 | 828 | 396 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1733 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1733 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.97 | 0.83 | 0.89 | 0.91 | 0.58 |
| Adj. Flow (vph) | 395 | 163 | 930 | 435 | 40 |
| RTOR Reduction (vph) | 117 | 48 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 159 | 234 | 930 | 475 | 0 |
| Confl. Peds. (#/hr) | | | | | 2 |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 11.8 | 11.8 | 40.7 | 17.7 | |
| Effective Green, g (s) | 11.8 | 11.8 | 40.7 | 17.7 | |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.68 | 0.30 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 331 | 341 | 2401 | 467 | |
| v/s Ratio Prot | | | c0.26 | c0.30 | |
| v/s Ratio Perm | 0.09 | 0.13 | | | |
| v/c Ratio | 0.48 | 0.69 | 0.39 | 1.02 | |
| Uniform Delay, d1 | 21.4 | 22.4 | 4.2 | 21.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.4 | 4.5 | 0.5 | 46.0 | |
| Delay (s) | 21.8 | 26.9 | 4.7 | 67.2 | |
| Level of Service | C | C | A | E | |
| Approach Delay (s) | | 24.4 | 25.8 | | |
| Approach LOS | | C | C | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 25.4 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | 0.66 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 46.8% | | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
|------------------------|------|------|-------|------|------|------|-------|------|------|-------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 34 | 94 | 82 | 17 | 38 | 13 | 128 | 114 | 12 | 218 | 317 | 22 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.94 | | | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1483 | | | 1770 | 1863 | 1450 | | 3433 | 3502 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1483 | | | 1770 | 1863 | 1450 | | 3433 | 3502 | |
| Peak-hour factor, PHF | 0.67 | 0.65 | 0.88 | 0.53 | 0.56 | 0.65 | 0.70 | 0.95 | 0.60 | 0.81 | 0.75 | 0.79 |
| Adj. Flow (vph) | 51 | 145 | 93 | 32 | 68 | 20 | 183 | 120 | 20 | 269 | 423 | 28 |
| RTOR Reduction (vph) | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 99 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 51 | 145 | 110 | 0 | 0 | 88 | 183 | 21 | 0 | 289 | 447 | 0 |
| Confl. Peds. (#/hr) | 21 | | 21 | | | | | 27 | | 9 | | 8 |
| Confl. Bikes (#/hr) | | | 8 | | | | | 24 | | | | 1 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 5.6 | 13.7 | 13.7 | | | 8.0 | 16.1 | 16.1 | | 12.8 | 42.9 | |
| Effective Green, g (s) | 5.6 | 13.7 | 13.7 | | | 8.0 | 16.1 | 16.1 | | 12.8 | 42.9 | |
| Actuated g/C Ratio | 0.06 | 0.15 | 0.15 | | | 0.09 | 0.18 | 0.18 | | 0.14 | 0.48 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 110 | 539 | 226 | | | 157 | 333 | 259 | | 488 | 1669 | |
| v/s Ratio Prot | 0.03 | 0.04 | | | | 0.05 | c0.10 | | | c0.08 | c0.13 | |
| v/s Ratio Perm | | | c0.07 | | | | | 0.01 | | | | |
| v/c Ratio | 0.46 | 0.27 | 0.49 | | | 0.56 | 0.55 | 0.08 | | 0.59 | 0.27 | |
| Uniform Delay, d1 | 40.7 | 33.7 | 34.9 | | | 39.3 | 33.6 | 30.8 | | 36.2 | 14.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.1 | 0.3 | 1.6 | | | 4.5 | 1.9 | 0.1 | | 1.9 | 0.4 | |
| Delay (s) | 43.8 | 34.0 | 36.6 | | | 43.8 | 35.5 | 30.9 | | 38.1 | 14.5 | |
| Level of Service | D | C | D | | | D | D | C | | D | B | |
| Approach Delay (s) | | 36.6 | | | | | 36.0 | | | | 23.7 | |
| Approach LOS | | D | | | | | D | | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 31.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.74 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 67.7% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 82 | 1035 | 81 | 80 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.98 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3460 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3460 | | |
| Peak-hour factor, PHF | 0.76 | 0.89 | 0.84 | 0.74 |
| Adj. Flow (vph) | 108 | 1163 | 96 | 108 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 |
| Lane Group Flow (vph) | 108 | 1361 | 0 | 0 |
| Confl. Peds. (#/hr) | 18 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 9.4 | 39.5 | | |
| Effective Green, g (s) | 9.4 | 39.5 | | |
| Actuated g/C Ratio | 0.10 | 0.44 | | |
| Clearance Time (s) | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 185 | 1519 | | |
| v/s Ratio Prot | 0.06 | 0.39 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.58 | 0.90 | | |
| Uniform Delay, d1 | 38.4 | 23.4 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 4.6 | 8.6 | | |
| Delay (s) | 43.1 | 32.0 | | |
| Level of Service | D | C | | |
| Approach Delay (s) | | 32.8 | | |
| Approach LOS | | C | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑ | ↑ | ↑ | ↑↑ | | ↑ | ↑↑ | |
| Volume (vph) | 48 | 156 | 87 | 28 | 253 | 247 | 47 | 392 | 31 | 80 | 506 | 36 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | | 0.91 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.96 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 4748 | | | 3507 | 1543 | 1759 | 3481 | | 1765 | 3481 | |
| Flt Permitted | | 0.80 | | | 0.85 | 1.00 | 0.37 | 1.00 | | 0.48 | 1.00 | |
| Satd. Flow (perm) | | 3844 | | | 3003 | 1543 | 677 | 3481 | | 888 | 3481 | |
| Peak-hour factor, PHF | 0.60 | 0.93 | 0.92 | 0.58 | 0.95 | 0.85 | 0.68 | 0.97 | 0.86 | 0.71 | 0.91 | 0.60 |
| Adj. Flow (vph) | 80 | 168 | 95 | 48 | 266 | 291 | 69 | 404 | 36 | 113 | 556 | 60 |
| RTOR Reduction (vph) | 0 | 55 | 0 | 0 | 0 | 168 | 0 | 8 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 0 | 288 | 0 | 0 | 314 | 123 | 69 | 432 | 0 | 113 | 607 | 0 |
| Confl. Peds. (#/hr) | 25 | | 25 | 18 | | 13 | 19 | | 13 | 6 | | 6 |
| Confl. Bikes (#/hr) | | 16 | 16 | 59 | | 5 | | 5 | 59 | | | 6 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | | 1628 | | | 1272 | 654 | 303 | 1556 | | 397 | 1556 | |
| v/s Ratio Prot | | | | | | | | 0.12 | | | c0.17 | |
| v/s Ratio Perm | | 0.07 | | | c0.10 | 0.08 | 0.10 | | | 0.13 | | |
| v/c Ratio | | 0.18 | | | 0.25 | 0.19 | 0.23 | 0.28 | | 0.28 | 0.39 | |
| Uniform Delay, d1 | | 15.3 | | | 15.8 | 15.3 | 14.5 | 14.8 | | 14.9 | 15.7 | |
| Progression Factor | | 0.78 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.5 | 0.6 | 1.7 | 0.4 | | 1.8 | 0.7 | |
| Delay (s) | | 12.1 | | | 16.2 | 16.0 | 16.2 | 15.3 | | 16.7 | 16.5 | |
| Level of Service | | B | | | B | B | B | B | | B | B | |
| Approach Delay (s) | | 12.1 | | | 16.1 | | | 15.4 | | | 16.5 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

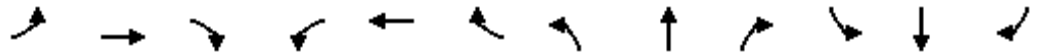
| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 15.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.32 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 91.8% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 293 | 340 | 125 | 37 | 227 | 91 | 75 | 309 | 19 | 41 | 306 | 113 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.96 | | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 3391 | | 1766 | 3378 | | 1761 | 3484 | | 1764 | 3357 | |
| Flt Permitted | 0.45 | 1.00 | | 0.45 | 1.00 | | 0.28 | 1.00 | | 0.44 | 1.00 | |
| Satd. Flow (perm) | 843 | 3391 | | 845 | 3378 | | 518 | 3484 | | 811 | 3357 | |
| Peak-hour factor, PHF | 0.81 | 0.86 | 0.92 | 0.84 | 0.79 | 0.88 | 0.96 | 0.91 | 0.68 | 0.70 | 0.87 | 0.76 |
| Adj. Flow (vph) | 362 | 395 | 136 | 44 | 287 | 103 | 78 | 340 | 28 | 59 | 352 | 149 |
| RTOR Reduction (vph) | 0 | 23 | 0 | 0 | 31 | 0 | 0 | 10 | 0 | 0 | 73 | 0 |
| Lane Group Flow (vph) | 362 | 508 | 0 | 44 | 359 | 0 | 78 | 358 | 0 | 59 | 428 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | | pm+pt | | | Perm | | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 60.2 | 52.3 | | 47.0 | 43.6 | | 15.8 | 15.8 | | 15.8 | 15.8 | |
| Effective Green, g (s) | 60.2 | 52.3 | | 47.0 | 43.6 | | 15.8 | 15.8 | | 15.8 | 15.8 | |
| Actuated g/C Ratio | 0.71 | 0.62 | | 0.55 | 0.51 | | 0.19 | 0.19 | | 0.19 | 0.19 | |
| Clearance Time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 729 | 2086 | | 504 | 1733 | | 96 | 648 | | 151 | 624 | |
| v/s Ratio Prot | c0.07 | 0.15 | | 0.00 | 0.11 | | | 0.10 | | | 0.13 | |
| v/s Ratio Perm | c0.28 | | | 0.04 | | | c0.15 | | | 0.07 | | |
| v/c Ratio | 0.50 | 0.24 | | 0.09 | 0.21 | | 0.81 | 0.55 | | 0.39 | 0.69 | |
| Uniform Delay, d1 | 4.9 | 7.4 | | 8.7 | 11.3 | | 33.2 | 31.4 | | 30.4 | 32.3 | |
| Progression Factor | 1.00 | 1.00 | | 0.63 | 0.71 | | 0.91 | 0.89 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.3 | | 0.0 | 0.3 | | 35.8 | 0.6 | | 0.6 | 2.5 | |
| Delay (s) | 5.1 | 7.7 | | 5.5 | 8.3 | | 66.2 | 28.6 | | 31.0 | 34.8 | |
| Level of Service | A | A | | A | A | | E | C | | C | C | |
| Approach Delay (s) | | 6.6 | | | 8.0 | | | 35.2 | | | 34.4 | |
| Approach LOS | | A | | | A | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 19.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.56 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 69.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 6: 27th Street & I-980 On Ramp

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 132 | 751 | 0 | 0 | 127 | 270 | 4 | 229 | 21 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.86 | 0.86 | | | 0.86 | 0.86 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 0.92 | 0.85 | | 0.98 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1520 | 4802 | | | 4407 | 1362 | | 4977 | | | | |
| Flt Permitted | 0.53 | 0.93 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 854 | 4479 | | | 4407 | 1362 | | 4977 | | | | |
| Peak-hour factor, PHF | 0.89 | 0.89 | 0.92 | 0.92 | 0.86 | 0.74 | 0.50 | 0.88 | 0.58 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 148 | 844 | 0 | 0 | 148 | 365 | 8 | 260 | 36 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 110 | 109 | 0 | 22 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 133 | 859 | 0 | 0 | 221 | 73 | 0 | 282 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 6 | | 6 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 4 | | | 3 |
| Turn Type | Perm | | | Perm | | | Perm | | | | | |
| Protected Phases | 4 | | | 8 | | | 2 | | | | | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 342 | 1792 | | | 1763 | 545 | | 1991 | | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | 0.16 | 0.19 | | | | 0.05 | | 0.06 | | | | |
| v/c Ratio | 0.39 | 0.48 | | | 0.13 | 0.13 | | 0.14 | | | | |
| Uniform Delay, d1 | 8.5 | 8.9 | | | 7.6 | 7.6 | | 7.6 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 3.3 | 0.9 | | | 0.1 | 0.5 | | 0.1 | | | | |
| Delay (s) | 11.8 | 9.8 | | | 7.7 | 8.1 | | 7.8 | | | | |
| Level of Service | B | A | | | A | A | | A | | | | |
| Approach Delay (s) | | 10.1 | | | 7.9 | | | 7.8 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 9.1 | | | HCM Level of Service | | | A | | | | |
| HCM Volume to Capacity ratio | | 0.31 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 49.0% | | | ICU Level of Service | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



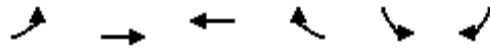
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑↑ | | | | | ↘ | ↑↑ | ↗ |
| Volume (vph) | 0 | 239 | 23 | 9 | 135 | 0 | 0 | 0 | 0 | 626 | 940 | 297 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.91 | | | 0.91 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (prot) | | 4984 | | | 5060 | | | | | 1610 | 3368 | 1583 |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (perm) | | 4984 | | | 4613 | | | | | 1610 | 3368 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.91 | 0.64 | 0.56 | 0.82 | 0.92 | 0.92 | 0.92 | 0.92 | 0.88 | 0.93 | 0.77 |
| Adj. Flow (vph) | 0 | 263 | 36 | 16 | 165 | 0 | 0 | 0 | 0 | 711 | 1011 | 386 |
| RTOR Reduction (vph) | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 |
| Lane Group Flow (vph) | 0 | 276 | 0 | 0 | 181 | 0 | 0 | 0 | 0 | 555 | 1167 | 199 |
| Confl. Peds. (#/hr) | 2 | | 2 | 10 | | 10 | 6 | | | 6 | | |
| Confl. Bikes (#/hr) | | | 3 | | | 4 | | | | 1 | | |
| Turn Type | | | Perm | | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1744 | | | 1615 | | | | | 832 | 1740 | 818 |
| v/s Ratio Prot | | c0.06 | | | | | | | | | | |
| v/s Ratio Perm | | | | | 0.04 | | | | | 0.34 | 0.35 | 0.13 |
| v/c Ratio | | 0.16 | | | 0.11 | | | | | 0.67 | 0.67 | 0.24 |
| Uniform Delay, d1 | | 13.4 | | | 13.2 | | | | | 10.7 | 10.7 | 8.0 |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.2 | | | 0.1 | | | | | 4.2 | 2.1 | 0.7 |
| Delay (s) | | 13.6 | | | 13.3 | | | | | 14.9 | 12.8 | 8.7 |
| Level of Service | | B | | | B | | | | | B | B | A |
| Approach Delay (s) | | 13.6 | | | 13.3 | | | 0.0 | | | 12.6 | |
| Approach LOS | | B | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.8 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.46 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 53.8% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 166 | 517 | 571 | 114 | 740 | 167 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.97 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3411 | | 3432 | 1414 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3411 | | 3432 | 1414 |
| Peak-hour factor, PHF | 0.91 | 0.86 | 0.89 | 0.70 | 0.90 | 0.89 |
| Adj. Flow (vph) | 182 | 601 | 642 | 163 | 822 | 188 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 2 | 119 |
| Lane Group Flow (vph) | 182 | 601 | 780 | 0 | 839 | 50 |
| Confl. Peds. (#/hr) | 14 | | | 11 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 10 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 12.0 | 48.4 | 32.4 | | 23.6 | 23.6 |
| Effective Green, g (s) | 12.0 | 48.4 | 32.4 | | 23.6 | 23.6 |
| Actuated g/C Ratio | 0.15 | 0.60 | 0.40 | | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 266 | 2141 | 1381 | | 1012 | 417 |
| v/s Ratio Prot | c0.10 | 0.17 | c0.23 | | c0.24 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 0.68 | 0.28 | 0.56 | | 0.83 | 0.12 |
| Uniform Delay, d1 | 32.2 | 7.5 | 18.4 | | 26.3 | 20.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.7 | 0.3 | 1.7 | | 5.4 | 0.0 |
| Delay (s) | 37.9 | 7.8 | 20.0 | | 31.8 | 20.7 |
| Level of Service | D | A | C | | C | C |
| Approach Delay (s) | | 14.8 | 20.0 | | 29.9 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 22.3 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.68 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 61.7% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 92 | 786 | 303 | 58 | 368 | 59 | 170 | 223 | 26 | 106 | 314 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 0.95 | | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1766 | 3253 | | 1770 | 3336 | | 1768 | 3450 | | 1756 | 3418 | |
| Flt Permitted | 0.33 | 1.00 | | 0.16 | 1.00 | | 0.44 | 1.00 | | 0.58 | 1.00 | |
| Satd. Flow (perm) | 610 | 3253 | | 297 | 3336 | | 811 | 3450 | | 1077 | 3418 | |
| Peak-hour factor, PHF | 0.77 | 0.96 | 0.85 | 0.85 | 0.83 | 0.72 | 0.82 | 0.95 | 0.65 | 0.87 | 0.92 | 0.77 |
| Adj. Flow (vph) | 119 | 819 | 356 | 68 | 443 | 82 | 207 | 235 | 40 | 122 | 341 | 84 |
| RTOR Reduction (vph) | 0 | 54 | 0 | 0 | 17 | 0 | 0 | 10 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 119 | 1121 | 0 | 68 | 508 | 0 | 207 | 265 | 0 | 122 | 401 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | | Perm | | | pm+pt | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 4 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 25.1 | 25.1 | | 25.1 | 25.1 | | 49.4 | 49.4 | | 35.8 | 35.8 | |
| Effective Green, g (s) | 25.1 | 25.1 | | 25.1 | 25.1 | | 49.4 | 49.4 | | 35.8 | 35.8 | |
| Actuated g/C Ratio | 0.30 | 0.30 | | 0.30 | 0.30 | | 0.58 | 0.58 | | 0.42 | 0.42 | |
| Clearance Time (s) | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 180 | 961 | | 88 | 985 | | 574 | 2005 | | 454 | 1440 | |
| v/s Ratio Prot | | c0.34 | | | 0.15 | | c0.04 | 0.08 | | | 0.12 | |
| v/s Ratio Perm | 0.20 | | | 0.23 | | | c0.17 | | | 0.11 | | |
| v/c Ratio | 0.66 | 1.17 | | 0.77 | 0.52 | | 0.36 | 0.13 | | 0.27 | 0.28 | |
| Uniform Delay, d1 | 26.2 | 30.0 | | 27.3 | 24.9 | | 8.7 | 8.1 | | 16.1 | 16.1 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.07 | 1.09 | |
| Incremental Delay, d2 | 17.5 | 86.5 | | 47.5 | 1.9 | | 0.1 | 0.1 | | 1.4 | 0.5 | |
| Delay (s) | 43.7 | 116.5 | | 74.8 | 26.8 | | 8.8 | 8.2 | | 18.7 | 18.1 | |
| Level of Service | D | F | | E | C | | A | A | | B | B | |
| Approach Delay (s) | | 109.8 | | | 32.3 | | | 8.5 | | | 18.2 | |
| Approach LOS | | F | | | C | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 60.1 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 82.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | ↰ | ↶↷ | | | ↶↷ | | ↰ | ↶↷ | ↰ | ↰ | ↶↷ | |
| Volume (vph) | 79 | 681 | 81 | 80 | 414 | 61 | 98 | 372 | 83 | 87 | 342 | 66 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1750 | 3340 | | | 3323 | | 1763 | 3539 | 1531 | 1760 | 3435 | |
| Flt Permitted | 0.29 | 1.00 | | | 0.59 | | 0.46 | 1.00 | 1.00 | 0.51 | 1.00 | |
| Satd. Flow (perm) | 528 | 3340 | | | 1989 | | 863 | 3539 | 1531 | 937 | 3435 | |
| Peak-hour factor, PHF | 0.71 | 0.92 | 0.74 | 0.83 | 0.90 | 0.90 | 0.63 | 0.92 | 0.66 | 0.55 | 0.88 | 0.83 |
| Adj. Flow (vph) | 111 | 740 | 109 | 96 | 460 | 68 | 156 | 404 | 126 | 158 | 389 | 80 |
| RTOR Reduction (vph) | 0 | 17 | 0 | 0 | 14 | 0 | 0 | 0 | 48 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 111 | 832 | 0 | 0 | 610 | 0 | 156 | 404 | 78 | 158 | 452 | 0 |
| Confl. Peds. (#/hr) | 34 | | 34 | 37 | | 37 | 8 | | 8 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 11 | | | 8 | | | 35 | | | 7 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | Perm | | |
| Protected Phases | 4 | | 8 | | 8 | | 2 | | 2 | 6 | 6 | |
| Permitted Phases | 4 | | 8 | | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 27.6 | 27.6 | | | 27.6 | | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | |
| Effective Green, g (s) | 27.6 | 27.6 | | | 27.6 | | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | |
| Actuated g/C Ratio | 0.34 | 0.34 | | | 0.34 | | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 182 | 1152 | | | 686 | | 479 | 1964 | 850 | 520 | 1906 | |
| v/s Ratio Prot | | 0.25 | | | | | | 0.11 | | | 0.13 | |
| v/s Ratio Perm | 0.21 | | | | c0.31 | | c0.18 | | 0.05 | 0.17 | | |
| v/c Ratio | 0.61 | 0.72 | | | 0.89 | | 0.33 | 0.21 | 0.09 | 0.30 | 0.24 | |
| Uniform Delay, d1 | 21.7 | 22.9 | | | 24.8 | | 9.7 | 8.9 | 8.3 | 9.5 | 9.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.12 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.9 | 1.9 | | | 13.1 | | 1.8 | 0.2 | 0.2 | 1.5 | 0.3 | |
| Delay (s) | 25.7 | 24.8 | | | 40.7 | | 11.5 | 9.2 | 8.6 | 11.0 | 9.4 | |
| Level of Service | C | C | | | D | | B | A | A | B | A | |
| Approach Delay (s) | | 24.9 | | | 40.7 | | | 9.6 | | | 9.8 | |
| Approach LOS | | C | | | D | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 21.4 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 82.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 11: Grand Avenue & Webster Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | ↔ | ↔↔ | | | | | | ↔↔ | |
| Volume (vph) | 0 | 356 | 406 | 101 | 375 | 0 | 0 | 0 | 0 | 10 | 128 | 16 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frpb, ped/bikes | | 0.97 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Frt | | 0.92 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3055 | | 1770 | 3427 | | | | | | 3360 | |
| Flt Permitted | | 1.00 | | 0.19 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3055 | | 350 | 3427 | | | | | | 3360 | |
| Peak-hour factor, PHF | 0.25 | 0.93 | 0.92 | 0.84 | 0.91 | 0.25 | 0.92 | 0.92 | 0.92 | 0.50 | 0.91 | 0.63 |
| Adj. Flow (vph) | 0 | 383 | 441 | 120 | 412 | 0 | 0 | 0 | 0 | 20 | 141 | 25 |
| RTOR Reduction (vph) | 0 | 223 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 |
| Lane Group Flow (vph) | 0 | 601 | 0 | 120 | 412 | 0 | 0 | 0 | 0 | 0 | 171 | 0 |
| Confl. Peds. (#/hr) | 26 | | 26 | 28 | | 28 | 21 | | 21 | 101 | | 101 |
| Confl. Bikes (#/hr) | | | 4 | | | 4 | | | 3 | | | 6 |
| Turn Type | Perm | | pm+pt | | | | | | Perm | | | |
| Protected Phases | 2 | | 1 | | 6 | | | | 4 | | | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 31.8 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Effective Green, g (s) | 31.8 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Actuated g/C Ratio | 0.40 | | 0.54 | | 0.54 | | | | 0.36 | | | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | 3.0 | | | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | 2.0 | | | |
| Lane Grp Cap (vph) | 1214 | | 298 | | 1842 | | | | 1218 | | | |
| v/s Ratio Prot | c0.20 | | c0.03 | | 0.12 | | | | | | | |
| v/s Ratio Perm | | | 0.18 | | | | | | 0.05 | | | |
| v/c Ratio | 0.50 | | 0.40 | | 0.22 | | | | 0.14 | | | |
| Uniform Delay, d1 | 18.1 | | 11.2 | | 9.7 | | | | 17.1 | | | |
| Progression Factor | 2.54 | | 1.00 | | 1.00 | | | | 1.00 | | | |
| Incremental Delay, d2 | 1.3 | | 0.3 | | 0.3 | | | | 0.2 | | | |
| Delay (s) | 47.2 | | 11.5 | | 10.0 | | | | 17.4 | | | |
| Level of Service | D | | B | | B | | | | B | | | |
| Approach Delay (s) | 47.2 | | | | 10.3 | | 0.0 | | | | 17.4 | |
| Approach LOS | D | | | | B | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 30.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.34 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 67.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|--------|------|------|------|------|
| Lane Configurations | ↰↱ | ↑ | ↱ | ↰↱ | ↑↑ | ↱ | | ↰↱↱ | ↱ | | ↰↱↱ | |
| Volume (vph) | 55 | 128 | 66 | 573 | 465 | 101 | 103 | 701 | 292 | 28 | 787 | 92 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 1.00 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 1.00 | 0.94 | | 1.00 | 0.90 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 1863 | 1479 | 3433 | 3539 | 1485 | | 5042 | 1419 | | 4954 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.79 | |
| Satd. Flow (perm) | 3433 | 1863 | 1479 | 3433 | 3539 | 1485 | | 3333 | 1419 | | 3947 | |
| Peak-hour factor, PHF | 0.74 | 0.81 | 0.65 | 0.89 | 0.80 | 0.52 | 0.83 | 0.88 | 0.82 | 0.50 | 0.93 | 0.79 |
| Adj. Flow (vph) | 74 | 158 | 102 | 644 | 581 | 194 | 124 | 797 | 356 | 56 | 846 | 116 |
| RTOR Reduction (vph) | 0 | 0 | 18 | 0 | 0 | 108 | 0 | 0 | 228 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 74 | 158 | 84 | 644 | 581 | 86 | 0 | 921 | 128 | 0 | 1002 | 0 |
| Confl. Peds. (#/hr) | 38 | | 38 | 34 | | 34 | 60 | | 60 | 28 | | 28 |
| Confl. Bikes (#/hr) | | | 12 | | | 18 | | | 39 | | | 9 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 5.6 | 33.0 | 33.0 | 16.0 | 44.4 | 44.4 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 5.6 | 33.0 | 33.0 | 16.0 | 44.4 | 44.4 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.06 | 0.33 | 0.33 | 0.16 | 0.44 | 0.44 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 192 | 615 | 488 | 549 | 1571 | 659 | | 1200 | 511 | | 1421 | |
| v/s Ratio Prot | 0.02 | 0.08 | | c0.19 | c0.16 | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | | 0.06 | | c0.28 | 0.09 | | 0.25 | |
| v/c Ratio | 0.39 | 0.26 | 0.17 | 1.17 | 0.37 | 0.13 | | 1.02dl | 0.25 | | 0.71 | |
| Uniform Delay, d1 | 45.5 | 24.5 | 23.8 | 42.0 | 18.5 | 16.4 | | 28.3 | 22.5 | | 27.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.5 | 1.0 | 0.8 | 95.9 | 0.7 | 0.4 | | 4.7 | 1.2 | | 3.0 | |
| Delay (s) | 46.0 | 25.5 | 24.6 | 137.9 | 19.2 | 16.8 | | 33.0 | 23.7 | | 30.4 | |
| Level of Service | D | C | C | F | B | B | | C | C | | C | |
| Approach Delay (s) | | 29.8 | | | 72.7 | | | 30.4 | | | 30.4 | |
| Approach LOS | | C | | | E | | | C | | | C | |

Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 45.2 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 94.7% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



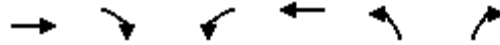
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|-------|-------|-------|------|------|
| Lane Configurations | WT | | WT | TTT | TTT | TT |
| Volume (vph) | 112 | 37 | 94 | 816 | 976 | 649 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.98 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.96 | | 1.00 | 1.00 | 0.94 | |
| Flt Protected | 0.96 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3303 | | 1768 | 3725 | 6019 | |
| Flt Permitted | 0.96 | | 0.10 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3303 | | 178 | 3725 | 6019 | |
| Peak-hour factor, PHF | 0.83 | 0.89 | 0.84 | 0.96 | 0.93 | 0.91 |
| Adj. Flow (vph) | 135 | 42 | 112 | 850 | 1049 | 713 |
| RTOR Reduction (vph) | 37 | 0 | 0 | 0 | 77 | 0 |
| Lane Group Flow (vph) | 140 | 0 | 112 | 850 | 1685 | 0 |
| Confl. Peds. (#/hr) | 36 | 36 | 109 | | | |
| Confl. Bikes (#/hr) | | 14 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 8.7 | | 57.8 | 51.7 | 51.7 | |
| Effective Green, g (s) | 8.7 | | 57.8 | 51.7 | 51.7 | |
| Actuated g/C Ratio | 0.11 | | 0.72 | 0.65 | 0.65 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 359 | | 250 | 2407 | 3890 | |
| v/s Ratio Prot | c0.04 | | c0.03 | 0.23 | 0.28 | |
| v/s Ratio Perm | | | c0.29 | | | |
| v/c Ratio | 0.39 | | 0.45 | 0.35 | 0.43 | |
| Uniform Delay, d1 | 33.2 | | 3.9 | 6.5 | 7.0 | |
| Progression Factor | 1.00 | | 1.63 | 1.15 | 1.00 | |
| Incremental Delay, d2 | 0.7 | | 1.3 | 0.4 | 0.4 | |
| Delay (s) | 33.9 | | 7.7 | 7.9 | 7.3 | |
| Level of Service | C | | A | A | A | |
| Approach Delay (s) | 33.9 | | | 7.9 | 7.3 | |
| Approach LOS | C | | | A | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 9.1 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 60.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis 14: 21st Street & Access Road

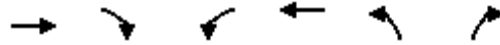
Existing plus Project (I+II) AM
Kaiser Center Transportation Study






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 136 | 29 | 111 | 629 | 1 | 13 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.84 | 0.66 | 0.82 | 0.83 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 162 | 44 | 135 | 758 | 4 | 52 |
| Pedestrians | 7 | | | 7 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 208 | | 1221 | 193 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 208 | | 1221 | 193 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 90 | | 98 | 94 |
| cM capacity (veh/h) | | | 1361 | | 177 | 842 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 206 | 893 | 56 | | | |
| Volume Left | 0 | 135 | 4 | | | |
| Volume Right | 44 | 0 | 52 | | | |
| cSH | 1700 | 1361 | 664 | | | |
| Volume to Capacity | 0.12 | 0.10 | 0.08 | | | |
| Queue Length 95th (ft) | 0 | 8 | 7 | | | |
| Control Delay (s) | 0.0 | 2.4 | 10.9 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 2.4 | 10.9 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | | 63.9% | | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

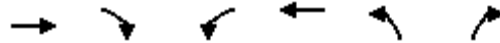
Existing plus Project (I+II) AM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 130 | 253 | 398 | 232 | 2 | 34 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.75 | 0.83 | 0.88 | 0.76 | 0.50 | 0.50 |
| Hourly flow rate (vph) | 173 | 305 | 452 | 305 | 4 | 68 |
| Pedestrians | 24 | | | 24 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 2 | | | 2 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 480 | | 1562 | 352 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 480 | | 1562 | 352 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 58 | | 94 | 90 |
| cM capacity (veh/h) | | | 1080 | | 70 | 677 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 478 | 758 | 72 | | | |
| Volume Left | 0 | 452 | 4 | | | |
| Volume Right | 305 | 0 | 68 | | | |
| cSH | 1700 | 1080 | 457 | | | |
| Volume to Capacity | 0.28 | 0.42 | 0.16 | | | |
| Queue Length 95th (ft) | 0 | 53 | 14 | | | |
| Control Delay (s) | 0.0 | 8.6 | 14.3 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 8.6 | 14.3 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.8 | | | |
| Intersection Capacity Utilization | | | 76.1% | ICU Level of Service | | D |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|-------|------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 228 | 149 | 130 | 319 | 33 | 42 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.85 | 1.00 | 0.73 | 0.85 | 0.86 | 0.75 |
| Hourly flow rate (vph) | 268 | 149 | 178 | 375 | 38 | 56 |
| Pedestrians | 16 | | | 16 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.85 | | 0.85 | 0.85 |
| vC, conflicting volume | | | 419 | | 1092 | 361 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 223 | | 1018 | 154 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 84 | | 79 | 92 |
| cM capacity (veh/h) | | | 1137 | | 185 | 743 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 417 | 553 | 19 | 19 | 28 | 28 |
| Volume Left | 0 | 178 | 19 | 19 | 0 | 0 |
| Volume Right | 149 | 0 | 0 | 0 | 28 | 28 |
| cSH | 1700 | 1137 | 185 | 185 | 743 | 743 |
| Volume to Capacity | 0.25 | 0.16 | 0.10 | 0.10 | 0.04 | 0.04 |
| Queue Length 95th (ft) | 0 | 14 | 9 | 9 | 3 | 3 |
| Control Delay (s) | 0.0 | 4.0 | 26.7 | 26.7 | 10.0 | 10.0 |
| Lane LOS | | A | D | D | B | B |
| Approach Delay (s) | 0.0 | 4.0 | 16.8 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.6 | | | |
| Intersection Capacity Utilization | | 62.6% | | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 317 | 54 | 40 | 50 | 0 | 0 | 0 | 0 | 255 | 334 | 24 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.96 | | | | | | 0.95 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 0.98 | |
| Satd. Flow (prot) | | 1863 | 1342 | | 1755 | | | | | | 4684 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.58 | | | | | | 0.98 | |
| Satd. Flow (perm) | | 1863 | 1342 | | 1044 | | | | | | 4684 | |
| Peak-hour factor, PHF | 0.92 | 0.87 | 0.80 | 0.77 | 0.85 | 0.92 | 0.92 | 0.92 | 0.92 | 0.91 | 0.90 | 0.75 |
| Adj. Flow (vph) | 0 | 364 | 68 | 52 | 59 | 0 | 0 | 0 | 0 | 280 | 371 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 364 | 20 | 0 | 111 | 0 | 0 | 0 | 0 | 0 | 680 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | 2 | |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.8 | 22.8 | | 22.8 | | | | | | 49.2 | |
| Effective Green, g (s) | | 22.8 | 22.8 | | 22.8 | | | | | | 49.2 | |
| Actuated g/C Ratio | | 0.29 | 0.29 | | 0.29 | | | | | | 0.62 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 531 | 382 | | 298 | | | | | | 2881 | |
| v/s Ratio Prot | | c0.20 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.11 | | | | | | 0.15 | |
| v/c Ratio | | 0.69 | 0.05 | | 0.37 | | | | | | 0.24 | |
| Uniform Delay, d1 | | 25.4 | 20.8 | | 22.9 | | | | | | 6.9 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.68 | |
| Incremental Delay, d2 | | 3.7 | 0.1 | | 0.8 | | | | | | 0.2 | |
| Delay (s) | | 29.1 | 20.8 | | 23.7 | | | | | | 4.9 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 27.8 | | | 23.7 | | | 0.0 | | | 4.9 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.7 | | HCM Level of Service | | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.38 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 62.4% | | ICU Level of Service | | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰↱ | ↱ | | | |
| Volume (vph) | 6 | 227 | 3 | 0 | 37 | 34 | 8 | 177 | 157 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 1.00 | 0.87 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 0.99 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1837 | | | 1647 | | | 3504 | 1377 | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1826 | | | 1647 | | | 3504 | 1377 | | | |
| Peak-hour factor, PHF | 0.50 | 0.89 | 0.25 | 0.92 | 0.75 | 0.81 | 0.50 | 0.77 | 0.86 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 12 | 255 | 12 | 0 | 49 | 42 | 16 | 230 | 183 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 15 | 0 | 0 | 0 | 152 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 277 | 0 | 0 | 76 | 0 | 0 | 246 | 31 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 29.4 | | | 29.4 | | | 7.6 | 7.6 | | | |
| Effective Green, g (s) | | 29.4 | | | 29.4 | | | 7.6 | 7.6 | | | |
| Actuated g/C Ratio | | 0.65 | | | 0.65 | | | 0.17 | 0.17 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1193 | | | 1076 | | | 592 | 233 | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | | c0.15 | | | | | | 0.07 | 0.02 | | | |
| v/c Ratio | | 0.23 | | | 0.07 | | | 0.42 | 0.13 | | | |
| Uniform Delay, d1 | | 3.2 | | | 2.8 | | | 16.7 | 15.9 | | | |
| Progression Factor | | 0.43 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.4 | | | 0.1 | | | 0.2 | 0.1 | | | |
| Delay (s) | | 1.8 | | | 3.0 | | | 16.9 | 16.0 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 1.8 | | | 3.0 | | | 16.5 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 9.8 | | | | | | HCM Level of Service | A | | | |
| HCM Volume to Capacity ratio | | 0.27 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 36.6% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 9 | 113 | 14 | 21 | 0 | 30 | 0 | 269 | 31 | 94 | 290 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | | 1.00 | | | 0.99 | |
| Frt | 1.00 | 0.98 | | | 0.92 | | | 0.98 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1751 | 1825 | | | 1651 | | | 3449 | | | 3463 | |
| Flt Permitted | 0.71 | 1.00 | | | 0.89 | | | 1.00 | | | 0.77 | |
| Satd. Flow (perm) | 1317 | 1825 | | | 1497 | | | 3449 | | | 2710 | |
| Peak-hour factor, PHF | 0.56 | 0.92 | 0.88 | 0.79 | 0.92 | 0.78 | 0.92 | 0.85 | 0.78 | 0.85 | 0.89 | 0.92 |
| Adj. Flow (vph) | 16 | 123 | 16 | 27 | 0 | 38 | 0 | 316 | 40 | 111 | 326 | 0 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 22 | 0 | 0 | 22 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 16 | 130 | 0 | 0 | 43 | 0 | 0 | 334 | 0 | 0 | 437 | 0 |
| Confl. Peds. (#/hr) | 16 | | 16 | 17 | | 17 | 43 | | 43 | 44 | | 44 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | 16 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Permitted Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 556 | 771 | | | 632 | | | 1303 | | | 1024 | |
| v/s Ratio Prot | c0.07 | | | | | | 0.10 | | | | | |
| v/s Ratio Perm | 0.01 | | | | 0.03 | | | | | | c0.16 | |
| v/c Ratio | 0.03 | 0.17 | | | 0.07 | | | 0.26 | | | 0.43 | |
| Uniform Delay, d1 | 7.6 | 8.1 | | | 7.7 | | | 9.6 | | | 10.4 | |
| Progression Factor | 1.00 | 1.00 | | | 1.38 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.5 | | | 0.2 | | | 0.5 | | | 1.3 | |
| Delay (s) | 7.7 | 8.6 | | | 10.9 | | | 10.1 | | | 11.7 | |
| Level of Service | A | A | | | B | | | B | | | B | |
| Approach Delay (s) | | 8.5 | | | 10.9 | | | 10.1 | | | 11.7 | |
| Approach LOS | | A | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.29 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 63.2% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | ↔ | ↔↔ | |
| Volume (vph) | 15 | 86 | 16 | 10 | 161 | 86 | 27 | 369 | 42 | 132 | 131 | 47 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.94 | | | 0.98 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3431 | | | 3287 | | | 3455 | | 1768 | 3385 | |
| Flt Permitted | | 0.88 | | | 0.94 | | | 0.91 | | 0.42 | 1.00 | |
| Satd. Flow (perm) | | 3029 | | | 3092 | | | 3162 | | 779 | 3385 | |
| Peak-hour factor, PHF | 0.75 | 0.78 | 0.80 | 0.83 | 0.94 | 0.74 | 0.61 | 0.98 | 0.79 | 0.91 | 0.76 | 0.78 |
| Adj. Flow (vph) | 20 | 110 | 20 | 12 | 171 | 116 | 44 | 377 | 53 | 145 | 172 | 60 |
| RTOR Reduction (vph) | 0 | 17 | 0 | 0 | 98 | 0 | 0 | 12 | 0 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 0 | 133 | 0 | 0 | 201 | 0 | 0 | 462 | 0 | 145 | 214 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 9.2 | | | 9.2 | | | 31.2 | | 41.8 | 41.8 | |
| Effective Green, g (s) | | 9.2 | | | 9.2 | | | 31.2 | | 41.8 | 41.8 | |
| Actuated g/C Ratio | | 0.15 | | | 0.15 | | | 0.52 | | 0.70 | 0.70 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 464 | | | 474 | | | 1644 | | 643 | 2358 | |
| v/s Ratio Prot | | | | | | | | | | c0.02 | 0.06 | |
| v/s Ratio Perm | | 0.04 | | | c0.06 | | | c0.15 | | 0.13 | | |
| v/c Ratio | | 0.29 | | | 0.42 | | | 0.28 | | 0.23 | 0.09 | |
| Uniform Delay, d1 | | 22.5 | | | 23.0 | | | 8.1 | | 3.2 | 2.9 | |
| Progression Factor | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.6 | | | 0.4 | | 0.2 | 0.1 | |
| Delay (s) | | 22.8 | | | 23.4 | | | 8.5 | | 3.4 | 3.0 | |
| Level of Service | | C | | | C | | | A | | A | A | |
| Approach Delay (s) | | 22.8 | | | 23.4 | | | 8.5 | | | 3.2 | |
| Approach LOS | | C | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 12.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.31 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 55.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕↕ | |
| Volume (vph) | 7 | 179 | 52 | 41 | 138 | 97 | 51 | 414 | 76 | 57 | 352 | 22 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.98 | | | 0.96 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.97 | | | 0.95 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | | 3355 | | | 3152 | | | 3386 | | | 4966 | |
| Flt Permitted | | 0.95 | | | 0.87 | | | 0.88 | | | 0.79 | |
| Satd. Flow (perm) | | 3179 | | | 2750 | | | 2990 | | | 3972 | |
| Peak-hour factor, PHF | 0.88 | 0.81 | 0.76 | 0.79 | 0.90 | 0.87 | 0.91 | 0.93 | 0.91 | 0.78 | 0.89 | 0.79 |
| Adj. Flow (vph) | 8 | 221 | 68 | 52 | 153 | 111 | 56 | 445 | 84 | 73 | 396 | 28 |
| RTOR Reduction (vph) | 0 | 43 | 0 | 0 | 70 | 0 | 0 | 23 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 254 | 0 | 0 | 246 | 0 | 0 | 562 | 0 | 0 | 486 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 99 | | 99 | 72 | | 72 | 49 | | 49 |
| Confl. Bikes (#/hr) | | | 7 | | | 33 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1166 | | | 1008 | | | 1491 | | | 1192 | |
| v/s Ratio Prot | | | | | | | | c0.04 | | | | |
| v/s Ratio Perm | | 0.08 | | | c0.09 | | | c0.14 | | | 0.12 | |
| v/c Ratio | | 0.22 | | | 0.24 | | | 0.38 | | | 0.41 | |
| Uniform Delay, d1 | | 13.1 | | | 13.2 | | | 9.8 | | | 16.7 | |
| Progression Factor | | 0.88 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 0.6 | | | 0.7 | | | 1.0 | |
| Delay (s) | | 11.9 | | | 13.8 | | | 10.5 | | | 17.8 | |
| Level of Service | | B | | | B | | | B | | | B | |
| Approach Delay (s) | | 11.9 | | | 13.8 | | | 10.5 | | | 17.8 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.32 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 75.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 23 | 296 | 0 | 0 | 212 | 80 | 29 | 248 | 95 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.99 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3518 | | | 3362 | 1337 | | 5028 | 1460 | | | |
| Flt Permitted | | 0.93 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3280 | | | 3362 | 1337 | | 5028 | 1460 | | | |
| Peak-hour factor, PHF | 0.96 | 0.91 | 0.92 | 0.92 | 0.92 | 0.91 | 0.72 | 0.74 | 0.91 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 24 | 325 | 0 | 0 | 230 | 88 | 40 | 335 | 104 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 18 | 0 | 0 | 89 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 349 | 0 | 0 | 238 | 61 | 0 | 375 | 15 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 61.4 | | | 61.4 | 61.4 | | 11.6 | 11.6 | | | |
| Effective Green, g (s) | | 61.4 | | | 61.4 | 61.4 | | 11.6 | 11.6 | | | |
| Actuated g/C Ratio | | 0.77 | | | 0.77 | 0.77 | | 0.14 | 0.14 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2517 | | | 2580 | 1026 | | 729 | 212 | | | |
| v/s Ratio Prot | | | | | 0.07 | | | | | | | |
| v/s Ratio Perm | | c0.11 | | | | 0.05 | | 0.07 | 0.01 | | | |
| v/c Ratio | | 0.14 | | | 0.09 | 0.06 | | 0.51 | 0.07 | | | |
| Uniform Delay, d1 | | 2.4 | | | 2.3 | 2.3 | | 31.6 | 29.5 | | | |
| Progression Factor | | 1.00 | | | 1.06 | 2.11 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.6 | 0.1 | | | |
| Delay (s) | | 2.5 | | | 2.5 | 4.9 | | 32.2 | 29.7 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 2.5 | | | 3.1 | | | 31.7 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.9 | | | | | HCM Level of Service | | B | | | |
| HCM Volume to Capacity ratio | | 0.20 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | | Sum of lost time (s) | | 7.0 | | | |
| Intersection Capacity Utilization | | 56.0% | | | | | ICU Level of Service | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

23: 20th Street & Webster Street

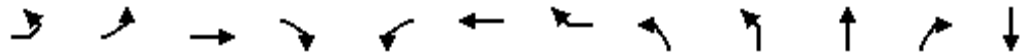
Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 257 | 138 | 163 | 221 | 0 | 0 | 0 | 0 | 54 | 295 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.90 | 1.00 | 1.00 | | | | | | 0.94 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 0.99 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 0.99 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1422 | 1610 | 3339 | | | | | | 4429 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.91 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1422 | 1610 | 3067 | | | | | | 4429 | |
| Peak-hour factor, PHF | 0.92 | 0.83 | 0.95 | 0.91 | 0.88 | 0.25 | 0.92 | 0.92 | 0.92 | 0.84 | 0.91 | 0.78 |
| Adj. Flow (vph) | 0 | 310 | 145 | 179 | 251 | 0 | 0 | 0 | 0 | 64 | 324 | 92 |
| RTOR Reduction (vph) | 0 | 0 | 107 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49 | 0 |
| Lane Group Flow (vph) | 0 | 310 | 38 | 140 | 290 | 0 | 0 | 0 | 0 | 0 | 431 | 0 |
| Confl. Peds. (#/hr) | 53 | | 53 | 86 | | 86 | 105 | | 105 | 331 | | 331 |
| Confl. Bikes (#/hr) | | | 16 | | | 2 | | | 1 | | | 14 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Effective Green, g (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | 0.20 | 0.51 | | | | | | 0.39 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 929 | 373 | 322 | 1626 | | | | | | 1716 | |
| v/s Ratio Prot | | c0.09 | | c0.09 | 0.04 | | | | | | | |
| v/s Ratio Perm | | | 0.03 | | 0.06 | | | | | | 0.10 | |
| v/c Ratio | | 0.33 | 0.10 | 0.43 | 0.18 | | | | | | 0.25 | |
| Uniform Delay, d1 | | 23.8 | 22.4 | 28.0 | 10.5 | | | | | | 16.6 | |
| Progression Factor | | 1.06 | 1.74 | 1.19 | 1.36 | | | | | | 1.12 | |
| Incremental Delay, d2 | | 1.0 | 0.5 | 0.3 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 26.3 | 39.5 | 33.7 | 14.3 | | | | | | 18.7 | |
| Level of Service | | C | D | C | B | | | | | | B | |
| Approach Delay (s) | | 30.5 | | | 20.6 | | | 0.0 | | | 18.7 | |
| Approach LOS | | C | | | C | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 23.2 | | | HCM Level of Service | | | | | C | |
| HCM Volume to Capacity ratio | | | 0.32 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 12.0 | | |
| Intersection Capacity Utilization | | | 87.5% | | | ICU Level of Service | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 24: 20th Street & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBT | EBR | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR | SBT |
|-----------------------------------|-------------|------|-------|------|-------|-------|----------------------|------|-------|-------|------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 96 | 89 | 31 | 122 | 11 | 111 | 42 | 50 | 67 | 249 | 15 | 326 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | | | 4.0 | | 4.0 |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 1.00 | 0.95 | | | | 0.95 | | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 |
| Frt | 1.00 | 1.00 | 0.89 | | 1.00 | 0.96 | | | | 0.99 | | 0.99 |
| Flt Protected | 0.95 | 0.95 | 1.00 | | 0.95 | 1.00 | | | | 0.98 | | 1.00 |
| Satd. Flow (prot) | 1770 | 3221 | 1500 | | 1770 | 3393 | | | | 3460 | | 3351 |
| Flt Permitted | 0.95 | 0.95 | 1.00 | | 0.95 | 1.00 | | | | 0.98 | | 1.00 |
| Satd. Flow (perm) | 1770 | 3221 | 1500 | | 1770 | 3393 | | | | 3460 | | 3351 |
| Peak-hour factor, PHF | 0.92 | 0.79 | 0.82 | 0.83 | 0.69 | 0.84 | 0.84 | 0.94 | 0.94 | 0.96 | 0.75 | 0.85 |
| Adj. Flow (vph) | 104 | 113 | 38 | 147 | 16 | 132 | 50 | 53 | 71 | 259 | 20 | 384 |
| RTOR Reduction (vph) | 0 | 0 | 113 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| Lane Group Flow (vph) | 104 | 102 | 83 | 0 | 16 | 182 | 0 | 0 | 0 | 398 | 0 | 416 |
| Confl. Peds. (#/hr) | 16 | | | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | 6 | | |
| Turn Type | Protocustom | | | | Split | | | | Split | Split | | |
| Protected Phases | 5 | 1 | 1 | | 7 | 7 | | 8 | 8 | 8 | | 2 |
| Permitted Phases | | 1 | | | | | | | | | | |
| Actuated Green, G (s) | 7.8 | 18.7 | 18.7 | | 7.5 | 7.5 | | | | 12.5 | | 16.8 |
| Effective Green, g (s) | 7.8 | 18.7 | 18.7 | | 7.5 | 7.5 | | | | 12.5 | | 16.8 |
| Actuated g/C Ratio | 0.10 | 0.23 | 0.23 | | 0.09 | 0.09 | | | | 0.16 | | 0.21 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | | | 4.0 | | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | | | 2.0 | | 2.0 |
| Lane Grp Cap (vph) | 173 | 753 | 351 | | 166 | 318 | | | | 541 | | 704 |
| v/s Ratio Prot | c0.06 | 0.03 | 0.06 | | 0.01 | c0.05 | | | | c0.12 | | c0.12 |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.60 | 0.14 | 0.24 | | 0.10 | 0.57 | | | | 0.74 | | 0.59 |
| Uniform Delay, d1 | 34.6 | 24.3 | 24.9 | | 33.2 | 34.7 | | | | 32.2 | | 28.5 |
| Progression Factor | 1.31 | 1.64 | 3.28 | | 1.12 | 1.18 | | | | 1.00 | | 0.78 |
| Incremental Delay, d2 | 3.9 | 0.4 | 1.5 | | 0.1 | 1.5 | | | | 4.5 | | 0.9 |
| Delay (s) | 49.1 | 40.1 | 83.2 | | 37.3 | 42.4 | | | | 36.6 | | 23.2 |
| Level of Service | D | D | F | | D | D | | | | D | | C |
| Approach Delay (s) | | | 63.4 | | | 42.0 | | | | 36.6 | | 20.6 |
| Approach LOS | | | E | | | D | | | | D | | C |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 37.7 | | | | HCM Level of Service | | | D | | |
| HCM Volume to Capacity ratio | | | 0.60 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | | Sum of lost time (s) | | | 24.0 | | |
| Intersection Capacity Utilization | | | 60.7% | | | | ICU Level of Service | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|--------|--------|-------|--------|------|
| Lane Configurations | ↑ | ↑ | ↶ | ↷ | ↷ |
| Volume (vph) | 202 | 23 | 20 | 19 | 25 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 |
| Lane Util. Factor | 0.91 | 1.00 | 1.00 | | 0.95 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.90 | | 0.94 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 |
| Frt | 0.85 | 0.85 | 0.92 | | 0.85 |
| Flt Protected | 1.00 | 1.00 | 0.98 | | 1.00 |
| Satd. Flow (prot) | 1441 | 1583 | 1515 | | 1416 |
| Flt Permitted | 1.00 | 1.00 | 0.98 | | 1.00 |
| Satd. Flow (perm) | 1441 | 1583 | 1515 | | 1416 |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 210 | 24 | 22 | 21 | 27 |
| RTOR Reduction (vph) | 0 | 16 | 3 | 0 | 19 |
| Lane Group Flow (vph) | 178 | 8 | 43 | 0 | 5 |
| Confl. Peds. (#/hr) | | 102 | 32 | | 32 |
| Confl. Bikes (#/hr) | | 10 | | | 2 |
| Turn Type | custom | custom | | custom | |
| Protected Phases | 6 | 6 | 9 | | |
| Permitted Phases | 6 | | | | 2 |
| Actuated Green, G (s) | 27.7 | 27.7 | 4.5 | | 16.8 |
| Effective Green, g (s) | 27.7 | 27.7 | 4.5 | | 16.8 |
| Actuated g/C Ratio | 0.35 | 0.35 | 0.06 | | 0.21 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 |
| Lane Grp Cap (vph) | 499 | 548 | 85 | | 297 |
| v/s Ratio Prot | c0.12 | 0.01 | c0.03 | | |
| v/s Ratio Perm | | | | | 0.00 |
| v/c Ratio | 0.36 | 0.02 | 0.51 | | 0.02 |
| Uniform Delay, d1 | 19.5 | 17.2 | 36.7 | | 25.1 |
| Progression Factor | 0.72 | 0.54 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 2.0 | 0.1 | 1.7 | | 0.0 |
| Delay (s) | 16.1 | 9.4 | 38.4 | | 25.1 |
| Level of Service | B | A | D | | C |
| Approach Delay (s) | | | 33.8 | | |
| Approach LOS | | | C | | |
| Intersection Summary | | | | | |

HCM Signalized Intersection Capacity Analysis 26: Harrison Street & Lakeside Drive

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|------|------|------|------|-------|
| Lane Configurations | ←←← | | | ↑↑↑ | ↑↑ | ←←← |
| Volume (vph) | 339 | 0 | 0 | 669 | 385 | 548 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.94 | | | 0.91 | 0.95 | 0.76 |
| Frpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 0.97 |
| Flpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (prot) | 4990 | | | 5085 | 3539 | 3510 |
| Flt Permitted | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 4990 | | | 5085 | 3539 | 3510 |
| Peak-hour factor, PHF | 0.90 | 0.92 | 0.92 | 0.97 | 0.96 | 0.90 |
| Adj. Flow (vph) | 377 | 0 | 0 | 690 | 401 | 609 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 377 | 0 | 0 | 690 | 401 | 609 |
| Confl. Peds. (#/hr) | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | | | 2 |
| Turn Type | | | | | | Free |
| Protected Phases | 1 | | | 2 | 2 | |
| Permitted Phases | | | | | | Free |
| Actuated Green, G (s) | 11.5 | | | 59.5 | 59.5 | 80.0 |
| Effective Green, g (s) | 11.5 | | | 59.5 | 59.5 | 80.0 |
| Actuated g/C Ratio | 0.14 | | | 0.74 | 0.74 | 1.00 |
| Clearance Time (s) | 5.0 | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 717 | | | 3782 | 2632 | 3510 |
| v/s Ratio Prot | c0.08 | | | 0.14 | 0.11 | |
| v/s Ratio Perm | | | | | | c0.17 |
| v/c Ratio | 0.53 | | | 0.18 | 0.15 | 0.17 |
| Uniform Delay, d1 | 31.7 | | | 3.0 | 3.0 | 0.0 |
| Progression Factor | 1.25 | | | 1.00 | 1.26 | 1.00 |
| Incremental Delay, d2 | 0.6 | | | 0.1 | 0.1 | 0.1 |
| Delay (s) | 40.2 | | | 3.1 | 3.8 | 0.1 |
| Level of Service | D | | | A | A | A |
| Approach Delay (s) | 40.2 | | | 3.1 | 1.6 | |
| Approach LOS | D | | | A | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.1 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.23 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 5.0 |
| Intersection Capacity Utilization | 27.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 27: Lakeside Drive & 20th Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | NBL | NBT | SBT | SBR | SEL | SER |
|-----------------------------------|------|-------|-------|----------------------|------|------|
| Lane Configurations | ←←← | ↑↑ | ↑↑ | | | ↗↗ |
| Volume (vph) | 165 | 669 | 385 | 0 | 0 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Util. Factor | 0.94 | 0.95 | 0.95 | | | 0.88 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Frt | 1.00 | 1.00 | 1.00 | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 4990 | 3539 | 3539 | | | 2787 |
| Flt Permitted | 0.94 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 4938 | 3539 | 3539 | | | 2787 |
| Peak-hour factor, PHF | 0.85 | 0.94 | 0.82 | 0.92 | 0.92 | 0.88 |
| Adj. Flow (vph) | 194 | 712 | 470 | 0 | 0 | 68 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 19 |
| Lane Group Flow (vph) | 194 | 712 | 470 | 0 | 0 | 49 |
| Confl. Bikes (#/hr) | | | | 8 | | 4 |
| Turn Type | Perm | | | custom | | |
| Protected Phases | | 2 | 1 | | | 2 |
| Permitted Phases | 2 | 1 | | | | 2 |
| Actuated Green, G (s) | 57.3 | 74.0 | 16.7 | | | 57.3 |
| Effective Green, g (s) | 57.3 | 74.0 | 16.7 | | | 57.3 |
| Actuated g/C Ratio | 0.72 | 0.92 | 0.21 | | | 0.72 |
| Clearance Time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 3537 | 3539 | 739 | | | 1996 |
| v/s Ratio Prot | | c0.14 | c0.13 | | | 0.02 |
| v/s Ratio Perm | 0.04 | 0.06 | | | | |
| v/c Ratio | 0.05 | 0.20 | 0.64 | | | 0.02 |
| Uniform Delay, d1 | 3.4 | 0.3 | 28.9 | | | 3.3 |
| Progression Factor | 1.00 | 1.00 | 1.10 | | | 1.00 |
| Incremental Delay, d2 | 0.0 | 0.0 | 1.8 | | | 0.0 |
| Delay (s) | 3.4 | 0.3 | 33.5 | | | 3.3 |
| Level of Service | A | A | C | | | A |
| Approach Delay (s) | | 1.0 | 33.5 | | 3.3 | |
| Approach LOS | | A | C | | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 11.7 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.30 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | 3.0 |
| Intersection Capacity Utilization | | 21.8% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 28: 18th Street & Brush Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 82 | 113 | 0 | 0 | 0 | 0 | 0 | 2317 | 9 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1770 | 3539 | | | | | | 6398 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1770 | 3539 | | | | | | 6398 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.83 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.45 |
| Adj. Flow (vph) | 0 | 0 | 0 | 88 | 136 | 0 | 0 | 0 | 0 | 0 | 2414 | 20 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 88 | 136 | 0 | 0 | 0 | 0 | 0 | 2434 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Effective Green, g (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Actuated g/C Ratio | | | | 0.12 | 0.12 | | | | | | 0.76 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 217 | 434 | | | | | | 4845 | |
| v/s Ratio Prot | | | | | 0.04 | | | | | | c0.38 | |
| v/s Ratio Perm | | | | c0.05 | | | | | | | | |
| v/c Ratio | | | | 0.41 | 0.31 | | | | | | 0.50 | |
| Uniform Delay, d1 | | | | 30.4 | 30.0 | | | | | | 3.6 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.92 | |
| Incremental Delay, d2 | | | | 5.5 | 1.9 | | | | | | 0.1 | |
| Delay (s) | | | | 35.9 | 31.9 | | | | | | 3.4 | |
| Level of Service | | | | D | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 33.5 | | | 0.0 | | | 3.4 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 5.9 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.49 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 47.1% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|------|-------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 219 | 1178 | 410 | 65 | 377 | 83 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.97 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 4920 | | 3372 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 4920 | | 3372 | |
| Peak-hour factor, PHF | 0.86 | 0.96 | 0.95 | 0.74 | 0.94 | 0.86 |
| Adj. Flow (vph) | 255 | 1227 | 432 | 88 | 401 | 97 |
| RTOR Reduction (vph) | 81 | 0 | 37 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 174 | 1227 | 483 | 0 | 498 | 0 |
| Confl. Peds. (#/hr) | | | | 22 | | |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 35.5 | 35.5 | 12.9 | | 14.6 | |
| Effective Green, g (s) | 35.5 | 35.5 | 12.9 | | 14.6 | |
| Actuated g/C Ratio | 0.47 | 0.47 | 0.17 | | 0.19 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 838 | 2407 | 846 | | 656 | |
| v/s Ratio Prot | | c0.24 | c0.10 | | c0.15 | |
| v/s Ratio Perm | 0.10 | | | | | |
| v/c Ratio | 0.21 | 0.51 | 0.57 | | 0.76 | |
| Uniform Delay, d1 | 11.5 | 13.7 | 28.5 | | 28.5 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.6 | 0.8 | 0.9 | | 5.0 | |
| Delay (s) | 12.1 | 14.5 | 29.4 | | 33.6 | |
| Level of Service | B | B | C | | C | |
| Approach Delay (s) | | 14.1 | 29.4 | | 33.6 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 21.2 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.58 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 59.0% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th St. & Castro Street

















Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 130 | 200 | 272 | 273 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.99 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.99 | 1.00 | | | | |
| Frt | | | | | 0.93 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3147 | 1423 | 1425 | 5920 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3147 | 1423 | 1425 | 5920 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.89 | 0.87 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 138 | 225 | 313 | 297 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 41 | 43 | 124 | 125 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 207 | 72 | 32 | 329 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 5 | | 5 | | | |
| Confl. Bikes (#/hr) | | | 6 | | | 2 | | | 5 | | | |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 37.8 | 37.8 | 12.2 | 12.2 | | | | |
| Effective Green, g (s) | | | | | 37.8 | 37.8 | 12.2 | 12.2 | | | | |
| Actuated g/C Ratio | | | | | 0.63 | 0.63 | 0.20 | 0.20 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1983 | 896 | 290 | 1204 | | | | |
| v/s Ratio Prot | | | | | c0.07 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.05 | 0.02 | 0.06 | | | | |
| v/c Ratio | | | | | 0.10 | 0.08 | 0.11 | 0.27 | | | | |
| Uniform Delay, d1 | | | | | 4.4 | 4.3 | 19.5 | 20.2 | | | | |
| Progression Factor | | | | | 4.34 | 7.68 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.1 | 0.1 | 0.2 | 0.1 | | | | |
| Delay (s) | | | | | 19.2 | 33.4 | 19.6 | 20.3 | | | | |
| Level of Service | | | | | B | C | B | C | | | | |
| Approach Delay (s) | | 0.0 | | | 23.7 | | | 20.1 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.4 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.15 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 27.0% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 31: 11th Street & Brush Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | | | | | | |  |  |  |
| Volume (vph) | 0 | 153 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 954 | 1071 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3401 | | | | | | | | 1522 | 4717 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3401 | | | | | | | | 1522 | 4717 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.65 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.86 | 0.90 | 0.75 |
| Adj. Flow (vph) | 0 | 165 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 1109 | 1190 | 40 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 337 | 67 | 0 |
| Lane Group Flow (vph) | 0 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 240 | 1696 | 0 |
| Confl. Peds. (#/hr) | 6 | | 6 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | 1 | | 1 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Effective Green, g (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Actuated g/C Ratio | | 0.52 | | | | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1757 | | | | | | | | 634 | 1965 | |
| v/s Ratio Prot | | c0.06 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.16 | 0.36 | |
| v/c Ratio | | 0.11 | | | | | | | | 0.38 | 0.86 | |
| Uniform Delay, d1 | | 14.9 | | | | | | | | 24.2 | 31.9 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | | | | | | | | 1.7 | 5.3 | |
| Delay (s) | | 15.0 | | | | | | | | 26.0 | 37.2 | |
| Level of Service | | B | | | | | | | | C | D | |
| Approach Delay (s) | | 15.0 | | | 0.0 | | | 0.0 | | | 34.4 | |
| Approach LOS | | B | | | A | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 32.8 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.45 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 53.1% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔ | ↔ | | | |
| Volume (vph) | 34 | 261 | 0 | 0 | 547 | 480 | 116 | 535 | 23 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | | 1.00 | 0.97 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3513 | | | 3539 | 1548 | | 3490 | 1531 | | | |
| Flt Permitted | | 0.83 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2945 | | | 3539 | 1548 | | 3490 | 1531 | | | |
| Peak-hour factor, PHF | 0.85 | 0.89 | 0.92 | 0.96 | 0.88 | 0.96 | 0.85 | 0.96 | 0.72 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 40 | 293 | 0 | 0 | 622 | 500 | 136 | 557 | 32 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 172 | 0 | 0 | 15 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 333 | 0 | 0 | 622 | 328 | 0 | 693 | 17 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 35 | | 35 | 6 | | 6 | 26 | | 26 | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 33 | | | 6 | | 10 | | | | 5 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | Perm | | | |
| Protected Phases | | 4 | | | 8 | 8 | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 884 | | | 1062 | 464 | | 1861 | 817 | | | |
| v/s Ratio Prot | | | | | 0.18 | | | | | | | |
| v/s Ratio Perm | | 0.11 | | | | 0.21 | | 0.20 | 0.01 | | | |
| v/c Ratio | | 0.38 | | | 0.59 | 0.71 | | 0.37 | 0.02 | | | |
| Uniform Delay, d1 | | 16.6 | | | 17.8 | 18.7 | | 8.2 | 6.6 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 1.2 | | | 2.4 | 8.8 | | 0.6 | 0.0 | | | |
| Delay (s) | | 17.8 | | | 20.2 | 27.4 | | 8.7 | 6.7 | | | |
| Level of Service | | B | | | C | C | | A | A | | | |
| Approach Delay (s) | | 17.8 | | | 23.4 | | | 8.6 | | | 0.0 | |
| Approach LOS | | B | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 17.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.49 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 76.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 33: 14th Street & Madison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↘ | ↑↑ | |
| Volume (vph) | 0 | 233 | 39 | 21 | 621 | 0 | 0 | 0 | 0 | 50 | 320 | 17 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frbp, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.99 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3435 | | | 3529 | | | | | 1746 | 3497 | |
| Flt Permitted | | 1.00 | | | 0.93 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3435 | | | 3292 | | | | | 1746 | 3497 | |
| Peak-hour factor, PHF | 0.92 | 0.75 | 0.70 | 0.66 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.74 | 0.96 | 0.71 |
| Adj. Flow (vph) | 0 | 311 | 56 | 32 | 647 | 0 | 0 | 0 | 0 | 68 | 333 | 24 |
| RTOR Reduction (vph) | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 335 | 0 | 0 | 679 | 0 | 0 | 0 | 0 | 68 | 345 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 28 | | 28 | 18 | | | 18 | 16 | 16 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | | 3 | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | 6 | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1450 | | | 1390 | | | | | 737 | 1477 | |
| v/s Ratio Prot | | 0.10 | | | | | | | | | c0.10 | |
| v/s Ratio Perm | | | | | c0.21 | | | | | 0.04 | | |
| v/c Ratio | | 0.23 | | | 0.49 | | | | | 0.09 | 0.23 | |
| Uniform Delay, d1 | | 8.3 | | | 9.5 | | | | | 7.8 | 8.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 1.2 | | | | | 0.2 | 0.4 | |
| Delay (s) | | 8.7 | | | 10.7 | | | | | 8.1 | 8.7 | |
| Level of Service | | A | | | B | | | | | A | A | |
| Approach Delay (s) | | 8.7 | | | 10.7 | | | 0.0 | | | 8.6 | |
| Approach LOS | | A | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.6 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 52.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 34: 14th Street & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 38 | 141 | 10 | 7 | 340 | 84 | 56 | 375 | 23 | 25 | 63 | 24 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | 0.97 | | | 0.99 | | | 0.97 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3424 | | | 3364 | | | 3443 | | | 3358 | |
| Flt Permitted | | 0.85 | | | 0.95 | | | 0.89 | | | 0.80 | |
| Satd. Flow (perm) | | 2922 | | | 3202 | | | 3083 | | | 2725 | |
| Peak-hour factor, PHF | 0.79 | 0.80 | 0.36 | 0.88 | 0.91 | 0.75 | 0.74 | 0.90 | 0.52 | 0.63 | 0.72 | 0.86 |
| Adj. Flow (vph) | 48 | 176 | 28 | 8 | 374 | 112 | 76 | 417 | 44 | 40 | 88 | 28 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 52 | 0 | 0 | 17 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 0 | 238 | 0 | 0 | 442 | 0 | 0 | 520 | 0 | 0 | 137 | 0 |
| Confl. Peds. (#/hr) | 30 | | 30 | 55 | | 55 | 41 | | 41 | 40 | | 40 |
| Confl. Bikes (#/hr) | | | 7 | | | 19 | | | 6 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 23.2 | | | 23.2 | | | 14.3 | | | 14.3 | |
| Effective Green, g (s) | | 23.2 | | | 23.2 | | | 14.3 | | | 14.3 | |
| Actuated g/C Ratio | | 0.52 | | | 0.52 | | | 0.32 | | | 0.32 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1506 | | | 1651 | | | 980 | | | 866 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | 0.14 | | | 0.17 | | | 0.05 | |
| v/c Ratio | | 0.16 | | | 0.27 | | | 0.53 | | | 0.16 | |
| Uniform Delay, d1 | | 5.7 | | | 6.1 | | | 12.6 | | | 11.0 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.4 | | | 0.6 | | | 0.1 | |
| Delay (s) | | 6.0 | | | 6.5 | | | 13.2 | | | 11.1 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 6.0 | | | 6.5 | | | 13.2 | | | 11.1 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.4 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.37 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 59.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | 4↑↑↑ | | | | | | 4↑↑↑ | |
| Volume (vph) | 0 | 0 | 0 | 353 | 1277 | 0 | 0 | 0 | 0 | 0 | 328 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.97 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6290 | | | | | | 4899 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6290 | | | | | | 4899 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.91 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.81 |
| Adj. Flow (vph) | 0 | 0 | 0 | 388 | 1316 | 0 | 0 | 0 | 0 | 0 | 335 | 80 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1616 | 0 | 0 | 0 | 0 | 0 | 407 | 0 |
| Confl. Peds. (#/hr) | 48 | | 48 | 30 | | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | 9 | | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2726 | | | | | | 2164 | |
| v/s Ratio Prot | | | | | | | | | | | c0.08 | |
| v/s Ratio Perm | | | | | 0.26 | | | | | | | |
| v/c Ratio | | | | | 0.59 | | | | | | 0.19 | |
| Uniform Delay, d1 | | | | | 13.0 | | | | | | 10.2 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.8 | | | | | | 0.2 | |
| Delay (s) | | | | | 7.0 | | | | | | 10.4 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 7.0 | | | 0.0 | | | 10.4 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.7 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.39 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 46.6% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 36: 12th St. & Oak St.

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1431 | 66 | 275 | 698 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6338 | | | 6170 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6338 | | | 6170 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.87 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1475 | 76 | 296 | 759 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 8 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1539 | 0 | 0 | 1047 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | 1 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3158 | | | 2118 | | | | |
| v/s Ratio Prot | | | | | 0.24 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.17 | | | | |
| v/c Ratio | | | | | 0.49 | | | 0.49 | | | | |
| Uniform Delay, d1 | | | | | 10.0 | | | 15.6 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.5 | | | 0.8 | | | | |
| Delay (s) | | | | | 10.5 | | | 16.4 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 10.5 | | | 16.4 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.9 | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | | 0.49 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | Sum of lost time (s) | | | 9.5 | |
| Intersection Capacity Utilization | | | 51.9% | | | | | ICU Level of Service | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 37: 11th Street & Oak Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 56 | 0 | 0 | 937 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.88 | 0.92 | 0.92 | 0.99 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 64 | 0 | 0 | 946 | 0 | 0 |
| Pedestrians | 12 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 1 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 249 | 12 | 12 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 249 | 12 | 12 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 91 | 100 | 100 | | | |
| cM capacity (veh/h) | 711 | 1055 | 1589 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 64 | 237 | 237 | 237 | 237 | |
| Volume Left | 64 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 711 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.09 | 0.14 | 0.14 | 0.14 | 0.14 | |
| Queue Length 95th (ft) | 7 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 10.6 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 10.6 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 23.6% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 338 | 121 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 668 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6067 | | | | | | | | | 5067 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6067 | | | | | | | | | 5067 | |
| Peak-hour factor, PHF | 0.92 | 0.86 | 0.84 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.55 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 393 | 144 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | 703 | 0 |
| RTOR Reduction (vph) | 0 | 71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 466 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 733 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2326 | | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.08 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.14 | |
| v/c Ratio | | 0.20 | | | | | | | | | 0.33 | |
| Uniform Delay, d1 | | 12.4 | | | | | | | | | 11.3 | |
| Progression Factor | | 0.77 | | | | | | | | | 1.19 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | | 0.4 | |
| Delay (s) | | 9.7 | | | | | | | | | 13.8 | |
| Level of Service | | A | | | | | | | | | B | |
| Approach Delay (s) | | 9.7 | | | 0.0 | | | 0.0 | | | 13.8 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.1 | | | | HCM Level of Service | | | | B | |
| HCM Volume to Capacity ratio | | | 0.27 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | Sum of lost time (s) | | | 11.0 | | |
| Intersection Capacity Utilization | | | 38.3% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTH | | | | | | 4TTH | | | | |
| Volume (vph) | 107 | 342 | 0 | 0 | 0 | 0 | 0 | 362 | 50 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6253 | | | | | | 6281 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6253 | | | | | | 6281 | | | | |
| Peak-hour factor, PHF | 0.79 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.74 | 0.83 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 135 | 368 | 0 | 0 | 0 | 0 | 0 | 489 | 60 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 116 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 387 | 0 | 0 | 0 | 0 | 0 | 534 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | 56 | 21 | | 21 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 5 | | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 8.4 | | | | | | 44.6 | | | | |
| Effective Green, g (s) | | 8.4 | | | | | | 44.6 | | | | |
| Actuated g/C Ratio | | 0.14 | | | | | | 0.74 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 875 | | | | | | 4669 | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.06 | | | | | | | | | | |
| v/c Ratio | | 0.44 | | | | | | 0.11 | | | | |
| Uniform Delay, d1 | | 23.7 | | | | | | 2.2 | | | | |
| Progression Factor | | 1.02 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.0 | | | | |
| Delay (s) | | 24.2 | | | | | | 2.2 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 24.2 | | | 0.0 | | | 2.2 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 12.7 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.17 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 40.0% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 40: 7th St. & Oak St.

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 115 | 490 | 0 | 0 | 0 | 0 | 0 | 979 | 247 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.97 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6329 | | | | | | 4883 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6329 | | | | | | 4883 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.91 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.85 | 0.71 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 124 | 538 | 0 | 0 | 0 | 0 | 0 | 1152 | 348 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 97 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 650 | 0 | 0 | 0 | 0 | 0 | 1403 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 59 | | 59 | 12 | | 12 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 2 | | | 1 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2532 | | | | | | 1953 | | | | |
| v/s Ratio Prot | | | | | | | | c0.29 | | | | |
| v/s Ratio Perm | | 0.10 | | | | | | | | | | |
| v/c Ratio | | 0.26 | | | | | | 0.72 | | | | |
| Uniform Delay, d1 | | 9.0 | | | | | | 11.4 | | | | |
| Progression Factor | | 0.82 | | | | | | 0.73 | | | | |
| Incremental Delay, d2 | | 0.2 | | | | | | 1.9 | | | | |
| Delay (s) | | 7.6 | | | | | | 10.3 | | | | |
| Level of Service | | A | | | | | | B | | | | |
| Approach Delay (s) | | 7.6 | | | 0.0 | | | 10.3 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.5 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.49 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 47.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑↑ | | | | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 470 | 241 | 0 | 0 | 0 | 0 | 0 | 0 | 131 | 530 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.95 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6034 | | | | | | | | | 5024 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6034 | | | | | | | | | 5024 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.86 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.89 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 511 | 280 | 0 | 0 | 0 | 0 | 0 | 0 | 147 | 541 | 0 |
| RTOR Reduction (vph) | 0 | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 0 | 666 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 606 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 10 | | 10 | 8 | | 8 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 7 | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2414 | | | | | | | | | 2233 | |
| v/s Ratio Prot | | c0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.12 | |
| v/c Ratio | | 0.28 | | | | | | | | | 0.27 | |
| Uniform Delay, d1 | | 9.1 | | | | | | | | | 7.9 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | | 0.3 | |
| Delay (s) | | 9.4 | | | | | | | | | 8.2 | |
| Level of Service | | A | | | | | | | | | A | |
| Approach Delay (s) | | 9.4 | | | 0.0 | | | 0.0 | | | 8.2 | |
| Approach LOS | | A | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.8 | | | | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.27 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | | | | 7.0 | | |
| Intersection Capacity Utilization | | | 38.3% | | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 42: I-880 NB On-ramp & Jackson Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↑ | ↱ | | ↕ | | | ↑ | ↱ |
| Volume (vph) | 0 | 0 | 0 | 20 | 297 | 45 | 192 | 240 | 0 | 0 | 142 | 1512 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frbp, ped/bikes | | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1736 | 1863 | 1503 | | 1820 | | | 1863 | 1558 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.77 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1736 | 1863 | 1503 | | 1435 | | | 1863 | 1558 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.71 | 0.96 | 0.87 | 0.84 | 0.87 | 0.92 | 0.92 | 0.81 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 28 | 309 | 52 | 229 | 276 | 0 | 0 | 175 | 1592 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 | 0 | 117 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 28 | 309 | 13 | 0 | 505 | 0 | 0 | 175 | 1475 |
| Confl. Peds. (#/hr) | 1 | | 1 | 23 | | 23 | 2 | | 2 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 11.6 | 11.6 | 11.6 | | 22.4 | | | 22.4 | 22.4 |
| Effective Green, g (s) | | | | 11.6 | 11.6 | 11.6 | | 22.4 | | | 22.4 | 22.4 |
| Actuated g/C Ratio | | | | 0.26 | 0.26 | 0.26 | | 0.50 | | | 0.50 | 0.50 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 448 | 480 | 387 | | 714 | | | 927 | 776 |
| v/s Ratio Prot | | | | c0.17 | | | | | | | 0.09 | |
| v/s Ratio Perm | | | | 0.02 | | 0.01 | | 0.35 | | | | c0.95 |
| v/c Ratio | | | | 0.06 | 0.64 | 0.03 | | 0.71 | | | 0.19 | 1.90 |
| Uniform Delay, d1 | | | | 12.6 | 14.9 | 12.5 | | 8.8 | | | 6.3 | 11.3 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.1 | 3.0 | 0.0 | | 5.8 | | | 0.5 | 410.2 |
| Delay (s) | | | | 12.7 | 17.8 | 12.5 | | 14.6 | | | 6.7 | 421.5 |
| Level of Service | | | | B | B | B | | B | | | A | F |
| Approach Delay (s) | | 0.0 | | | 16.7 | | | 14.6 | | | 380.4 | |
| Approach LOS | | A | | | B | | | B | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 257.8 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.47 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 146.8% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 123 | 429 | 120 | 49 | 778 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3491 | | 3197 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3491 | | 3197 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.75 | 0.96 | 0.77 | 0.86 | 0.89 |
| Adj. Flow (vph) | 0 | 164 | 447 | 156 | 57 | 874 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 611 | 0 | 650 | 437 |
| Confl. Peds. (#/hr) | 51 | 2 | | | | |
| Confl. Bikes (#/hr) | 2 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1265 | | 1151 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.18 | | 0.20 | 0.30 |
| v/c Ratio | | | 0.48 | | 0.56 | 0.84 |
| Uniform Delay, d1 | | | 11.1 | | 11.6 | 13.2 |
| Progression Factor | | | 0.81 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.6 | | 2.0 | 15.2 |
| Delay (s) | | | 9.6 | | 13.6 | 28.4 |
| Level of Service | | | A | | B | C |
| Approach Delay (s) | | | 9.6 | | 19.6 | |
| Approach LOS | | | A | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 16.0 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.65 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 61.6% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 44: 5th St. & Oak St.

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ←↑↑→ | | | | | | ↑ | | | ←↑ | |
| Volume (vph) | 303 | 558 | 152 | 0 | 0 | 0 | 0 | 230 | 68 | 3 | 117 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.97 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4848 | | | | | | 1795 | | | 1858 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.98 | |
| Satd. Flow (perm) | | 1850 | | | | | | 1500 | | | 1600 | |
| Peak-hour factor, PHF | 0.95 | 0.89 | 0.81 | 0.92 | 0.92 | 0.92 | 0.92 | 0.82 | 0.74 | 0.38 | 0.77 | 0.92 |
| Adj. Flow (vph) | 319 | 627 | 188 | 0 | 0 | 0 | 0 | 280 | 92 | 8 | 152 | 0 |
| RTOR Reduction (vph) | 0 | 67 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1068 | 0 | 0 | 0 | 0 | 0 | 346 | 0 | 0 | 160 | 0 |
| Confl. Peds. (#/hr) | 14 | | 14 | 52 | | 52 | 1 | | 1 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 5 | | | 2 | | | | | | |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 925 | | | | | | 618 | | | 551 | |
| v/s Ratio Prot | | | | | | | | c0.19 | | | | |
| v/s Ratio Perm | | c0.58 | | | | | | | | | 0.10 | |
| v/c Ratio | | 1.15 | | | | | | 0.56 | | | 0.29 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 12.0 | | | 10.7 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.97 | |
| Incremental Delay, d2 | | 81.7 | | | | | | 3.6 | | | 1.1 | |
| Delay (s) | | 92.9 | | | | | | 15.6 | | | 11.6 | |
| Level of Service | | F | | | | | | B | | | B | |
| Approach Delay (s) | | 92.9 | | | 0.0 | | | 15.6 | | | 11.6 | |
| Approach LOS | | F | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 67.9 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.91 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 46.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (WB) & Grand Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



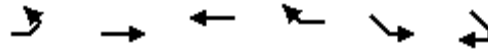
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|------|------|-------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 443 | 302 | 461 | 294 | 155 | 1028 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3340 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3340 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.89 | 0.92 | 0.83 | 0.88 | 0.90 | 0.85 |
| Adj. Flow (vph) | 498 | 328 | 555 | 334 | 172 | 1209 |
| RTOR Reduction (vph) | 0 | 233 | 95 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 498 | 95 | 794 | 0 | 172 | 1209 |
| Turn Type | Perm | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 26.0 | 26.0 | 38.7 | | 13.3 | 56.0 |
| Effective Green, g (s) | 26.0 | 26.0 | 38.7 | | 13.3 | 56.0 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.43 | | 0.15 | 0.62 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 511 | 457 | 1436 | | 262 | 2202 |
| v/s Ratio Prot | c0.28 | | 0.24 | | c0.10 | c0.34 |
| v/s Ratio Perm | | 0.06 | | | | |
| v/c Ratio | 0.97 | 0.21 | 0.55 | | 0.66 | 0.55 |
| Uniform Delay, d1 | 31.7 | 24.2 | 19.2 | | 36.2 | 9.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 33.0 | 0.2 | 1.5 | | 12.2 | 1.0 |
| Delay (s) | 64.7 | 24.4 | 20.7 | | 48.4 | 10.7 |
| Level of Service | E | C | C | | D | B |
| Approach Delay (s) | 48.7 | | 20.7 | | | 15.4 |
| Approach LOS | D | | C | | | B |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 25.8 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.69 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 65.3% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis
46: Lakeshore Drive & El Embarcadero (WB)

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | ↰ | ↗↗ | ↰↗ | | ↰ | ↗ |
| Volume (vph) | 471 | 447 | 572 | 262 | 182 | 261 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3370 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3370 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.94 | 0.92 | 0.91 | 0.89 | 0.85 | 0.92 |
| Adj. Flow (vph) | 501 | 486 | 629 | 294 | 214 | 284 |
| RTOR Reduction (vph) | 0 | 0 | 79 | 0 | 0 | 219 |
| Lane Group Flow (vph) | 501 | 486 | 844 | 0 | 214 | 65 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.1 | 33.2 | 15.1 | | 12.3 | 12.3 |
| Effective Green, g (s) | 14.1 | 33.2 | 15.1 | | 12.3 | 12.3 |
| Actuated g/C Ratio | 0.26 | 0.62 | 0.28 | | 0.23 | 0.23 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 466 | 2196 | 951 | | 407 | 364 |
| v/s Ratio Prot | c0.28 | 0.14 | c0.25 | | c0.12 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 1.08 | 0.22 | 0.89 | | 0.53 | 0.18 |
| Uniform Delay, d1 | 19.7 | 4.5 | 18.4 | | 18.0 | 16.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 63.3 | 0.1 | 10.1 | | 1.2 | 0.2 |
| Delay (s) | 83.0 | 4.5 | 28.5 | | 19.3 | 16.8 |
| Level of Service | F | A | C | | B | B |
| Approach Delay (s) | | 44.4 | 28.5 | | 17.9 | |
| Approach LOS | | D | C | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 32.8 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.84 | | |
| Actuated Cycle Length (s) | 53.5 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 70.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|------|------|-------|------|
| Lane Configurations | | | | 3 1 1 | | | 2 2 | 1 1 | 1 1 | 2 2 | |
| Volume (vph) | 0 | 0 | 395 | 626 | 270 | 0 | 571 | 184 | 277 | 1208 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.96 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4877 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4877 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.78 | 0.88 | 0.69 | 0.92 | 0.93 | 0.76 | 0.80 | 0.84 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 506 | 711 | 391 | 0 | 614 | 242 | 346 | 1438 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 167 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1583 | 0 | 0 | 614 | 75 | 346 | 1438 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1679 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.32 | | | c0.17 | | 0.20 | c0.41 | |
| v/s Ratio Perm | | | | | | | | 0.05 | | | |
| v/c Ratio | | | | 0.94 | | | 1.05 | 0.29 | 0.53 | 0.71 | |
| Uniform Delay, d1 | | | | 33.7 | | | 44.3 | 38.8 | 26.3 | 16.4 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 11.2 | | | 51.5 | 2.8 | 3.1 | 2.2 | |
| Delay (s) | | | | 44.9 | | | 95.7 | 41.5 | 29.4 | 18.6 | |
| Level of Service | | | | D | | | F | D | C | B | |
| Approach Delay (s) | 0.0 | | | 44.9 | | | 80.4 | | | 20.7 | |
| Approach LOS | A | | | D | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 41.9 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.88 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 67.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 260 | 445 | 196 | 184 | 340 | 259 | 32 | 229 | 31 | 654 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.99 | 0.85 | 0.85 | 0.93 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3173 | 1441 | 1583 | 3281 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3173 | 1441 | 1583 | 3281 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.81 | 0.88 | 0.89 | 0.88 | 0.94 | 0.85 | 0.83 | 0.91 | 0.78 | 0.82 |
| Adj. Flow (vph) | 321 | 506 | 220 | 209 | 362 | 305 | 39 | 252 | 40 | 798 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 76 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 276 | 573 | 198 | 133 | 703 | 0 | 0 | 0 | 292 | 798 |
| Turn Type | Split | | Prot | Perm | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | 4 | | | | | | |
| Actuated Green, G (s) | 28.8 | 28.8 | 28.8 | 28.8 | 42.0 | | | | 22.7 | 68.2 |
| Effective Green, g (s) | 28.8 | 28.8 | 28.8 | 28.8 | 42.0 | | | | 22.7 | 68.2 |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.27 | 0.27 | 0.40 | | | | 0.21 | 0.64 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 437 | 862 | 392 | 430 | 1300 | | | | 379 | 2277 |
| v/s Ratio Prot | 0.17 | c0.18 | 0.14 | | c0.21 | | | | c0.17 | 0.23 |
| v/s Ratio Perm | | | | 0.08 | | | | | | |
| v/c Ratio | 0.63 | 0.66 | 0.51 | 0.31 | 0.54 | | | | 0.77 | 0.35 |
| Uniform Delay, d1 | 33.9 | 34.3 | 32.6 | 30.7 | 24.6 | | | | 39.2 | 8.7 |
| Progression Factor | 0.76 | 0.76 | 0.76 | 0.64 | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.9 | 1.2 | 0.6 | 0.3 | 1.6 | | | | 9.3 | 0.4 |
| Delay (s) | 27.8 | 27.4 | 25.5 | 19.8 | 26.2 | | | | 48.5 | 9.1 |
| Level of Service | C | C | C | B | C | | | | D | A |
| Approach Delay (s) | | 25.9 | | | 26.2 | | | | | 19.7 |
| Approach LOS | | C | | | C | | | | | B |

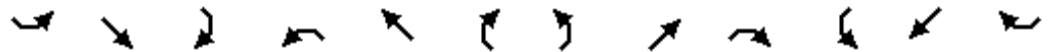
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 23.8 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 58.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2273 | 103 | 381 | 340 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4790 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4790 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.78 | 0.93 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2368 | 132 | 410 | 358 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 69 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2368 | 63 | 0 | 767 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | 0.48 | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2415 | 752 | | 2036 | | | | |
| v/s Ratio Prot | | | | | c0.47 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.04 | | 0.16 | | | | |
| v/c Ratio | | | | | 0.98 | 0.08 | | 0.38 | | | | |
| Uniform Delay, d1 | | | | | 20.6 | 11.5 | | 15.7 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 14.3 | 0.2 | | 0.5 | | | | |
| Delay (s) | | | | | 34.9 | 11.7 | | 16.3 | | | | |
| Level of Service | | | | | C | B | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 33.7 | | | 16.3 | | | 0.0 | |
| Approach LOS | | A | | | C | | | B | | | A | |

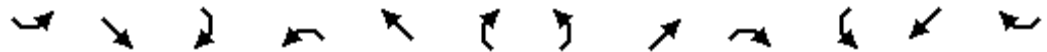
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 29.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 78.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street


















Existing plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1142 | 1418 | 0 | 0 | 0 | 0 | 0 | 1032 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4746 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4746 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1177 | 1541 | 0 | 0 | 0 | 0 | 0 | 1098 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 654 | 2054 | 0 | 0 | 0 | 0 | 0 | 1127 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2729 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.32 | |
| v/s Ratio Perm | | | | 0.43 | 0.43 | | | | | | | |
| v/c Ratio | | | | 0.75 | 0.75 | | | | | | 0.98 | |
| Uniform Delay, d1 | | | | 12.7 | 12.7 | | | | | | 26.8 | |
| Progression Factor | | | | 1.47 | 1.49 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 2.6 | 0.9 | | | | | | 23.1 | |
| Delay (s) | | | | 21.2 | 19.8 | | | | | | 49.9 | |
| Level of Service | | | | C | B | | | | | | D | |
| Approach Delay (s) | | 0.0 | | | 20.1 | | | 0.0 | | | 49.9 | |
| Approach LOS | | A | | | C | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 28.9 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.84 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 78.9% | | | ICU Level of Service | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 74 | 196 | 6 | 9 | 433 | 13 | 9 | 6 | 8 | 18 | 14 | 13 |
| Peak Hour Factor | 0.90 | 0.94 | 0.67 | 0.81 | 0.84 | 0.63 | 0.75 | 0.75 | 0.79 | 0.74 | 0.77 | 0.69 |
| Hourly flow rate (vph) | 82 | 209 | 9 | 11 | 515 | 21 | 12 | 8 | 10 | 24 | 18 | 19 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 82 | 217 | 547 | 30 | 61 | | | | | | | |
| Volume Left (vph) | 82 | 0 | 11 | 12 | 24 | | | | | | | |
| Volume Right (vph) | 0 | 9 | 21 | 10 | 19 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.09 | -0.07 | | | | | | | |
| Departure Headway (s) | 5.8 | 5.2 | 4.6 | 5.9 | 5.8 | | | | | | | |
| Degree Utilization, x | 0.13 | 0.32 | 0.71 | 0.05 | 0.10 | | | | | | | |
| Capacity (veh/h) | 607 | 665 | 761 | 538 | 544 | | | | | | | |
| Control Delay (s) | 8.4 | 9.4 | 18.0 | 9.2 | 9.5 | | | | | | | |
| Approach Delay (s) | 9.2 | | 18.0 | 9.2 | 9.5 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 14.3 | | | | | | | | | |
| HCM Level of Service | | | B | | | | | | | | | |
| Intersection Capacity Utilization | | | 48.1% | ICU Level of Service | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 4.0 Worst Case Level Of Service: B[12.2]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 1 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 609 0 0 0 258 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 609 0 0 0 258 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 609 0 0 0 258 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.91 1.00 1.00 1.00 0.80 1.00 1.00 1.00

PHF Volume: 0 0 0 0 669 0 0 0 323 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 669 0 0 0 323 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 223 xxxxx xxxx xxxxx

Potent Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 821 xxxxx xxxx xxxxx

Move Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 821 xxxxx xxxx xxxxx

Volume/Cap: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 0.39 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 1.9 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 12.2 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * B * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 12.2 xxxxxx

ApproachLOS: * * B *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: Oakland Avenue & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 543 | 257 | 990 | 746 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1740 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1740 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.88 | 0.83 | 0.89 | 0.92 | 0.75 |
| Adj. Flow (vph) | 617 | 310 | 1112 | 811 | 96 |
| RTOR Reduction (vph) | 71 | 31 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 386 | 439 | 1112 | 907 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Effective Green, g (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.61 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 448 | 464 | 2153 | 356 | |
| v/s Ratio Prot | | | c0.31 | c0.57 | |
| v/s Ratio Perm | 0.23 | 0.25 | | | |
| v/c Ratio | 0.86 | 0.95 | 0.52 | 2.55 | |
| Uniform Delay, d1 | 20.9 | 21.6 | 6.7 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 15.0 | 28.2 | 0.9 | 704.7 | |
| Delay (s) | 36.0 | 49.8 | 7.6 | 728.0 | |
| Level of Service | D | D | A | F | |
| Approach Delay (s) | | 43.0 | 331.2 | | |
| Approach LOS | | D | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 240.5 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 1.16 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 79.3% | | ICU Level of Service | D |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |   |  | | |  |  |  | |   |   |  |
| Volume (vph) | 192 | 365 | 89 | 17 | 45 | 14 | 155 | 177 | 8 | 384 | 1204 | 86 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1520 | | 3433 | 3495 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1520 | | 3433 | 3495 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 204 | 388 | 95 | 18 | 53 | 16 | 182 | 208 | 9 | 417 | 1309 | 93 |
| RTOR Reduction (vph) | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 175 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 204 | 388 | 106 | 0 | 0 | 69 | 182 | 33 | 0 | 426 | 1396 | 0 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | 20 | | | | 9 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 19.5 | 26.3 | 26.3 | | | 7.5 | 14.3 | 14.3 | | 14.4 | 27.2 | |
| Effective Green, g (s) | 19.5 | 26.3 | 26.3 | | | 7.5 | 14.3 | 14.3 | | 14.4 | 27.2 | |
| Actuated g/C Ratio | 0.22 | 0.29 | 0.29 | | | 0.08 | 0.16 | 0.16 | | 0.16 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 384 | 1034 | 463 | | | 148 | 296 | 242 | | 549 | 1056 | |
| v/s Ratio Prot | c0.12 | 0.11 | | | | 0.04 | c0.10 | | | 0.12 | c0.40 | |
| v/s Ratio Perm | | | 0.07 | | | | | 0.02 | | | | |
| v/c Ratio | 0.53 | 0.38 | 0.23 | | | 0.47 | 0.61 | 0.14 | | 0.78 | 1.32 | |
| Uniform Delay, d1 | 31.2 | 25.3 | 24.2 | | | 39.3 | 35.3 | 32.5 | | 36.3 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.4 | 0.2 | 0.3 | | | 2.3 | 3.8 | 0.3 | | 6.8 | 151.7 | |
| Delay (s) | 32.6 | 25.5 | 24.4 | | | 41.7 | 39.0 | 32.8 | | 43.0 | 183.1 | |
| Level of Service | C | C | C | | | D | D | C | | D | F | |
| Approach Delay (s) | | 27.4 | | | | | 36.6 | | | | 150.5 | |
| Approach LOS | | C | | | | | D | | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 91.9 | | | | HCM Level of Service | | F | | | | |
| HCM Volume to Capacity ratio | | 0.91 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 90.0 | | | | Sum of lost time (s) | | 18.0 | | | | |
| Intersection Capacity Utilization | | 80.2% | | | | ICU Level of Service | | D | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 185 | 437 | 39 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3437 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3437 | | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 199 | 470 | 42 | 70 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 |
| Lane Group Flow (vph) | 199 | 570 | 0 | 0 |
| Confl. Peds. (#/hr) | 26 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 11.0 | 22.8 | | |
| Effective Green, g (s) | 11.0 | 22.8 | | |
| Actuated g/C Ratio | 0.12 | 0.25 | | |
| Clearance Time (s) | 4.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 216 | 871 | | |
| v/s Ratio Prot | 0.11 | 0.17 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.92 | 0.65 | | |
| Uniform Delay, d1 | 39.1 | 30.1 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 40.0 | 3.8 | | |
| Delay (s) | 79.0 | 33.9 | | |
| Level of Service | E | C | | |
| Approach Delay (s) | | 45.4 | | |
| Approach LOS | | D | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑ | ↑ | ↑ | ↑↑ | | ↑ | ↑↑ | |
| Volume (vph) | 73 | 206 | 66 | 29 | 427 | 237 | 173 | 618 | 30 | 144 | 594 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | | 0.91 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frbp, ped/bikes | | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 4788 | | | 3523 | 1536 | 1767 | 3504 | | 1767 | 3455 | |
| Flt Permitted | | 0.74 | | | 0.88 | 1.00 | 0.30 | 1.00 | | 0.31 | 1.00 | |
| Satd. Flow (perm) | | 3588 | | | 3119 | 1536 | 559 | 3504 | | 581 | 3455 | |
| Peak-hour factor, PHF | 0.68 | 0.86 | 0.66 | 0.73 | 0.96 | 0.87 | 0.83 | 0.92 | 0.75 | 0.82 | 0.92 | 0.86 |
| Adj. Flow (vph) | 107 | 240 | 100 | 40 | 445 | 272 | 208 | 672 | 40 | 176 | 646 | 88 |
| RTOR Reduction (vph) | 0 | 58 | 0 | 0 | 0 | 84 | 0 | 5 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 389 | 0 | 0 | 485 | 188 | 208 | 707 | 0 | 176 | 721 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 10 | | 10 | 6 | | 6 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 20 | | | 18 | | | 17 | | | 66 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | | 1520 | | | 1321 | 651 | 250 | 1566 | | 260 | 1545 | |
| v/s Ratio Prot | | | | | | | | 0.20 | | | 0.21 | |
| v/s Ratio Perm | | 0.11 | | | 0.16 | 0.12 | 0.37 | | | 0.30 | | |
| v/c Ratio | | 0.26 | | | 0.37 | 0.29 | 0.83 | 0.45 | | 0.68 | 0.47 | |
| Uniform Delay, d1 | | 15.8 | | | 16.7 | 16.1 | 20.7 | 16.3 | | 18.6 | 16.4 | |
| Progression Factor | | 0.79 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 0.8 | 1.1 | 26.4 | 0.9 | | 13.3 | 1.0 | |
| Delay (s) | | 12.9 | | | 17.5 | 17.2 | 47.1 | 17.2 | | 31.9 | 17.4 | |
| Level of Service | | B | | | B | B | D | B | | C | B | |
| Approach Delay (s) | | 12.9 | | | 17.4 | | | 24.0 | | | 20.2 | |
| Approach LOS | | B | | | B | | | C | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 19.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 105.4% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations | ↰ | ↶ | | ↰ | ↶ | | ↰ | ↶ | | ↰ | ↶ | |
| Volume (vph) | 180 | 352 | 118 | 55 | 585 | 99 | 182 | 430 | 39 | 112 | 391 | 294 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.97 | | 1.00 | 0.98 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 3388 | | 1769 | 3436 | | 1761 | 3472 | | 1762 | 3257 | |
| Flt Permitted | 0.16 | 1.00 | | 0.43 | 1.00 | | 0.27 | 1.00 | | 0.39 | 1.00 | |
| Satd. Flow (perm) | 297 | 3388 | | 806 | 3436 | | 495 | 3472 | | 716 | 3257 | |
| Peak-hour factor, PHF | 0.85 | 0.90 | 0.89 | 0.81 | 0.88 | 0.72 | 0.88 | 0.87 | 0.70 | 0.80 | 0.92 | 0.91 |
| Adj. Flow (vph) | 212 | 391 | 133 | 68 | 665 | 138 | 207 | 494 | 56 | 140 | 425 | 323 |
| RTOR Reduction (vph) | 0 | 35 | 0 | 0 | 20 | 0 | 0 | 10 | 0 | 0 | 161 | 0 |
| Lane Group Flow (vph) | 212 | 489 | 0 | 68 | 783 | 0 | 207 | 540 | 0 | 140 | 587 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 17 | | | 28 |
| Turn Type | pm+pt | | | pm+pt | | | Perm | | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 42.8 | 33.2 | | 34.2 | 28.9 | | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 42.8 | 33.2 | | 34.2 | 28.9 | | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.50 | 0.39 | | 0.40 | 0.34 | | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | | 4.5 | 3.5 | | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 316 | 1323 | | 384 | 1168 | | 192 | 1348 | | 278 | 1264 | |
| v/s Ratio Prot | c0.08 | 0.14 | | 0.01 | 0.23 | | | 0.16 | | | 0.18 | |
| v/s Ratio Perm | c0.26 | | | 0.06 | | | c0.42 | | | 0.20 | | |
| v/c Ratio | 0.67 | 0.37 | | 0.18 | 0.67 | | 1.08 | 0.40 | | 0.50 | 0.46 | |
| Uniform Delay, d1 | 14.7 | 18.4 | | 15.8 | 24.0 | | 26.0 | 18.8 | | 19.8 | 19.4 | |
| Progression Factor | 1.00 | 1.00 | | 1.58 | 1.46 | | 0.76 | 0.66 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 4.4 | 0.8 | | 0.1 | 2.8 | | 84.5 | 0.1 | | 0.5 | 0.1 | |
| Delay (s) | 19.1 | 19.2 | | 25.0 | 37.8 | | 104.2 | 12.6 | | 20.3 | 19.5 | |
| Level of Service | B | B | | C | D | | F | B | | C | B | |
| Approach Delay (s) | | 19.2 | | | 36.8 | | | 37.6 | | | 19.6 | |
| Approach LOS | | B | | | D | | | D | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 28.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.90 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 14.5 |
| Intersection Capacity Utilization | 76.8% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 6: 27th Street & Northgate Avenue (NB)

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 211 | 569 | 0 | 0 | 221 | 942 | 18 | 747 | 63 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.86 | 0.86 | | | 0.86 | 0.86 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 0.90 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1521 | 4785 | | | 4329 | 1362 | | 5007 | | | | |
| Flt Permitted | 0.33 | 0.84 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 536 | 4023 | | | 4329 | 1362 | | 5007 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.90 | 0.25 | 0.25 | 0.89 | 0.97 | 0.64 | 0.92 | 0.83 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 227 | 632 | 0 | 0 | 248 | 971 | 28 | 812 | 76 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 43 | 43 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 166 | 693 | 0 | 0 | 691 | 442 | 0 | 890 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 4 | | 4 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | 5 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 214 | 1609 | | | 1732 | 545 | | 2003 | | | | |
| v/s Ratio Prot | | | | | 0.16 | | | | | | | |
| v/s Ratio Perm | 0.31 | 0.17 | | | | 0.32 | | 0.18 | | | | |
| v/c Ratio | 0.78 | 0.43 | | | 0.40 | 0.81 | | 0.44 | | | | |
| Uniform Delay, d1 | 10.4 | 8.7 | | | 8.6 | 10.7 | | 8.8 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 23.6 | 0.8 | | | 0.7 | 12.4 | | 0.7 | | | | |
| Delay (s) | 34.0 | 9.5 | | | 9.3 | 23.1 | | 9.5 | | | | |
| Level of Service | C | A | | | A | C | | A | | | | |
| Approach Delay (s) | | 14.3 | | | 14.8 | | | 9.5 | | | 0.0 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.0 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.63 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 78.5% | | | ICU Level of Service | | | D | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑↑ | | | ↑↑↑ | | | | | ↘ | ↑↑ | ↗ |
| Volume (vph) | 0 | 423 | 33 | 10 | 209 | 0 | 0 | 0 | 0 | 348 | 261 | 172 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.91 | | | 0.91 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (prot) | | 5014 | | | 5069 | | | | | 1605 | 3332 | 1558 |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (perm) | | 5014 | | | 4607 | | | | | 1605 | 3332 | 1558 |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.83 | 0.63 | 0.86 | 0.25 | 0.25 | 0.25 | 0.25 | 0.87 | 0.79 | 0.88 |
| Adj. Flow (vph) | 0 | 445 | 40 | 16 | 243 | 0 | 0 | 0 | 0 | 400 | 330 | 195 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 |
| Lane Group Flow (vph) | 0 | 467 | 0 | 0 | 259 | 0 | 0 | 0 | 0 | 240 | 490 | 101 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 1 | | | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 5 | | | 9 | | | | 1 | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1755 | | | 1612 | | | | | 829 | 1722 | 805 |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | | | 0.06 | | | | | c0.15 | 0.15 | 0.06 |
| v/c Ratio | | 0.27 | | | 0.16 | | | | | 0.29 | 0.28 | 0.13 |
| Uniform Delay, d1 | | 14.0 | | | 13.4 | | | | | 8.2 | 8.2 | 7.5 |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.4 | | | 0.2 | | | | | 0.9 | 0.4 | 0.3 |
| Delay (s) | | 14.4 | | | 13.6 | | | | | 9.1 | 8.6 | 7.8 |
| Level of Service | | B | | | B | | | | | A | A | A |
| Approach Delay (s) | | 14.4 | | | 13.6 | | | 0.0 | | | 8.6 | |
| Approach LOS | | B | | | B | | | A | | | A | |

Intersection Summary

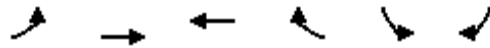
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.28 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 36.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 234 | 492 | 546 | 431 | 176 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.94 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3264 | | 3426 | 1421 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3264 | | 3426 | 1421 |
| Peak-hour factor, PHF | 0.74 | 0.93 | 0.90 | 0.97 | 0.72 | 0.86 |
| Adj. Flow (vph) | 316 | 529 | 607 | 444 | 244 | 103 |
| RTOR Reduction (vph) | 0 | 0 | 130 | 0 | 5 | 81 |
| Lane Group Flow (vph) | 316 | 529 | 921 | 0 | 249 | 12 |
| Confl. Peds. (#/hr) | 14 | | | 18 | | |
| Confl. Bikes (#/hr) | | | | 7 | | 1 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 5 | 2 | 6 | | 4 | |
| Permitted Phases | | | | | | 4 |
| Actuated Green, G (s) | 20.4 | 61.8 | 37.4 | | 10.2 | 10.2 |
| Effective Green, g (s) | 20.4 | 61.8 | 37.4 | | 10.2 | 10.2 |
| Actuated g/C Ratio | 0.26 | 0.77 | 0.47 | | 0.13 | 0.13 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 451 | 2734 | 1526 | | 437 | 181 |
| v/s Ratio Prot | c0.18 | 0.15 | c0.28 | | c0.07 | |
| v/s Ratio Perm | | | | | | 0.01 |
| v/c Ratio | 0.70 | 0.19 | 0.60 | | 0.57 | 0.07 |
| Uniform Delay, d1 | 27.0 | 2.4 | 15.8 | | 32.8 | 30.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 4.0 | 0.2 | 1.8 | | 1.0 | 0.1 |
| Delay (s) | 31.0 | 2.6 | 17.6 | | 33.9 | 30.8 |
| Level of Service | C | A | B | | C | C |
| Approach Delay (s) | | 13.2 | 17.6 | | 33.0 | |
| Approach LOS | | B | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 18.3 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.63 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 58.6% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 23 | 604 | 27 | 16 | 776 | 124 | 80 | 482 | 28 | 121 | 363 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3393 | | 1761 | 3333 | | 1769 | 3496 | | 1760 | 3378 | |
| Flt Permitted | 0.17 | 1.00 | | 0.17 | 1.00 | | 0.40 | 1.00 | | 0.42 | 1.00 | |
| Satd. Flow (perm) | 308 | 3393 | | 306 | 3333 | | 747 | 3496 | | 779 | 3378 | |
| Peak-hour factor, PHF | 0.64 | 0.80 | 0.61 | 0.57 | 0.92 | 0.85 | 0.87 | 0.85 | 0.64 | 0.87 | 0.95 | 0.72 |
| Adj. Flow (vph) | 36 | 755 | 44 | 28 | 843 | 146 | 92 | 567 | 44 | 139 | 382 | 124 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 16 | 0 | 0 | 7 | 0 | 0 | 31 | 0 |
| Lane Group Flow (vph) | 36 | 794 | 0 | 28 | 973 | 0 | 92 | 604 | 0 | 139 | 475 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | | Perm | | | pm+pt | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 4 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | | 24.2 | 24.2 | | 50.3 | 50.3 | | 40.4 | 40.4 | |
| Effective Green, g (s) | 24.2 | 24.2 | | 24.2 | 24.2 | | 50.3 | 50.3 | | 40.4 | 40.4 | |
| Actuated g/C Ratio | 0.28 | 0.28 | | 0.28 | 0.28 | | 0.59 | 0.59 | | 0.48 | 0.48 | |
| Clearance Time (s) | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 966 | | 87 | 949 | | 507 | 2069 | | 370 | 1606 | |
| v/s Ratio Prot | | 0.23 | | | c0.29 | | 0.01 | c0.17 | | | 0.14 | |
| v/s Ratio Perm | 0.12 | | | 0.09 | | | 0.10 | | | c0.18 | | |
| v/c Ratio | 0.41 | 0.82 | | 0.32 | 1.03 | | 0.18 | 0.29 | | 0.38 | 0.30 | |
| Uniform Delay, d1 | 24.6 | 28.4 | | 23.9 | 30.4 | | 7.7 | 8.6 | | 14.2 | 13.6 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.12 | 1.15 | |
| Incremental Delay, d2 | 13.5 | 7.8 | | 9.5 | 35.9 | | 0.1 | 0.4 | | 2.7 | 0.4 | |
| Delay (s) | 38.1 | 36.2 | | 33.5 | 66.3 | | 7.8 | 8.9 | | 18.6 | 16.0 | |
| Level of Service | D | D | | C | E | | A | A | | B | B | |
| Approach Delay (s) | | 36.3 | | | 65.4 | | | 8.8 | | | 16.6 | |
| Approach LOS | | D | | | E | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 35.5 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 66.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | ↰ | ↶↷ | | | ↶↷ | | ↰ | ↶↷ | ↰ | ↰ | ↶↷ | |
| Volume (vph) | 70 | 414 | 37 | 90 | 306 | 30 | 303 | 580 | 146 | 50 | 427 | 91 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3361 | | | 3321 | | 1764 | 3539 | 1551 | 1748 | 3408 | |
| Flt Permitted | 0.31 | 1.00 | | | 0.63 | | 0.41 | 1.00 | 1.00 | 0.39 | 1.00 | |
| Satd. Flow (perm) | 583 | 3361 | | | 2105 | | 761 | 3539 | 1551 | 727 | 3408 | |
| Peak-hour factor, PHF | 0.72 | 0.91 | 0.65 | 0.63 | 0.90 | 0.52 | 0.87 | 0.95 | 0.79 | 0.57 | 0.90 | 0.84 |
| Adj. Flow (vph) | 97 | 455 | 57 | 143 | 340 | 58 | 348 | 611 | 185 | 88 | 474 | 108 |
| RTOR Reduction (vph) | 0 | 15 | 0 | 0 | 15 | 0 | 0 | 0 | 74 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 97 | 497 | 0 | 0 | 526 | 0 | 348 | 611 | 111 | 88 | 564 | 0 |
| Confl. Peds. (#/hr) | 8 | | 8 | 2 | | 2 | 8 | | 8 | 32 | | 32 |
| Confl. Bikes (#/hr) | | | 6 | | | 6 | | | 4 | | | 28 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 23.9 | 23.9 | | | 23.9 | | 48.1 | 48.1 | 48.1 | 48.1 | 48.1 | |
| Effective Green, g (s) | 23.9 | 23.9 | | | 23.9 | | 48.1 | 48.1 | 48.1 | 48.1 | 48.1 | |
| Actuated g/C Ratio | 0.30 | 0.30 | | | 0.30 | | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 174 | 1004 | | | 629 | | 458 | 2128 | 933 | 437 | 2049 | |
| v/s Ratio Prot | | 0.15 | | | | | | 0.17 | | | 0.17 | |
| v/s Ratio Perm | 0.17 | | | | c0.25 | | c0.46 | | 0.07 | 0.12 | | |
| v/c Ratio | 0.56 | 0.49 | | | 0.84 | | 0.76 | 0.29 | 0.12 | 0.20 | 0.28 | |
| Uniform Delay, d1 | 23.6 | 23.1 | | | 26.2 | | 11.7 | 7.7 | 6.9 | 7.2 | 7.6 | |
| Progression Factor | 1.00 | 1.00 | | | 1.07 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.2 | 0.1 | | | 9.0 | | 11.3 | 0.3 | 0.3 | 1.0 | 0.3 | |
| Delay (s) | 25.8 | 23.2 | | | 36.9 | | 23.0 | 8.0 | 7.1 | 8.3 | 8.0 | |
| Level of Service | C | C | | | D | | C | A | A | A | A | |
| Approach Delay (s) | | 23.6 | | | 36.9 | | | 12.4 | | | 8.0 | |
| Approach LOS | | C | | | D | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 18.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 79.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 5 | 574 | 192 | 102 | 328 | 2 | 0 | 0 | 0 | 70 | 197 | 59 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frbp, ped/bikes | | 0.95 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | 0.96 | | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3101 | | 1770 | 3413 | | | | | | 3352 | |
| Flt Permitted | | 0.95 | | 0.19 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 2941 | | 362 | 3413 | | | | | | 3352 | |
| Peak-hour factor, PHF | 0.42 | 0.99 | 0.87 | 0.93 | 0.88 | 0.25 | 0.25 | 0.25 | 0.25 | 0.74 | 0.94 | 0.69 |
| Adj. Flow (vph) | 12 | 580 | 221 | 110 | 373 | 8 | 0 | 0 | 0 | 95 | 210 | 86 |
| RTOR Reduction (vph) | 0 | 41 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 33 | 0 |
| Lane Group Flow (vph) | 0 | 772 | 0 | 110 | 379 | 0 | 0 | 0 | 0 | 0 | 358 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 8 | | 8 | 36 | | 36 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 18 | | | 14 | | | 2 | | | 8 |
| Turn Type | Perm | | pm+pt | | pm+pt | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 32.0 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Effective Green, g (s) | 32.0 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Actuated g/C Ratio | 0.40 | | 0.54 | | 0.54 | | | | 0.36 | | | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | 3.0 | | | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | 2.0 | | | |
| Lane Grp Cap (vph) | 1176 | | 300 | | 1834 | | | | 1215 | | | |
| v/s Ratio Prot | | | c0.03 | | 0.11 | | | | | | | |
| v/s Ratio Perm | c0.26 | | 0.17 | | | | | | 0.11 | | | |
| v/c Ratio | 0.66 | | 0.37 | | 0.21 | | | | 0.30 | | | |
| Uniform Delay, d1 | 19.5 | | 11.0 | | 9.6 | | | | 18.2 | | | |
| Progression Factor | 1.66 | | 1.00 | | 1.00 | | | | 1.00 | | | |
| Incremental Delay, d2 | 2.8 | | 0.3 | | 0.3 | | | | 0.6 | | | |
| Delay (s) | 35.1 | | 11.3 | | 9.9 | | | | 18.8 | | | |
| Level of Service | D | | B | | A | | | | B | | | |
| Approach Delay (s) | 35.1 | | | | 10.2 | | 0.0 | | | | 18.8 | |
| Approach LOS | D | | | | B | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.1 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.48 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 67.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|-------|-------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↑↑↑ | ↗ | | ↔↔↔ | |
| Volume (vph) | 123 | 546 | 113 | 326 | 724 | 36 | 9 | 1431 | 839 | 2 | 545 | 52 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1484 | 3433 | 3539 | 1459 | | 5082 | 1466 | | 4918 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.93 | 1.00 | | 0.93 | |
| Satd. Flow (perm) | 3433 | 3539 | 1484 | 3433 | 3539 | 1459 | | 4721 | 1466 | | 4564 | |
| Peak-hour factor, PHF | 0.63 | 0.92 | 0.83 | 0.98 | 0.93 | 0.75 | 0.56 | 0.92 | 0.86 | 0.50 | 0.96 | 0.50 |
| Adj. Flow (vph) | 195 | 593 | 136 | 333 | 778 | 48 | 16 | 1555 | 976 | 4 | 568 | 104 |
| RTOR Reduction (vph) | 0 | 0 | 61 | 0 | 0 | 29 | 0 | 0 | 261 | 0 | 26 | 0 |
| Lane Group Flow (vph) | 195 | 593 | 75 | 333 | 778 | 19 | 0 | 1571 | 715 | 0 | 650 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 10.0 | 35.4 | 35.4 | 13.6 | 40.0 | 40.0 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 10.0 | 35.4 | 35.4 | 13.6 | 40.0 | 40.0 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.10 | 0.35 | 0.35 | 0.14 | 0.40 | 0.40 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 343 | 1253 | 525 | 467 | 1416 | 584 | | 1700 | 528 | | 1643 | |
| v/s Ratio Prot | 0.06 | 0.17 | | c0.10 | c0.22 | | | | | | | |
| v/s Ratio Perm | | | 0.05 | | | 0.01 | | 0.33 | c0.49 | | 0.14 | |
| v/c Ratio | 0.57 | 0.47 | 0.14 | 0.71 | 0.55 | 0.03 | | 0.92 | 1.35 | | 0.40 | |
| Uniform Delay, d1 | 42.9 | 25.1 | 22.0 | 41.3 | 23.1 | 18.2 | | 30.7 | 32.0 | | 23.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 1.3 | 1.3 | 0.6 | 4.3 | 1.5 | 0.1 | | 10.0 | 171.4 | | 0.7 | |
| Delay (s) | 44.2 | 26.3 | 22.6 | 45.6 | 24.6 | 18.3 | | 40.7 | 203.4 | | 24.6 | |
| Level of Service | D | C | C | D | C | B | | D | F | | C | |
| Approach Delay (s) | | 29.6 | | | 30.4 | | | 103.0 | | | 24.6 | |
| Approach LOS | | C | | | C | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 64.4 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.93 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 15.0 |
| Intersection Capacity Utilization | 108.8% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

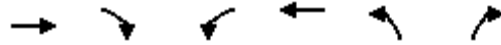


| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 705 | 109 | 86 | 1293 | 779 | 153 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.99 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 0.99 | 1.00 | 1.00 | |
| Frt | 0.95 | | 1.00 | 1.00 | 0.97 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3270 | | 1759 | 3725 | 6247 | |
| Flt Permitted | 0.97 | | 0.19 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3270 | | 360 | 3725 | 6247 | |
| Peak-hour factor, PHF | 0.90 | 0.25 | 0.91 | 0.96 | 0.90 | 0.88 |
| Adj. Flow (vph) | 783 | 436 | 95 | 1347 | 866 | 174 |
| RTOR Reduction (vph) | 107 | 0 | 0 | 0 | 42 | 0 |
| Lane Group Flow (vph) | 1112 | 0 | 95 | 1347 | 998 | 0 |
| Confl. Peds. (#/hr) | 30 | 30 | 106 | | | |
| Confl. Bikes (#/hr) | | 2 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 31.9 | | 34.6 | 28.1 | 28.1 | |
| Effective Green, g (s) | 31.9 | | 34.6 | 28.1 | 28.1 | |
| Actuated g/C Ratio | 0.40 | | 0.43 | 0.35 | 0.35 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 1304 | | 269 | 1308 | 2194 | |
| v/s Ratio Prot | c0.34 | | c0.03 | c0.36 | 0.16 | |
| v/s Ratio Perm | | | 0.12 | | | |
| v/c Ratio | 0.85 | | 0.35 | 1.03 | 0.46 | |
| Uniform Delay, d1 | 21.9 | | 13.9 | 25.9 | 20.0 | |
| Progression Factor | 1.00 | | 0.81 | 0.99 | 1.00 | |
| Incremental Delay, d2 | 5.6 | | 0.8 | 32.4 | 0.7 | |
| Delay (s) | 27.5 | | 12.0 | 58.0 | 20.7 | |
| Level of Service | C | | B | E | C | |
| Approach Delay (s) | 27.5 | | | 55.0 | 20.7 | |
| Approach LOS | C | | | D | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 36.3 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | | 0.88 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | | | 54.5% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

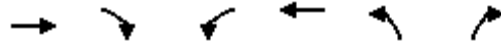
Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 475 | 10 | 27 | 214 | 11 | 298 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.63 | 0.66 | 0.91 | 0.69 | 0.84 |
| Hourly flow rate (vph) | 505 | 16 | 41 | 235 | 16 | 355 |
| Pedestrians | 18 | | | 18 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 521 | | 848 | 531 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 521 | | 848 | 531 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 96 | | 95 | 34 |
| cM capacity (veh/h) | | | 1045 | | 314 | 540 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 521 | 276 | 371 | | | |
| Volume Left | 0 | 41 | 16 | | | |
| Volume Right | 16 | 0 | 355 | | | |
| cSH | 1700 | 1045 | 524 | | | |
| Volume to Capacity | 0.31 | 0.04 | 0.71 | | | |
| Queue Length 95th (ft) | 0 | 3 | 141 | | | |
| Control Delay (s) | 0.0 | 1.6 | 26.8 | | | |
| Lane LOS | | A | D | | | |
| Approach Delay (s) | 0.0 | 1.6 | 26.8 | | | |
| Approach LOS | | | D | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 8.9 | | | |
| Intersection Capacity Utilization | | 61.3% | | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

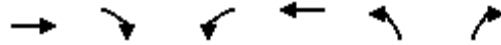
Existing plus Project (I+II) PM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 266 | 41 | 66 | 160 | 29 | 219 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.75 | 0.31 | 0.83 | 0.73 | 0.75 |
| Hourly flow rate (vph) | 296 | 55 | 213 | 193 | 40 | 292 |
| Pedestrians | 27 | | | 27 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 350 | | 968 | 350 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 350 | | 968 | 350 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 82 | | 82 | 57 |
| cM capacity (veh/h) | | | 1209 | | 227 | 678 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 350 | 406 | 332 | | | |
| Volume Left | 0 | 213 | 40 | | | |
| Volume Right | 55 | 0 | 292 | | | |
| cSH | 1700 | 1209 | 547 | | | |
| Volume to Capacity | 0.21 | 0.18 | 0.61 | | | |
| Queue Length 95th (ft) | 0 | 16 | 100 | | | |
| Control Delay (s) | 0.0 | 5.3 | 21.2 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 5.3 | 21.2 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 8.4 | | | |
| Intersection Capacity Utilization | | 55.9% | | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|----------------------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 314 | 32 | 34 | 116 | 113 | 205 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.38 | 0.63 | 0.94 | 0.80 | 0.82 |
| Hourly flow rate (vph) | 324 | 84 | 54 | 123 | 141 | 250 |
| Pedestrians | 20 | | | 20 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.91 | | 0.91 | 0.91 |
| vC, conflicting volume | | | 408 | | 617 | 386 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 300 | | 530 | 275 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 95 | | 67 | 63 |
| cM capacity (veh/h) | | | 1148 | | 435 | 683 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 408 | 177 | 71 | 71 | 125 | 125 |
| Volume Left | 0 | 54 | 71 | 71 | 0 | 0 |
| Volume Right | 84 | 0 | 0 | 0 | 125 | 125 |
| cSH | 1700 | 1148 | 435 | 435 | 683 | 683 |
| Volume to Capacity | 0.24 | 0.05 | 0.16 | 0.16 | 0.18 | 0.18 |
| Queue Length 95th (ft) | 0 | 4 | 14 | 14 | 17 | 17 |
| Control Delay (s) | 0.0 | 2.8 | 14.9 | 14.9 | 11.4 | 11.4 |
| Lane LOS | | A | B | B | B | B |
| Approach Delay (s) | 0.0 | 2.8 | 12.7 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | 5.6 | | | | | |
| Intersection Capacity Utilization | 44.7% | | ICU Level of Service | | A | |
| Analysis Period (min) | 15 | | | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 191 | 80 | 58 | 199 | 0 | 0 | 0 | 0 | 66 | 410 | 22 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | | 0.98 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.98 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.99 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1436 | | 1800 | | | | | | 4739 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.85 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1436 | | 1545 | | | | | | 4739 | |
| Peak-hour factor, PHF | 0.92 | 0.91 | 0.79 | 0.76 | 0.84 | 0.92 | 0.25 | 0.25 | 0.25 | 0.75 | 0.97 | 0.69 |
| Adj. Flow (vph) | 0 | 210 | 101 | 76 | 237 | 0 | 0 | 0 | 0 | 88 | 423 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 210 | 65 | 0 | 313 | 0 | 0 | 0 | 0 | 0 | 538 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.9 | 22.9 | | 22.9 | | | | | | 49.1 | |
| Effective Green, g (s) | | 22.9 | 22.9 | | 22.9 | | | | | | 49.1 | |
| Actuated g/C Ratio | | 0.29 | 0.29 | | 0.29 | | | | | | 0.61 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 533 | 411 | | 442 | | | | | | 2909 | |
| v/s Ratio Prot | | 0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.05 | | 0.20 | | | | | | 0.11 | |
| v/c Ratio | | 0.39 | 0.16 | | 0.71 | | | | | | 0.19 | |
| Uniform Delay, d1 | | 23.0 | 21.3 | | 25.6 | | | | | | 6.7 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 1.32 | |
| Incremental Delay, d2 | | 0.5 | 0.2 | | 5.1 | | | | | | 0.1 | |
| Delay (s) | | 23.5 | 21.5 | | 30.7 | | | | | | 9.0 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 22.8 | | | 30.7 | | | 0.0 | | | 9.0 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 18.5 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.35 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 54.2% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↰ | | | ↰↰ | ↰ | | | |
| Volume (vph) | 11 | 106 | 1 | 0 | 119 | 98 | 16 | 303 | 159 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 1.00 | 0.81 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1833 | | | 1686 | | | 3507 | 1277 | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1782 | | | 1686 | | | 3507 | 1277 | | | |
| Peak-hour factor, PHF | 0.69 | 0.84 | 0.25 | 0.25 | 0.87 | 0.82 | 0.80 | 0.93 | 0.88 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 16 | 126 | 4 | 0 | 137 | 120 | 20 | 326 | 181 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 44 | 0 | 0 | 0 | 145 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 144 | 0 | 0 | 213 | 0 | 0 | 346 | 36 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | | 40 | | | 1 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 28.0 | | | 28.0 | | | 9.0 | 9.0 | | | |
| Effective Green, g (s) | | 28.0 | | | 28.0 | | | 9.0 | 9.0 | | | |
| Actuated g/C Ratio | | 0.62 | | | 0.62 | | | 0.20 | 0.20 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1109 | | | 1049 | | | 701 | 255 | | | |
| v/s Ratio Prot | | | | | c0.13 | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | | | | 0.10 | 0.03 | | | |
| v/c Ratio | | 0.13 | | | 0.20 | | | 0.49 | 0.14 | | | |
| Uniform Delay, d1 | | 3.5 | | | 3.7 | | | 16.0 | 14.8 | | | |
| Progression Factor | | 0.44 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.4 | | | 0.2 | 0.1 | | | |
| Delay (s) | | 1.8 | | | 4.1 | | | 16.2 | 14.9 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 1.8 | | | 4.1 | | | 15.7 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.3 | | | | | | HCM Level of Service | B | | | |
| HCM Volume to Capacity ratio | | 0.27 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 37.1% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 11 | 39 | 17 | 63 | 0 | 67 | 0 | 446 | 35 | 37 | 369 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.98 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.96 | | | 0.93 | | | 0.99 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1748 | 1765 | | | 1649 | | | 3477 | | | 3511 | |
| Flt Permitted | 0.72 | 1.00 | | | 0.86 | | | 1.00 | | | 0.87 | |
| Satd. Flow (perm) | 1326 | 1765 | | | 1457 | | | 3477 | | | 3056 | |
| Peak-hour factor, PHF | 0.69 | 0.82 | 0.85 | 0.88 | 0.92 | 0.77 | 0.25 | 0.89 | 0.88 | 0.89 | 0.99 | 0.92 |
| Adj. Flow (vph) | 16 | 48 | 20 | 72 | 0 | 87 | 0 | 501 | 40 | 42 | 373 | 0 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 50 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 16 | 56 | 0 | 0 | 109 | 0 | 0 | 528 | 0 | 0 | 415 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 24 | | 24 | 40 | | 40 | 48 | | 48 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | 17 | | | 7 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Permitted Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 560 | 745 | | | 615 | | | 1314 | | | 1154 | |
| v/s Ratio Prot | 0.03 | | | | | | c0.15 | | | | | |
| v/s Ratio Perm | 0.01 | | | | c0.07 | | | | | | 0.14 | |
| v/c Ratio | 0.03 | 0.08 | | | 0.18 | | | 0.40 | | | 0.36 | |
| Uniform Delay, d1 | 7.6 | 7.8 | | | 8.1 | | | 10.3 | | | 10.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.12 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.2 | | | 0.6 | | | 0.9 | | | 0.9 | |
| Delay (s) | 7.7 | 8.0 | | | 9.7 | | | 11.2 | | | 11.0 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | 7.9 | | | | 9.7 | | 11.2 | | | | 11.0 | |
| Approach LOS | A | | | | A | | B | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.28 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 55.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|------|-------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | ↔ | ↔↔ | |
| Volume (vph) | 22 | 131 | 23 | 9 | 173 | 183 | 20 | 507 | 25 | 32 | 139 | 49 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.98 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | 0.92 | | | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3379 | | | 3197 | | | 3489 | | 1766 | 3281 | |
| Flt Permitted | | 0.73 | | | 0.94 | | | 0.93 | | 0.34 | 1.00 | |
| Satd. Flow (perm) | | 2470 | | | 3012 | | | 3267 | | 639 | 3281 | |
| Peak-hour factor, PHF | 0.55 | 0.84 | 0.52 | 0.56 | 0.70 | 0.65 | 0.71 | 0.91 | 0.66 | 0.97 | 0.85 | 0.44 |
| Adj. Flow (vph) | 40 | 156 | 44 | 16 | 247 | 282 | 28 | 557 | 38 | 33 | 164 | 111 |
| RTOR Reduction (vph) | 0 | 35 | 0 | 0 | 225 | 0 | 0 | 6 | 0 | 0 | 39 | 0 |
| Lane Group Flow (vph) | 0 | 205 | 0 | 0 | 320 | 0 | 0 | 617 | 0 | 33 | 236 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 3 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 12.1 | | | 12.1 | | | 31.8 | | 38.9 | 38.9 | |
| Effective Green, g (s) | | 12.1 | | | 12.1 | | | 31.8 | | 38.9 | 38.9 | |
| Actuated g/C Ratio | | 0.20 | | | 0.20 | | | 0.53 | | 0.65 | 0.65 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 498 | | | 607 | | | 1732 | | 463 | 2127 | |
| v/s Ratio Prot | | | | | | | | | | 0.00 | c0.07 | |
| v/s Ratio Perm | | 0.08 | | | c0.11 | | | c0.19 | | 0.04 | | |
| v/c Ratio | | 0.41 | | | 0.53 | | | 0.36 | | 0.07 | 0.11 | |
| Uniform Delay, d1 | | 20.8 | | | 21.4 | | | 8.2 | | 4.1 | 4.0 | |
| Progression Factor | | 1.00 | | | 0.75 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | 0.8 | | | 0.6 | | 0.1 | 0.1 | |
| Delay (s) | | 21.4 | | | 16.7 | | | 8.7 | | 4.2 | 4.1 | |
| Level of Service | | C | | | B | | | A | | A | A | |
| Approach Delay (s) | | 21.4 | | | 16.7 | | | 8.7 | | | 4.1 | |
| Approach LOS | | C | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 12.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.39 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 59.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕↕ | |
| Volume (vph) | 19 | 138 | 80 | 51 | 256 | 108 | 92 | 676 | 99 | 38 | 480 | 33 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.97 | | | 0.96 | | | 0.99 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | | 0.96 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Satd. Flow (prot) | | 3231 | | | 3218 | | | 3408 | | | 4958 | |
| Flt Permitted | | 0.90 | | | 0.89 | | | 0.77 | | | 0.81 | |
| Satd. Flow (perm) | | 2930 | | | 2866 | | | 2651 | | | 4009 | |
| Peak-hour factor, PHF | 0.79 | 0.82 | 0.83 | 0.91 | 0.89 | 0.80 | 0.92 | 0.92 | 0.95 | 0.71 | 0.88 | 0.63 |
| Adj. Flow (vph) | 24 | 168 | 96 | 56 | 288 | 135 | 100 | 735 | 104 | 54 | 545 | 52 |
| RTOR Reduction (vph) | 0 | 61 | 0 | 0 | 65 | 0 | 0 | 16 | 0 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 0 | 227 | 0 | 0 | 414 | 0 | 0 | 923 | 0 | 0 | 634 | 0 |
| Confl. Peds. (#/hr) | 74 | | 74 | 120 | | 120 | 85 | | 85 | 65 | | 65 |
| Confl. Bikes (#/hr) | | | 30 | | | 13 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1074 | | | 1051 | | | 1370 | | | 1203 | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.08 | | | c0.14 | | | c0.25 | | | 0.16 | |
| v/c Ratio | | 0.21 | | | 0.39 | | | 0.67 | | | 0.53 | |
| Uniform Delay, d1 | | 13.0 | | | 14.1 | | | 11.9 | | | 17.5 | |
| Progression Factor | | 1.85 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 1.1 | | | 2.7 | | | 1.7 | |
| Delay (s) | | 24.6 | | | 15.2 | | | 14.5 | | | 19.1 | |
| Level of Service | | C | | | B | | | B | | | B | |
| Approach Delay (s) | | 24.6 | | | 15.2 | | | 14.5 | | | 19.1 | |
| Approach LOS | | C | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 17.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 84.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 29 | 270 | 0 | 0 | 364 | 108 | 65 | 327 | 239 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3503 | | | 3367 | 1319 | | 4983 | 1457 | | | |
| Flt Permitted | | 0.87 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3079 | | | 3367 | 1319 | | 4983 | 1457 | | | |
| Peak-hour factor, PHF | 0.66 | 0.87 | 0.92 | 0.92 | 0.92 | 0.94 | 0.83 | 0.91 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 44 | 310 | 0 | 0 | 396 | 115 | 78 | 359 | 257 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 26 | 0 | 0 | 215 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 354 | 0 | 0 | 407 | 77 | 0 | 437 | 42 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | 12 | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | Perm | | | Perm | Perm | | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 59.8 | | | 59.8 | 59.8 | | 13.2 | 13.2 | | | |
| Effective Green, g (s) | | 59.8 | | | 59.8 | 59.8 | | 13.2 | 13.2 | | | |
| Actuated g/C Ratio | | 0.75 | | | 0.75 | 0.75 | | 0.16 | 0.16 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2302 | | | 2517 | 986 | | 822 | 240 | | | |
| v/s Ratio Prot | | | | | c0.12 | | | | | | | |
| v/s Ratio Perm | | 0.11 | | | | 0.06 | | 0.09 | 0.03 | | | |
| v/c Ratio | | 0.15 | | | 0.16 | 0.08 | | 0.53 | 0.18 | | | |
| Uniform Delay, d1 | | 2.9 | | | 2.9 | 2.7 | | 30.6 | 28.7 | | | |
| Progression Factor | | 1.00 | | | 0.49 | 0.69 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.7 | 0.4 | | | |
| Delay (s) | | 3.0 | | | 1.5 | 2.0 | | 31.2 | 29.1 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 3.0 | | | 1.6 | | | 30.4 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.8 | | | | | HCM Level of Service | | B | | | |
| HCM Volume to Capacity ratio | | 0.23 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | | Sum of lost time (s) | | 7.0 | | | |
| Intersection Capacity Utilization | | 56.8% | | | | | ICU Level of Service | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 23: 20th Street & Webster Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

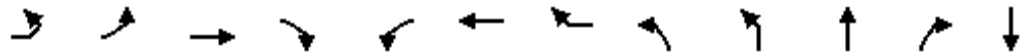


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 357 | 151 | 125 | 379 | 0 | 0 | 0 | 0 | 63 | 412 | 92 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1439 | 1610 | 3376 | | | | | | 4496 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.95 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1439 | 1610 | 3199 | | | | | | 4496 | |
| Peak-hour factor, PHF | 0.92 | 0.88 | 0.90 | 0.83 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.72 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 406 | 168 | 151 | 412 | 0 | 0 | 0 | 0 | 88 | 448 | 100 |
| RTOR Reduction (vph) | 0 | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 0 |
| Lane Group Flow (vph) | 0 | 406 | 119 | 136 | 427 | 0 | 0 | 0 | 0 | 0 | 602 | 0 |
| Confl. Peds. (#/hr) | 51 | | 51 | 114 | | 114 | 115 | | 115 | 333 | | 333 |
| Confl. Bikes (#/hr) | | | 8 | | | 3 | | | 17 | | | 6 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Effective Green, g (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Actuated g/C Ratio | | 0.35 | 0.35 | 0.12 | 0.52 | | | | | | 0.38 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1239 | 504 | 201 | 1702 | | | | | | 1686 | |
| v/s Ratio Prot | | c0.11 | | c0.08 | 0.03 | | | | | | | |
| v/s Ratio Perm | | | 0.08 | | 0.10 | | | | | | 0.13 | |
| v/c Ratio | | 0.33 | 0.24 | 0.68 | 0.25 | | | | | | 0.36 | |
| Uniform Delay, d1 | | 19.1 | 18.4 | 33.5 | 10.4 | | | | | | 18.0 | |
| Progression Factor | | 1.15 | 1.23 | 0.93 | 1.44 | | | | | | 1.35 | |
| Incremental Delay, d2 | | 0.7 | 1.1 | 6.2 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 22.7 | 23.8 | 37.2 | 15.0 | | | | | | 24.4 | |
| Level of Service | | C | C | D | B | | | | | | C | |
| Approach Delay (s) | | 23.0 | | | 20.3 | | | 0.0 | | | 24.4 | |
| Approach LOS | | C | | | C | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 22.6 | | | | HCM Level of Service | | C | | | | |
| HCM Volume to Capacity ratio | | 0.39 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | Sum of lost time (s) | | 12.0 | | | | |
| Intersection Capacity Utilization | | 93.3% | | | | ICU Level of Service | | F | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBT | EBR | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR | SBT |
|-----------------------------------|-------------|------|-------|------|-------|-------|------|-------|------|-------|------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 14 | 283 | 89 | 35 | 7 | 112 | 16 | 75 | 31 | 629 | 20 | 140 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | | | 4.0 | | 4.0 |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 1.00 | 0.95 | | | | 0.95 | | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 1.00 | | 1.00 |
| Frt | 1.00 | 1.00 | 0.96 | | 1.00 | 0.98 | | | | 1.00 | | 0.98 |
| Flt Protected | 0.95 | 0.95 | 0.99 | | 0.95 | 1.00 | | | | 0.99 | | 1.00 |
| Satd. Flow (prot) | 1770 | 3221 | 1614 | | 1770 | 3472 | | | | 3493 | | 3328 |
| Flt Permitted | 0.95 | 0.95 | 0.99 | | 0.95 | 1.00 | | | | 0.99 | | 1.00 |
| Satd. Flow (perm) | 1770 | 3221 | 1614 | | 1770 | 3472 | | | | 3493 | | 3328 |
| Peak-hour factor, PHF | 0.89 | 0.91 | 0.86 | 0.73 | 0.63 | 0.86 | 0.86 | 0.71 | 0.71 | 0.88 | 0.71 | 0.78 |
| Adj. Flow (vph) | 16 | 311 | 103 | 48 | 11 | 130 | 19 | 106 | 44 | 715 | 28 | 179 |
| RTOR Reduction (vph) | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| Lane Group Flow (vph) | 16 | 280 | 166 | 0 | 11 | 149 | 0 | 0 | 0 | 890 | 0 | 204 |
| Confl. Peds. (#/hr) | 22 | | | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 12 | | | | | | | 7 | | |
| Turn Type | Protocustom | | | | Split | | | Split | | Split | | |
| Protected Phases | 5 | 1 | 1 | | 7 | 7 | | 8 | 8 | 8 | | 2 |
| Permitted Phases | | 1 | | | | | | | | | | |
| Actuated Green, G (s) | 16.0 | 15.0 | 15.0 | | 7.8 | 7.8 | | | | 18.2 | | 11.0 |
| Effective Green, g (s) | 16.0 | 15.0 | 15.0 | | 7.8 | 7.8 | | | | 18.2 | | 11.0 |
| Actuated g/C Ratio | 0.20 | 0.19 | 0.19 | | 0.10 | 0.10 | | | | 0.23 | | 0.14 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | | | 4.0 | | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | | | 2.0 | | 2.0 |
| Lane Grp Cap (vph) | 354 | 604 | 303 | | 173 | 339 | | | | 795 | | 458 |
| v/s Ratio Prot | 0.01 | 0.09 | c0.10 | | 0.01 | c0.04 | | | | c0.25 | | c0.06 |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.05 | 0.46 | 0.55 | | 0.06 | 0.44 | | | | 1.12 | | 0.45 |
| Uniform Delay, d1 | 25.8 | 28.9 | 29.4 | | 32.8 | 34.0 | | | | 30.9 | | 31.7 |
| Progression Factor | 1.79 | 1.73 | 1.81 | | 0.76 | 0.85 | | | | 1.00 | | 0.82 |
| Incremental Delay, d2 | 0.0 | 2.4 | 6.7 | | 0.1 | 0.3 | | | | 70.0 | | 0.3 |
| Delay (s) | 46.2 | 52.4 | 59.9 | | 25.1 | 29.1 | | | | 100.9 | | 26.1 |
| Level of Service | D | D | E | | C | C | | | | F | | C |
| Approach Delay (s) | | | 55.0 | | | 28.8 | | | | 100.9 | | 27.9 |
| Approach LOS | | | E | | | C | | | | F | | C |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 81.2 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.74 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | | | | | 16.0 | | |
| Intersection Capacity Utilization | | | 75.1% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 24: 20th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|--------|--------|-------|--------|------|
| Lane Configurations | ↑ | ↑ | ↶ | ↷ | ↷ |
| Volume (vph) | 100 | 36 | 92 | 101 | 109 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 |
| Lane Util. Factor | 0.91 | 1.00 | 1.00 | | 0.95 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 |
| Frt | 0.85 | 0.85 | 0.92 | | 0.85 |
| Flt Protected | 1.00 | 1.00 | 0.98 | | 1.00 |
| Satd. Flow (prot) | 1441 | 1583 | 1646 | | 1469 |
| Flt Permitted | 1.00 | 1.00 | 0.98 | | 1.00 |
| Satd. Flow (perm) | 1441 | 1583 | 1646 | | 1469 |
| Peak-hour factor, PHF | 0.89 | 0.89 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 112 | 40 | 97 | 106 | 115 |
| RTOR Reduction (vph) | 0 | 35 | 3 | 0 | 68 |
| Lane Group Flow (vph) | 87 | 5 | 212 | 0 | 35 |
| Confl. Peds. (#/hr) | | 74 | | | |
| Confl. Bikes (#/hr) | | 8 | | | 7 |
| Turn Type | custom | custom | | custom | |
| Protected Phases | 6 | 6 | 9 | | |
| Permitted Phases | 6 | | | | 2 |
| Actuated Green, G (s) | 10.0 | 10.0 | 8.0 | | 11.0 |
| Effective Green, g (s) | 10.0 | 10.0 | 8.0 | | 11.0 |
| Actuated g/C Ratio | 0.12 | 0.12 | 0.10 | | 0.14 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 |
| Lane Grp Cap (vph) | 180 | 198 | 165 | | 202 |
| v/s Ratio Prot | 0.06 | 0.00 | 0.13 | | |
| v/s Ratio Perm | | | | | 0.02 |
| v/c Ratio | 0.48 | 0.03 | 1.29 | | 0.17 |
| Uniform Delay, d1 | 32.6 | 30.7 | 36.0 | | 30.5 |
| Progression Factor | 0.80 | 0.68 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 9.0 | 0.2 | 166.9 | | 0.1 |
| Delay (s) | 35.1 | 21.1 | 202.9 | | 30.6 |
| Level of Service | D | C | F | | C |
| Approach Delay (s) | | | 147.1 | | |
| Approach LOS | | | F | | |
| Intersection Summary | | | | | |

HCM Signalized Intersection Capacity Analysis

26: Harrison Street &

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|------|----------------------|-------|------|
| Lane Configurations | ←←← | | | →→→ | →→ | ←←← |
| Volume (vph) | 923 | 0 | 0 | 705 | 671 | 278 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.94 | | | 0.91 | 0.95 | 0.76 |
| Frpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | 1.00 | | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (prot) | 4990 | | | 5085 | 3539 | 3481 |
| Flt Permitted | 0.95 | | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 4990 | | | 5085 | 3539 | 3481 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.25 | 0.93 | 0.99 | 0.84 |
| Adj. Flow (vph) | 972 | 0 | 0 | 758 | 678 | 331 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 972 | 0 | 0 | 758 | 678 | 331 |
| Confl. Peds. (#/hr) | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | 16 |
| Turn Type | | | | | | Free |
| Protected Phases | 1 | | | 2 | 2 | |
| Permitted Phases | | | | | | Free |
| Actuated Green, G (s) | 22.6 | | | 48.4 | 48.4 | 80.0 |
| Effective Green, g (s) | 22.6 | | | 48.4 | 48.4 | 80.0 |
| Actuated g/C Ratio | 0.28 | | | 0.60 | 0.60 | 1.00 |
| Clearance Time (s) | 5.0 | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 1410 | | | 3076 | 2141 | 3481 |
| v/s Ratio Prot | c0.19 | | | 0.15 | c0.19 | |
| v/s Ratio Perm | | | | | | 0.10 |
| v/c Ratio | 0.69 | | | 0.25 | 0.32 | 0.10 |
| Uniform Delay, d1 | 25.6 | | | 7.3 | 7.7 | 0.0 |
| Progression Factor | 1.76 | | | 1.00 | 0.77 | 1.00 |
| Incremental Delay, d2 | 0.5 | | | 0.2 | 0.3 | 0.0 |
| Delay (s) | 45.5 | | | 7.5 | 6.3 | 0.0 |
| Level of Service | D | | | A | A | A |
| Approach Delay (s) | 45.5 | | | 7.5 | 4.2 | |
| Approach LOS | D | | | A | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 19.8 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.44 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | 9.0 |
| Intersection Capacity Utilization | | 43.6% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 27: Harrison Street & 20th Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | NBL | NBT | SBT | SBR | SEL | SER |
|-----------------------------------|------|-------|-------|----------------------|--------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 135 | 705 | 671 | 0 | 0 | 163 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Util. Factor | 0.94 | 0.95 | 0.95 | | | 0.88 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Frt | 1.00 | 1.00 | 1.00 | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 4990 | 3539 | 3539 | | | 2787 |
| Flt Permitted | 0.94 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 4938 | 3539 | 3539 | | | 2787 |
| Peak-hour factor, PHF | 0.69 | 0.88 | 0.92 | 0.92 | 0.92 | 0.71 |
| Adj. Flow (vph) | 196 | 801 | 729 | 0 | 0 | 230 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 63 |
| Lane Group Flow (vph) | 196 | 801 | 729 | 0 | 0 | 167 |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | custom | |
| Protected Phases | | 2 | 1 | | | 2 |
| Permitted Phases | 2 | 1 | | | | 2 |
| Actuated Green, G (s) | 50.3 | 74.0 | 23.7 | | | 50.3 |
| Effective Green, g (s) | 50.3 | 74.0 | 23.7 | | | 50.3 |
| Actuated g/C Ratio | 0.63 | 0.92 | 0.30 | | | 0.63 |
| Clearance Time (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 3105 | 3539 | 1048 | | | 1752 |
| v/s Ratio Prot | | c0.14 | c0.21 | | | 0.06 |
| v/s Ratio Perm | 0.04 | 0.08 | | | | |
| v/c Ratio | 0.06 | 0.23 | 0.70 | | | 0.10 |
| Uniform Delay, d1 | 5.7 | 0.3 | 25.0 | | | 5.9 |
| Progression Factor | 1.00 | 1.00 | 1.42 | | | 0.04 |
| Incremental Delay, d2 | 0.0 | 0.0 | 2.0 | | | 0.0 |
| Delay (s) | 5.8 | 0.3 | 37.5 | | | 0.3 |
| Level of Service | A | A | D | | | A |
| Approach Delay (s) | | 1.4 | 37.5 | | 0.3 | |
| Approach LOS | | A | D | | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 14.7 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.37 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | 3.0 |
| Intersection Capacity Utilization | | 30.9% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 28: 18th Street & Brush Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱↱↱ | |
| Volume (vph) | 0 | 0 | 0 | 150 | 168 | 0 | 0 | 0 | 0 | 0 | 986 | 114 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1766 | 3539 | | | | | | 6289 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1766 | 3539 | | | | | | 6289 | |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.91 | 0.90 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.89 |
| Adj. Flow (vph) | 0 | 0 | 0 | 165 | 187 | 0 | 0 | 0 | 0 | 0 | 1016 | 128 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 155 | 187 | 0 | 0 | 0 | 0 | 0 | 1120 | 0 |
| Confl. Peds. (#/hr) | 15 | | 15 | 2 | | 2 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 31.1 | 31.1 | | | | | | 34.9 | |
| Effective Green, g (s) | | | | 31.1 | 31.1 | | | | | | 34.9 | |
| Actuated g/C Ratio | | | | 0.41 | 0.41 | | | | | | 0.47 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 732 | 1468 | | | | | | 2926 | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | c0.18 | |
| v/s Ratio Perm | | | | c0.09 | | | | | | | | |
| v/c Ratio | | | | 0.21 | 0.13 | | | | | | 0.38 | |
| Uniform Delay, d1 | | | | 14.1 | 13.6 | | | | | | 13.0 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.62 | |
| Incremental Delay, d2 | | | | 0.7 | 0.2 | | | | | | 0.1 | |
| Delay (s) | | | | 14.7 | 13.7 | | | | | | 8.2 | |
| Level of Service | | | | B | B | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 14.2 | | | 0.0 | | | 8.2 | |
| Approach LOS | | A | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.6 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.30 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 41.2% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



















| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 200 | 397 | 947 | 61 | 269 | 32 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.99 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 5021 | | 3403 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 5021 | | 3403 | |
| Peak-hour factor, PHF | 0.82 | 0.93 | 0.93 | 0.82 | 0.91 | 0.89 |
| Adj. Flow (vph) | 244 | 427 | 1018 | 74 | 296 | 36 |
| RTOR Reduction (vph) | 7 | 0 | 11 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 237 | 427 | 1081 | 0 | 332 | 0 |
| Confl. Peds. (#/hr) | | | | 17 | | |
| Confl. Bikes (#/hr) | | | | 6 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 23.6 | 23.6 | 22.4 | | 17.0 | |
| Effective Green, g (s) | 23.6 | 23.6 | 22.4 | | 17.0 | |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.30 | | 0.23 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 557 | 1600 | 1500 | | 771 | |
| v/s Ratio Prot | | 0.08 | c0.22 | | c0.10 | |
| v/s Ratio Perm | c0.13 | | | | | |
| v/c Ratio | 0.43 | 0.27 | 0.72 | | 0.43 | |
| Uniform Delay, d1 | 20.3 | 19.2 | 23.5 | | 24.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 2.4 | 0.4 | 1.7 | | 0.4 | |
| Delay (s) | 22.7 | 19.6 | 25.2 | | 25.2 | |
| Level of Service | C | B | C | | C | |
| Approach Delay (s) | | 20.8 | 25.2 | | 25.2 | |
| Approach LOS | | C | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 23.8 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.53 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 50.3% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th Street & Castro Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | |  |  |  |  | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 238 | 756 | 876 | 452 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.98 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.98 | 0.99 | | | | |
| Frt | | | | | 0.91 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3057 | 1417 | 1403 | 5826 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3057 | 1417 | 1403 | 5826 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.77 | 0.83 | 0.90 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 309 | 911 | 973 | 486 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 75 | 75 | 346 | 291 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 690 | 380 | 140 | 682 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 4 | | 4 | 14 | | 14 | | | |
| Confl. Bikes (#/hr) | | | | | | 1 | | | | | | 4 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | | 2 | | | | |
| Actuated Green, G (s) | | | | | 45.6 | 45.6 | 19.4 | 19.4 | | | | |
| Effective Green, g (s) | | | | | 45.6 | 45.6 | 19.4 | 19.4 | | | | |
| Actuated g/C Ratio | | | | | 0.61 | 0.61 | 0.26 | 0.26 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1859 | 862 | 363 | 1507 | | | | |
| v/s Ratio Prot | | | | | 0.23 | | | | | | | |
| v/s Ratio Perm | | | | | | c0.27 | 0.10 | 0.12 | | | | |
| v/c Ratio | | | | | 0.37 | 0.44 | 0.39 | 0.45 | | | | |
| Uniform Delay, d1 | | | | | 7.4 | 7.9 | 22.9 | 23.3 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.6 | 1.6 | 0.7 | 0.2 | | | | |
| Delay (s) | | | | | 8.0 | 9.5 | 23.6 | 23.6 | | | | |
| Level of Service | | | | | A | A | C | C | | | | |
| Approach Delay (s) | | 0.0 | | | 8.6 | | | 23.6 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 16.7 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.44 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | Sum of lost time (s) | | | 10.0 | | | | |
| Intersection Capacity Utilization | | 64.2% | | | ICU Level of Service | | | C | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|----------------------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 216 | 62 | 0 | 0 | 0 | 0 | 0 | 0 | 480 | 777 | 47 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.96 | | | | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3397 | | | | | | | | 1522 | 4735 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3397 | | | | | | | | 1522 | 4735 | |
| Peak-hour factor, PHF | 0.92 | 0.89 | 0.82 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.89 | 0.82 | 0.84 |
| Adj. Flow (vph) | 0 | 243 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 539 | 948 | 56 |
| RTOR Reduction (vph) | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 216 | 34 | 0 |
| Lane Group Flow (vph) | 0 | 289 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 1132 | 0 |
| Confl. Peds. (#/hr) | 5 | | 5 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Effective Green, g (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Actuated g/C Ratio | | 0.47 | | | | | | | | 0.43 | 0.43 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1585 | | | | | | | | 649 | 2020 | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.11 | 0.24 | |
| v/c Ratio | | 0.18 | | | | | | | | 0.25 | 0.56 | |
| Uniform Delay, d1 | | 11.7 | | | | | | | | 13.8 | 16.2 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | 0.9 | 1.1 | |
| Delay (s) | | 11.9 | | | | | | | | 14.7 | 17.3 | |
| Level of Service | | B | | | | | | | | B | B | |
| Approach Delay (s) | | 11.9 | | | 0.0 | | | 0.0 | | | 16.7 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 15.9 | | | | | | | | HCM Level of Service | B | |
| HCM Volume to Capacity ratio | | 0.36 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | Sum of lost time (s) | 8.0 | |
| Intersection Capacity Utilization | | 41.9% | | | | | | | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕ | ↗ | | | |
| Volume (vph) | 53 | 767 | 0 | 0 | 355 | 218 | 171 | 533 | 35 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.96 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3518 | | | 3539 | 1461 | | 3468 | 1520 | | | |
| Flt Permitted | | 0.87 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3078 | | | 3539 | 1461 | | 3468 | 1520 | | | |
| Peak-hour factor, PHF | 0.63 | 0.86 | 0.25 | 0.99 | 0.96 | 0.96 | 0.84 | 0.92 | 0.73 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 84 | 892 | 0 | 0 | 370 | 227 | 204 | 579 | 48 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 155 | 0 | 0 | 6 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 976 | 0 | 0 | 370 | 72 | 0 | 783 | 42 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 52 | | 52 | 35 | | 35 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 5 | | | 21 | | | | | | 22 |
| Turn Type | Perm | | Perm | | Perm | | Perm | Perm | | Perm | | |
| Protected Phases | | 4 | | | 8 | 8 | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 923 | | | 1062 | 438 | | 1850 | 811 | | | |
| v/s Ratio Prot | | | | | 0.10 | | | | | | | |
| v/s Ratio Perm | | c0.32 | | | | 0.05 | | 0.23 | 0.03 | | | |
| v/c Ratio | | 1.06 | | | 0.35 | 0.16 | | 0.42 | 0.05 | | | |
| Uniform Delay, d1 | | 21.0 | | | 16.4 | 15.5 | | 8.4 | 6.7 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 46.0 | | | 0.9 | 0.8 | | 0.7 | 0.1 | | | |
| Delay (s) | | 67.0 | | | 17.3 | 16.3 | | 9.2 | 6.8 | | | |
| Level of Service | | E | | | B | B | | A | A | | | |
| Approach Delay (s) | | 67.0 | | | 16.9 | | | 9.0 | | | 0.0 | |
| Approach LOS | | E | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 34.5 | | | HCM Level of Service | | | | C | | | |
| HCM Volume to Capacity ratio | | 0.65 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | Sum of lost time (s) | | | | 10.0 | | | |
| Intersection Capacity Utilization | | 73.2% | | | ICU Level of Service | | | | D | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 33: 14th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↖ | ↑↑ | |
| Volume (vph) | 0 | 538 | 61 | 22 | 468 | 0 | 0 | 0 | 0 | 287 | 584 | 16 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frbp, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3451 | | | 3529 | | | | | 1734 | 3515 | |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3451 | | | 3233 | | | | | 1734 | 3515 | |
| Peak-hour factor, PHF | 0.25 | 0.91 | 0.76 | 0.79 | 0.91 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.67 |
| Adj. Flow (vph) | 0 | 591 | 80 | 28 | 514 | 0 | 0 | 0 | 0 | 305 | 608 | 24 |
| RTOR Reduction (vph) | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 0 | 647 | 0 | 0 | 542 | 0 | 0 | 0 | 0 | 305 | 626 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 25 | | 25 | 17 | | | 17 | 24 | 24 |
| Confl. Bikes (#/hr) | | | 16 | | | 17 | | | | 2 | | |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | 6 | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1457 | | | 1365 | | | | | 732 | 1484 | |
| v/s Ratio Prot | | c0.19 | | | | | | | | | c0.18 | |
| v/s Ratio Perm | | | | | 0.17 | | | | | 0.18 | | |
| v/c Ratio | | 0.44 | | | 0.40 | | | | | 0.42 | 0.42 | |
| Uniform Delay, d1 | | 9.2 | | | 9.0 | | | | | 9.1 | 9.1 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.0 | | | 0.9 | | | | | 1.7 | 0.9 | |
| Delay (s) | | 10.2 | | | 9.9 | | | | | 10.9 | 10.0 | |
| Level of Service | | B | | | A | | | | | B | B | |
| Approach Delay (s) | | 10.2 | | | 9.9 | | | 0.0 | | | 10.3 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.2 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.43 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | Sum of lost time (s) | | | | 7.0 | | |
| Intersection Capacity Utilization | | | 52.5% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 34: 14th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 61 | 359 | 7 | 16 | 335 | 37 | 58 | 376 | 21 | 95 | 149 | 42 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 0.99 | | | 1.00 | | | 1.00 | | | 0.99 | |
| Frt | | 1.00 | | | 0.98 | | | 0.99 | | | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Satd. Flow (prot) | | 3471 | | | 3446 | | | 3459 | | | 3347 | |
| Flt Permitted | | 0.84 | | | 0.93 | | | 0.87 | | | 0.66 | |
| Satd. Flow (perm) | | 2935 | | | 3223 | | | 3032 | | | 2254 | |
| Peak-hour factor, PHF | 0.80 | 0.92 | 0.58 | 0.80 | 0.83 | 0.71 | 0.85 | 0.86 | 0.58 | 0.82 | 0.97 | 0.81 |
| Adj. Flow (vph) | 76 | 390 | 12 | 20 | 404 | 52 | 68 | 437 | 36 | 116 | 154 | 52 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 18 | 0 | 0 | 13 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 0 | 475 | 0 | 0 | 458 | 0 | 0 | 528 | 0 | 0 | 286 | 0 |
| Confl. Peds. (#/hr) | 80 | | 80 | 58 | | 58 | 44 | | 44 | 41 | | 41 |
| Confl. Bikes (#/hr) | | | 14 | | | 10 | | | 7 | | | 4 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 23.4 | | | 23.4 | | | 14.1 | | | 14.1 | |
| Effective Green, g (s) | | 23.4 | | | 23.4 | | | 14.1 | | | 14.1 | |
| Actuated g/C Ratio | | 0.52 | | | 0.52 | | | 0.31 | | | 0.31 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1526 | | | 1676 | | | 950 | | | 706 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | c0.16 | | | 0.14 | | | c0.17 | | | 0.13 | |
| v/c Ratio | | 0.31 | | | 0.27 | | | 0.56 | | | 0.41 | |
| Uniform Delay, d1 | | 6.2 | | | 6.0 | | | 12.8 | | | 12.2 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 0.4 | | | 0.7 | | | 0.4 | |
| Delay (s) | | 6.7 | | | 6.4 | | | 13.6 | | | 12.5 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 6.7 | | | 6.4 | | | 13.6 | | | 12.5 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 65.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 208 | 786 | 0 | 0 | 0 | 0 | 0 | 665 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6268 | | | | | | 5032 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6268 | | | | | | 5032 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.91 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.86 | 0.86 |
| Adj. Flow (vph) | 0 | 0 | 0 | 229 | 810 | 0 | 0 | 0 | 0 | 0 | 773 | 44 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 988 | 0 | 0 | 0 | 0 | 0 | 806 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 47 | | 47 | 36 | | 36 | 29 | | 29 |
| Confl. Bikes (#/hr) | | | 3 | | | 13 | | | 9 | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2716 | | | | | | 2222 | |
| v/s Ratio Prot | | | | | | | | | | | c0.16 | |
| v/s Ratio Perm | | | | | 0.16 | | | | | | | |
| v/c Ratio | | | | | 0.36 | | | | | | 0.36 | |
| Uniform Delay, d1 | | | | | 11.4 | | | | | | 11.1 | |
| Progression Factor | | | | | 0.47 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.4 | | | | | | 0.5 | |
| Delay (s) | | | | | 5.7 | | | | | | 11.6 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 5.7 | | | 0.0 | | | 11.6 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.3 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 38.7% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th Street & Oak St.

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 848 | 50 | 149 | 827 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6317 | | | 6223 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6317 | | | 6223 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.78 | 0.83 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 893 | 64 | 180 | 861 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 950 | 0 | 0 | 996 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | 121 | 69 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | | | | 15 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3148 | | | 2137 | | | | |
| v/s Ratio Prot | | | | | c0.15 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.16 | | | | |
| v/c Ratio | | | | | 0.30 | | | 0.47 | | | | |
| Uniform Delay, d1 | | | | | 8.9 | | | 15.4 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.2 | | | 0.7 | | | | |
| Delay (s) | | | | | 9.1 | | | 16.1 | | | | |
| Level of Service | | | | | A | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 9.1 | | | 16.1 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.8 | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | | 0.37 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | Sum of lost time (s) | | | 9.5 | |
| Intersection Capacity Utilization | | | 43.8% | | | | | ICU Level of Service | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 37: 11th Street & Oak Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 57 | 0 | 0 | 907 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.71 | 0.92 | 0.25 | 0.92 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 80 | 0 | 0 | 986 | 0 | 0 |
| Pedestrians | 6 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 252 | 6 | 6 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 252 | 6 | 6 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 711 | 1069 | 1605 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 80 | 246 | 246 | 246 | 246 | |
| Volume Left | 80 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 711 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.14 | 0.14 | 0.14 | 0.14 | |
| Queue Length 95th (ft) | 10 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 10.7 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 10.7 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.8 | | | | |
| Intersection Capacity Utilization | | 23.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------------------------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 760 | 162 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 812 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.97 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6181 | | | | | | | | | 5063 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6181 | | | | | | | | | 5063 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.86 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.72 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 792 | 188 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 873 | 0 |
| RTOR Reduction (vph) | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 939 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 920 | 0 |
| Confl. Peds. (#/hr) | 20 | | 20 | 30 | | 30 | 12 | | 12 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 5 | | | 7 | | | 3 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2369 | | | | | | | | | 2194 | |
| v/s Ratio Prot | | c0.15 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.18 | |
| v/c Ratio | | 0.40 | | | | | | | | | 0.42 | |
| Uniform Delay, d1 | | 13.5 | | | | | | | | | 11.8 | |
| Progression Factor | | 0.84 | | | | | | | | | 0.56 | |
| Incremental Delay, d2 | | 0.5 | | | | | | | | | 0.6 | |
| Delay (s) | | 11.8 | | | | | | | | | 7.2 | |
| Level of Service | | B | | | | | | | | | A | |
| Approach Delay (s) | | 11.8 | | | 0.0 | | | 0.0 | | | 7.2 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.5 | | | | | | | | | HCM Level of Service A |
| HCM Volume to Capacity ratio | | | 0.41 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 11.0 | Sum of lost time (s) |
| Intersection Capacity Utilization | | | 39.9% | | | | | | | | | ICU Level of Service A |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 27 | 605 | 0 | 0 | 0 | 0 | 0 | 282 | 112 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6374 | | | | | | 6065 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6374 | | | | | | 6065 | | | | |
| Peak-hour factor, PHF | 0.63 | 0.87 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.86 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 43 | 695 | 0 | 0 | 0 | 0 | 0 | 328 | 115 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 718 | 0 | 0 | 0 | 0 | 0 | 417 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | 17 | 53 | | 53 | 68 | | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | 1 | | | 6 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 12.4 | | | | | | 40.6 | | | | |
| Effective Green, g (s) | | 12.4 | | | | | | 40.6 | | | | |
| Actuated g/C Ratio | | 0.21 | | | | | | 0.68 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1317 | | | | | | 4104 | | | | |
| v/s Ratio Prot | | | | | | | | c0.07 | | | | |
| v/s Ratio Perm | | 0.11 | | | | | | | | | | |
| v/c Ratio | | 0.55 | | | | | | 0.10 | | | | |
| Uniform Delay, d1 | | 21.3 | | | | | | 3.4 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.2 | | | | | | 0.0 | | | | |
| Delay (s) | | 21.5 | | | | | | 3.4 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 21.5 | | | 0.0 | | | 3.4 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.7 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.21 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.6% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 149 | 940 | 0 | 0 | 0 | 0 | 0 | 792 | 329 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6343 | | | | | | 4832 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6343 | | | | | | 4832 | | | | |
| Peak-hour factor, PHF | 0.85 | 0.98 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 175 | 959 | 0 | 0 | 0 | 0 | 0 | 843 | 343 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 35 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1099 | 0 | 0 | 0 | 0 | 0 | 1164 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 50 | | 50 | 14 | | 14 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 16 | | | 1 | | | 2 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2537 | | | | | | 1933 | | | | |
| v/s Ratio Prot | | | | | | | | c0.24 | | | | |
| v/s Ratio Perm | | 0.17 | | | | | | | | | | |
| v/c Ratio | | 0.43 | | | | | | 0.60 | | | | |
| Uniform Delay, d1 | | 9.8 | | | | | | 10.7 | | | | |
| Progression Factor | | 1.03 | | | | | | 1.58 | | | | |
| Incremental Delay, d2 | | 0.4 | | | | | | 1.2 | | | | |
| Delay (s) | | 10.5 | | | | | | 18.0 | | | | |
| Level of Service | | B | | | | | | B | | | | |
| Approach Delay (s) | | 10.5 | | | 0.0 | | | 18.0 | | | 0.0 | |
| Approach LOS | | B | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 48.1% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 816 | 242 | 0 | 0 | 0 | 0 | 0 | 0 | 401 | 1271 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6151 | | | | | | | | | 5011 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6151 | | | | | | | | | 5011 | |
| Peak-hour factor, PHF | 0.25 | 0.99 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.87 | 0.95 | 0.25 |
| Adj. Flow (vph) | 0 | 824 | 263 | 0 | 0 | 0 | 0 | 0 | 0 | 461 | 1338 | 0 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 0 |
| Lane Group Flow (vph) | 0 | 1077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1761 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 8 | | 8 | 2 | | 2 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 2 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2460 | | | | | | | | | 2227 | |
| v/s Ratio Prot | | c0.18 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.35 | |
| v/c Ratio | | 0.44 | | | | | | | | | 0.79 | |
| Uniform Delay, d1 | | 9.8 | | | | | | | | | 10.7 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | | | | | | | 3.0 | |
| Delay (s) | | 10.4 | | | | | | | | | 13.7 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 10.4 | | | 0.0 | | | 0.0 | | | 13.7 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.4 | | | | HCM Level of Service | | | | B | |
| HCM Volume to Capacity ratio | | | 0.62 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | Sum of lost time (s) | | | 7.0 | | |
| Intersection Capacity Utilization | | | 57.5% | | | | ICU Level of Service | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 42: I-880 NB On-ramp & Jackson Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↰ | | ↕ | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 6 | 308 | 47 | 293 | 294 | 0 | 0 | 180 | 1379 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | 0.93 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.97 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1726 | 1863 | 1471 | | 1815 | | | 1863 | 1559 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.74 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1726 | 1863 | 1471 | | 1373 | | | 1863 | 1559 |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.50 | 0.78 | 0.84 | 0.84 | 0.90 | 0.92 | 0.92 | 0.92 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 12 | 395 | 56 | 349 | 327 | 0 | 0 | 196 | 1407 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 42 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 12 | 395 | 13 | 0 | 676 | 0 | 0 | 196 | 1365 |
| Confl. Peds. (#/hr) | 4 | | 4 | 20 | | 20 | 1 | | 1 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 10 | | | 7 | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 14.3 | 14.3 | 14.3 | | 34.7 | | | 34.7 | 34.7 |
| Effective Green, g (s) | | | | 14.3 | 14.3 | 14.3 | | 34.7 | | | 34.7 | 34.7 |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | 0.24 | | 0.58 | | | 0.58 | 0.58 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 411 | 444 | 351 | | 794 | | | 1077 | 902 |
| v/s Ratio Prot | | | | c0.21 | | | | | | | 0.11 | |
| v/s Ratio Perm | | | | 0.01 | | 0.01 | | 0.49 | | | | c0.88 |
| v/c Ratio | | | | 0.03 | 0.89 | 0.04 | | 0.85 | | | 0.18 | 1.51 |
| Uniform Delay, d1 | | | | 17.5 | 22.1 | 17.6 | | 10.5 | | | 6.0 | 12.6 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 19.1 | 0.0 | | 11.1 | | | 0.4 | 236.6 |
| Delay (s) | | | | 17.6 | 41.2 | 17.6 | | 21.6 | | | 6.3 | 249.3 |
| Level of Service | | | | B | D | B | | C | | | A | F |
| Approach Delay (s) | | 0.0 | | | 37.7 | | | 21.6 | | | 219.6 | |
| Approach LOS | | A | | | D | | | C | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 140.1 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.33 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 147.7% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|------------------------|--------|------|------|------|------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 154 | 524 | 55 | 47 | 615 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3501 | | 3191 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3501 | | 3191 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.90 | 0.86 | 0.60 | 0.84 | 0.94 |
| Adj. Flow (vph) | 0 | 171 | 609 | 92 | 56 | 654 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 780 | 0 | 475 | 327 |
| Confl. Peds. (#/hr) | 46 | | | | | |
| Confl. Bikes (#/hr) | 3 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1268 | | 1149 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.22 | | 0.15 | 0.23 |
| v/c Ratio | | | 0.62 | | 0.41 | 0.63 |
| Uniform Delay, d1 | | | 11.8 | | 10.8 | 11.9 |
| Progression Factor | | | 0.68 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.2 | | 1.1 | 5.7 |
| Delay (s) | | | 8.2 | | 11.9 | 17.6 |
| Level of Service | | | A | | B | B |
| Approach Delay (s) | | | 8.2 | | 14.3 | |
| Approach LOS | | | A | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 11.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 58.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 243 | 523 | 69 | 0 | 0 | 0 | 0 | 446 | 62 | 1 | 58 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.98 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4907 | | | | | | 1830 | | | 1858 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.71 | |
| Satd. Flow (perm) | | 1000 | | | | | | 1300 | | | 1300 | |
| Peak-hour factor, PHF | 0.86 | 0.93 | 0.72 | 0.25 | 0.25 | 0.25 | 0.25 | 0.75 | 0.70 | 0.25 | 0.76 | 0.25 |
| Adj. Flow (vph) | 283 | 562 | 96 | 0 | 0 | 0 | 0 | 595 | 89 | 4 | 76 | 0 |
| RTOR Reduction (vph) | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 910 | 0 | 0 | 0 | 0 | 0 | 672 | 0 | 0 | 80 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | 4 | | | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 500 | | | | | | 630 | | | 448 | |
| v/s Ratio Prot | | | | | | | | c0.37 | | | | |
| v/s Ratio Perm | | c0.91 | | | | | | | | | 0.06 | |
| v/c Ratio | | 1.82 | | | | | | 1.07 | | | 0.18 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 14.8 | | | 10.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.03 | |
| Incremental Delay, d2 | | 376.8 | | | | | | 55.1 | | | 0.8 | |
| Delay (s) | | 388.1 | | | | | | 69.8 | | | 1.2 | |
| Level of Service | | F | | | | | | E | | | A | |
| Approach Delay (s) | | 388.1 | | | 0.0 | | | 69.8 | | | 1.2 | |
| Approach LOS | | F | | | A | | | E | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 242.2 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.51 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 54.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (WB) & Grand Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



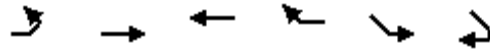
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|--------|------|-------|------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 245 | 255 | 1069 | 772 | 235 | 770 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.93 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3302 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3302 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.91 | 0.78 | 0.94 | 0.84 | 0.92 | 0.88 |
| Adj. Flow (vph) | 269 | 327 | 1137 | 919 | 255 | 875 |
| RTOR Reduction (vph) | 0 | 97 | 159 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 269 | 230 | 1897 | 0 | 255 | 875 |
| Turn Type | custom | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 2 | | | | |
| Actuated Green, G (s) | 18.8 | 63.2 | 37.1 | | 22.1 | 63.2 |
| Effective Green, g (s) | 18.8 | 63.2 | 37.1 | | 22.1 | 63.2 |
| Actuated g/C Ratio | 0.21 | 0.70 | 0.41 | | 0.25 | 0.70 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 370 | 1112 | 1361 | | 435 | 2485 |
| v/s Ratio Prot | c0.15 | | c0.57 | | c0.14 | 0.25 |
| v/s Ratio Perm | | 0.15 | | | | |
| v/c Ratio | 0.73 | 0.21 | 1.39 | | 0.59 | 0.35 |
| Uniform Delay, d1 | 33.2 | 4.7 | 26.4 | | 29.9 | 5.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.77 | 1.12 |
| Incremental Delay, d2 | 7.0 | 0.4 | 181.9 | | 4.9 | 0.3 |
| Delay (s) | 40.2 | 5.1 | 208.3 | | 27.9 | 6.3 |
| Level of Service | D | A | F | | C | A |
| Approach Delay (s) | 20.9 | | 208.3 | | | 11.1 |
| Approach LOS | C | | F | | | B |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 119.9 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.00 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 90.9% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis
46: Lakeshore Drive & El Embarcadero (WB)

Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | ↰ | ↱↱ | ↰↱ | | ↰ | ↱↱ |
| Volume (vph) | 350 | 665 | 466 | 148 | 383 | 623 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.96 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3403 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3403 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.84 | 0.86 | 0.87 | 0.80 | 0.91 | 0.85 |
| Adj. Flow (vph) | 417 | 773 | 536 | 185 | 421 | 733 |
| RTOR Reduction (vph) | 0 | 0 | 52 | 0 | 0 | 371 |
| Lane Group Flow (vph) | 417 | 773 | 669 | 0 | 421 | 362 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.1 | 32.6 | 14.5 | | 19.8 | 19.8 |
| Effective Green, g (s) | 14.1 | 32.6 | 14.5 | | 19.8 | 19.8 |
| Actuated g/C Ratio | 0.23 | 0.54 | 0.24 | | 0.33 | 0.33 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 413 | 1910 | 817 | | 580 | 519 |
| v/s Ratio Prot | c0.24 | 0.22 | c0.20 | | c0.24 | |
| v/s Ratio Perm | | | | | | 0.23 |
| v/c Ratio | 1.01 | 0.40 | 0.82 | | 0.73 | 0.70 |
| Uniform Delay, d1 | 23.1 | 8.2 | 21.7 | | 17.9 | 17.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 46.7 | 0.1 | 6.4 | | 4.5 | 4.1 |
| Delay (s) | 69.9 | 8.3 | 28.1 | | 22.4 | 21.8 |
| Level of Service | E | A | C | | C | C |
| Approach Delay (s) | | 29.9 | 28.1 | | 22.0 | |
| Approach LOS | | C | C | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 26.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.84 | | |
| Actuated Cycle Length (s) | 60.4 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 68.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study




















| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | 3TW | | | ↑↑ | ↑ | ↑ | ↑↑ | |
| Volume (vph) | 0 | 0 | 298 | 768 | 224 | 0 | 696 | 629 | 350 | 785 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4906 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4906 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.91 | 0.84 | 0.92 | 0.93 | 0.84 | 0.90 | 0.91 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 310 | 844 | 267 | 0 | 748 | 749 | 389 | 863 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 102 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1375 | 0 | 0 | 748 | 647 | 389 | 863 | 0 |
| Turn Type | | | Split | | | | | Perm | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 1 2 | |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 29.4 | | | 20.7 | 20.7 | 26.9 | 51.6 | |
| Effective Green, g (s) | | | | 29.4 | | | 20.7 | 20.7 | 26.9 | 51.6 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.23 | 0.23 | 0.30 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1603 | | | 814 | 364 | 529 | 2029 | |
| v/s Ratio Prot | | | | c0.28 | | | 0.21 | | c0.22 | 0.24 | |
| v/s Ratio Perm | | | | | | | | c0.41 | | | |
| v/c Ratio | | | | 0.86 | | | 0.92 | 1.78 | 0.74 | 0.43 | |
| Uniform Delay, d1 | | | | 28.3 | | | 33.8 | 34.6 | 28.4 | 10.8 | |
| Progression Factor | | | | 1.00 | | | 1.39 | 1.56 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.8 | | | 2.1 | 350.4 | 5.3 | 0.1 | |
| Delay (s) | | | | 33.1 | | | 49.1 | 404.6 | 33.6 | 11.0 | |
| Level of Service | | | | C | | | D | F | C | B | |
| Approach Delay (s) | 0.0 | | | 33.1 | | | 227.0 | | | 18.0 | |
| Approach LOS | A | | | C | | | F | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 98.2 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.06 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 74.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
| Lane Configurations |  |  |  |  |  | | | |  |  |
| Volume (vph) | 329 | 830 | 424 | 163 | 444 | 483 | 144 | 263 | 19 | 456 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.99 | 0.85 | 0.85 | 0.91 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3166 | 1441 | 1583 | 3235 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3166 | 1441 | 1583 | 3235 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.70 | 0.94 | 0.87 | 0.74 | 0.81 | 0.84 | 0.90 | 0.83 | 0.68 | 0.91 |
| Adj. Flow (vph) | 470 | 883 | 487 | 220 | 548 | 575 | 160 | 317 | 28 | 501 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 41 | 12 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 423 | 993 | 424 | 179 | 1271 | 0 | 0 | 0 | 345 | 501 |
| Turn Type | Split | | Prot | Perm | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | 4 | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | 0.31 | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 985 | 448 | 492 | 1330 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.26 | c0.31 | 0.29 | | c0.39 | | | | c0.19 | 0.14 |
| v/s Ratio Perm | | | | 0.11 | | | | | | |
| v/c Ratio | 0.84 | 1.01 | 0.95 | 0.36 | 1.09 | dr | | | 1.46 | 0.24 |
| Uniform Delay, d1 | 29.0 | 31.0 | 30.3 | 24.1 | 25.7 | | | | 39.0 | 8.9 |
| Progression Factor | 0.80 | 0.82 | 0.81 | 0.70 | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.7 | 10.7 | 5.2 | 0.2 | 16.1 | | | | 229.7 | 0.3 |
| Delay (s) | 24.9 | 36.0 | 29.7 | 17.0 | 41.8 | | | | 268.7 | 9.1 |
| Level of Service | C | D | C | B | D | | | | F | A |
| Approach Delay (s) | | 30.4 | | | 41.8 | | | | | 115.0 |
| Approach LOS | | C | | | D | | | | | F |













Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 51.0 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 1.05 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 83.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Harrison Street

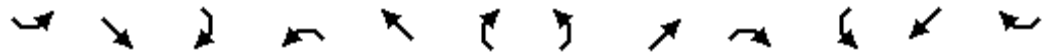
Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | | | ↑↑↑↑ | ↑ | | ↑↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1240 | 172 | 242 | 820 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4864 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4864 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.91 | 0.98 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1292 | 189 | 247 | 872 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 21 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1292 | 167 | 0 | 1098 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | 4 | | | | | |
| Actuated Green, G (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2543 | 792 | | 1783 | | | | |
| v/s Ratio Prot | | | | | c0.25 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.11 | | 0.23 | | | | |
| v/c Ratio | | | | | 0.51 | 0.21 | | 0.62 | | | | |
| Uniform Delay, d1 | | | | | 10.1 | 8.4 | | 15.5 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.30 | | | | |
| Incremental Delay, d2 | | | | | 0.7 | 0.6 | | 1.2 | | | | |
| Delay (s) | | | | | 10.8 | 9.0 | | 21.4 | | | | |
| Level of Service | | | | | B | A | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 10.6 | | | 21.4 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 15.2 | | HCM Level of Service | | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.55 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | Sum of lost time (s) | | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 52.4% | | ICU Level of Service | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

50: Santa Clara Avenue & Harrison Street


















Existing plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|----------------------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 502 | 1008 | 0 | 0 | 0 | 0 | 0 | 533 | 48 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4772 | | | | | | 3500 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4772 | | | | | | 3500 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.90 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.75 | 0.86 |
| Adj. Flow (vph) | 0 | 0 | 0 | 558 | 1039 | 0 | 0 | 0 | 0 | 0 | 711 | 56 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 48 | 35 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 337 | 1177 | 0 | 0 | 0 | 0 | 0 | 757 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2306 | | | | | | 1342 | |
| v/s Ratio Prot | | | | | | | | | | | c0.22 | |
| v/s Ratio Perm | | | | 0.22 | 0.25 | | | | | | | |
| v/c Ratio | | | | 0.46 | 0.51 | | | | | | 0.56 | |
| Uniform Delay, d1 | | | | 10.3 | 10.6 | | | | | | 14.6 | |
| Progression Factor | | | | 1.64 | 1.44 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 1.8 | 0.7 | | | | | | 1.7 | |
| Delay (s) | | | | 18.6 | 16.0 | | | | | | 16.3 | |
| Level of Service | | | | B | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 16.6 | | | 0.0 | | | 16.3 | |
| Approach LOS | | A | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 16.5 | | HCM Level of Service | | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.53 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | Sum of lost time (s) | | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 52.4% | | ICU Level of Service | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Harrison Street & Monte Vista Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 169 | 437 | 8 | 13 | 185 | 15 | 12 | 18 | 22 | 50 | 37 | 33 |
| Peak Hour Factor | 0.90 | 0.94 | 0.67 | 0.81 | 0.84 | 0.63 | 0.75 | 0.75 | 0.79 | 0.74 | 0.77 | 0.69 |
| Hourly flow rate (vph) | 188 | 465 | 12 | 16 | 220 | 24 | 16 | 24 | 28 | 68 | 48 | 48 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 188 | 477 | 260 | 68 | 163 | | | | | | | |
| Volume Left (vph) | 188 | 0 | 16 | 16 | 68 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 24 | 28 | 48 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | -0.01 | -0.17 | -0.06 | | | | | | | |
| Departure Headway (s) | 6.1 | 5.6 | 5.6 | 6.3 | 6.1 | | | | | | | |
| Degree Utilization, x | 0.32 | 0.74 | 0.40 | 0.12 | 0.28 | | | | | | | |
| Capacity (veh/h) | 571 | 628 | 615 | 506 | 531 | | | | | | | |
| Control Delay (s) | 10.8 | 21.7 | 12.3 | 10.2 | 11.5 | | | | | | | |
| Approach Delay (s) | 18.6 | | 12.3 | 10.2 | 11.5 | | | | | | | |
| Approach LOS | C | | B | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 15.7 | | | | | | | | | |
| HCM Level of Service | | | C | | | | | | | | | |
| Intersection Capacity Utilization | | | 56.7% | | ICU Level of Service | | B | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 9.0 Worst Case Level Of Service: D[28.3]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 1060 0 0 0 491 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 1060 0 0 0 491 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 1060 0 0 0 491 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.92 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1152 0 0 0 534 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1152 0 0 0 534 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 384 xxxxx xxxx xxxxx

Potent Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 668 xxxxx xxxx xxxxx

Move Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 668 xxxxx xxxx xxxxx

Volume/Cap: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 0.80 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 8.1 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 28.3 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * D * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 28.3 xxxxxx

ApproachLOS: * * * * D *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis

2: I-580 EB On-Ramp & Oakland Avenue

Near-Term AM
Kaiser Center Transportation Study
























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 468 | 165 | 1004 | 422 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1730 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1730 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 482 | 179 | 1091 | 459 | 30 |
| RTOR Reduction (vph) | 79 | 55 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 249 | 278 | 1091 | 489 | 0 |
| Confl. Peds. (#/hr) | | | | | 2 |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 12.9 | 12.9 | 39.6 | 16.6 | |
| Effective Green, g (s) | 12.9 | 12.9 | 39.6 | 16.6 | |
| Actuated g/C Ratio | 0.22 | 0.22 | 0.66 | 0.28 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 361 | 372 | 2336 | 438 | |
| v/s Ratio Prot | | | c0.31 | c0.31 | |
| v/s Ratio Perm | 0.15 | 0.16 | | | |
| v/c Ratio | 0.69 | 0.75 | 0.47 | 1.12 | |
| Uniform Delay, d1 | 21.7 | 22.0 | 5.0 | 21.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 4.3 | 7.0 | 0.7 | 78.6 | |
| Delay (s) | 26.0 | 29.0 | 5.7 | 100.3 | |
| Level of Service | C | C | A | F | |
| Approach Delay (s) | | 27.5 | 35.0 | | |
| Approach LOS | | C | C | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 32.8 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | 0.73 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 51.8% | | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |  |  | | |  |  |  | |  |  |  |
| Volume (vph) | 38 | 110 | 74 | 20 | 45 | 15 | 150 | 134 | 14 | 235 | 307 | 26 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | | | 1.00 | 1.00 | 0.91 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1477 | | | 1770 | 1863 | 1442 | | 3433 | 3494 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1477 | | | 1770 | 1863 | 1442 | | 3433 | 3494 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 41 | 120 | 80 | 22 | 49 | 16 | 163 | 141 | 15 | 255 | 334 | 28 |
| RTOR Reduction (vph) | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 118 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 41 | 120 | 89 | 0 | 0 | 65 | 163 | 23 | 0 | 270 | 357 | 0 |
| Confl. Peds. (#/hr) | 21 | | 21 | | | | | 27 | | 9 | | 8 |
| Confl. Bikes (#/hr) | | | 8 | | | | | 24 | | | | 1 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 5.2 | 12.7 | 12.7 | | | 7.4 | 14.9 | 14.9 | | 12.3 | 44.6 | |
| Effective Green, g (s) | 5.2 | 12.7 | 12.7 | | | 7.4 | 14.9 | 14.9 | | 12.3 | 44.6 | |
| Actuated g/C Ratio | 0.06 | 0.14 | 0.14 | | | 0.08 | 0.17 | 0.17 | | 0.14 | 0.50 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 102 | 499 | 208 | | | 146 | 308 | 239 | | 469 | 1731 | |
| v/s Ratio Prot | 0.02 | 0.03 | | | | 0.04 | c0.09 | | | c0.08 | c0.10 | |
| v/s Ratio Perm | | | c0.06 | | | | | 0.02 | | | | |
| v/c Ratio | 0.40 | 0.24 | 0.43 | | | 0.45 | 0.53 | 0.10 | | 0.58 | 0.21 | |
| Uniform Delay, d1 | 40.9 | 34.4 | 35.3 | | | 39.3 | 34.3 | 31.8 | | 36.4 | 12.8 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.6 | 0.3 | 1.4 | | | 2.2 | 1.6 | 0.2 | | 1.7 | 0.3 | |
| Delay (s) | 43.5 | 34.6 | 36.8 | | | 41.5 | 36.0 | 32.0 | | 38.1 | 13.0 | |
| Level of Service | D | C | D | | | D | D | C | | D | B | |
| Approach Delay (s) | | 36.8 | | | | | 35.4 | | | | 23.7 | |
| Approach LOS | | D | | | | | D | | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 27.5 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.67 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | Sum of lost time (s) | | | | 16.0 | | |
| Intersection Capacity Utilization | | | 66.9% | | | ICU Level of Service | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 96 | 939 | 95 | 94 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3450 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3450 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 104 | 1021 | 103 | 102 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 |
| Lane Group Flow (vph) | 104 | 1221 | 0 | 0 |
| Confl. Peds. (#/hr) | 18 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 9.3 | 41.6 | | |
| Effective Green, g (s) | 9.3 | 41.6 | | |
| Actuated g/C Ratio | 0.10 | 0.46 | | |
| Clearance Time (s) | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 183 | 1595 | | |
| v/s Ratio Prot | 0.06 | 0.35 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.57 | 0.77 | | |
| Uniform Delay, d1 | 38.4 | 20.1 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 4.0 | 3.6 | | |
| Delay (s) | 42.4 | 23.7 | | |
| Level of Service | D | C | | |
| Approach Delay (s) | | 25.2 | | |
| Approach LOS | | C | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 56 | 161 | 77 | 33 | 280 | 289 | 48 | 457 | 37 | 94 | 511 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1746 | 3321 | | | 3516 | 1543 | 1759 | 3484 | | 1766 | 3492 | |
| Flt Permitted | 0.55 | 1.00 | | | 0.90 | 1.00 | 0.37 | 1.00 | | 0.43 | 1.00 | |
| Satd. Flow (perm) | 1014 | 3321 | | | 3169 | 1543 | 692 | 3484 | | 799 | 3492 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 61 | 173 | 84 | 36 | 295 | 314 | 52 | 471 | 40 | 102 | 555 | 47 |
| RTOR Reduction (vph) | 0 | 48 | 0 | 0 | 0 | 148 | 0 | 7 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 61 | 209 | 0 | 0 | 331 | 166 | 52 | 504 | 0 | 102 | 595 | 0 |
| Confl. Peds. (#/hr) | 25 | | 25 | 18 | | 13 | 19 | | 13 | 6 | | 6 |
| Confl. Bikes (#/hr) | | 16 | 16 | 59 | | 5 | | 5 | 59 | | | 6 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 429 | 1407 | | | 1342 | 654 | 309 | 1558 | | 357 | 1561 | |
| v/s Ratio Prot | | 0.06 | | | | | | 0.14 | | | c0.17 | |
| v/s Ratio Perm | 0.06 | | | | 0.10 | c0.11 | 0.08 | | | 0.13 | | |
| v/c Ratio | 0.14 | 0.15 | | | 0.25 | 0.25 | 0.17 | 0.32 | | 0.29 | 0.38 | |
| Uniform Delay, d1 | 15.0 | 15.1 | | | 15.8 | 15.8 | 14.1 | 15.2 | | 14.9 | 15.7 | |
| Progression Factor | 1.00 | 0.95 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.2 | | | 0.4 | 0.9 | 1.2 | 0.6 | | 2.0 | 0.7 | |
| Delay (s) | 15.7 | 14.5 | | | 16.2 | 16.8 | 15.2 | 15.7 | | 16.9 | 16.4 | |
| Level of Service | B | B | | | B | B | B | B | | B | B | |
| Approach Delay (s) | | 14.8 | | | 16.5 | | | 15.7 | | | 16.4 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 16.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.32 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 93.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|-----------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 343 | 354 | 134 | 43 | 244 | 107 | 81 | 360 | 22 | 46 | 327 | 133 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1561 | 1765 | 1863 | 1547 | 1761 | 3498 | | 1764 | 3361 | |
| Flt Permitted | 0.49 | 1.00 | 1.00 | 0.53 | 1.00 | 1.00 | 0.29 | 1.00 | | 0.38 | 1.00 | |
| Satd. Flow (perm) | 916 | 1863 | 1561 | 992 | 1863 | 1547 | 529 | 3498 | | 710 | 3361 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 373 | 385 | 146 | 47 | 265 | 116 | 84 | 391 | 24 | 50 | 355 | 145 |
| RTOR Reduction (vph) | 0 | 0 | 57 | 0 | 0 | 57 | 0 | 7 | 0 | 0 | 69 | 0 |
| Lane Group Flow (vph) | 373 | 385 | 89 | 47 | 265 | 59 | 84 | 408 | 0 | 50 | 431 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | Permpm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 59.9 | 52.0 | 52.0 | 46.3 | 42.9 | 42.9 | 16.1 | 16.1 | | 16.1 | 16.1 | |
| Effective Green, g (s) | 59.9 | 52.0 | 52.0 | 46.3 | 42.9 | 42.9 | 16.1 | 16.1 | | 16.1 | 16.1 | |
| Actuated g/C Ratio | 0.70 | 0.61 | 0.61 | 0.54 | 0.50 | 0.50 | 0.19 | 0.19 | | 0.19 | 0.19 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 771 | 1140 | 955 | 571 | 940 | 781 | 100 | 663 | | 134 | 637 | |
| v/s Ratio Prot | c0.07 | 0.21 | | 0.00 | 0.14 | | | 0.12 | | | 0.13 | |
| v/s Ratio Perm | c0.27 | | 0.06 | 0.04 | | 0.04 | c0.16 | | | 0.07 | | |
| v/c Ratio | 0.48 | 0.34 | 0.09 | 0.08 | 0.28 | 0.07 | 0.84 | 0.61 | | 0.37 | 0.68 | |
| Uniform Delay, d1 | 5.3 | 8.1 | 6.8 | 9.1 | 12.2 | 10.8 | 33.2 | 31.6 | | 30.0 | 32.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.65 | 0.68 | 0.36 | 0.91 | 0.89 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.8 | 0.2 | 0.0 | 0.7 | 0.2 | 41.3 | 1.2 | | 0.6 | 2.2 | |
| Delay (s) | 5.5 | 8.9 | 7.0 | 5.9 | 9.0 | 4.1 | 71.5 | 29.4 | | 30.7 | 34.3 | |
| Level of Service | A | A | A | A | A | A | E | C | | C | C | |
| Approach Delay (s) | | 7.2 | | | 7.4 | | | 36.5 | | | 34.0 | |
| Approach LOS | | A | | | A | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 19.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.56 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 72.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

6: 27th Street & I-980 On Ramp

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 155 | 823 | 0 | 0 | 149 | 286 | 5 | 259 | 25 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1608 | 3387 | | | 3539 | 2787 | | 5007 | | | | |
| Flt Permitted | 0.65 | 0.95 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 1099 | 3219 | | | 3539 | 2787 | | 5007 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 168 | 895 | 0 | 0 | 162 | 311 | 5 | 282 | 27 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 187 | 0 | 16 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 151 | 912 | 0 | 0 | 162 | 124 | 0 | 298 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 6 | | 6 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 4 | | | 3 |
| Turn Type | Perm | | | Perm | | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 440 | 1288 | | | 1416 | 1115 | | 2003 | | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | 0.14 | 0.28 | | | | 0.04 | | 0.06 | | | | |
| v/c Ratio | 0.34 | 0.71 | | | 0.11 | 0.11 | | 0.15 | | | | |
| Uniform Delay, d1 | 8.3 | 10.0 | | | 7.5 | 7.5 | | 7.7 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 2.1 | 3.3 | | | 0.2 | 0.2 | | 0.2 | | | | |
| Delay (s) | 10.5 | 13.4 | | | 7.7 | 7.7 | | 7.8 | | | | |
| Level of Service | B | B | | | A | A | | A | | | | |
| Approach Delay (s) | | 12.9 | | | 7.7 | | | 7.8 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.7 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.43 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 56.1% | | | ICU Level of Service | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 280 | 27 | 11 | 158 | 0 | 0 | 0 | 0 | 681 | 990 | 351 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1558 | | 3526 | | | | | 1610 | 3369 | 1583 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1558 | | 3296 | | | | | 1610 | 3369 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 0 | 304 | 29 | 12 | 172 | 0 | 0 | 0 | 0 | 740 | 1065 | 382 |
| RTOR Reduction (vph) | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 185 |
| Lane Group Flow (vph) | 0 | 304 | 10 | 0 | 184 | 0 | 0 | 0 | 0 | 585 | 1220 | 197 |
| Confl. Peds. (#/hr) | 2 | | 2 | 10 | | 10 | 6 | | 6 | | | |
| Confl. Bikes (#/hr) | | | 3 | | | 4 | | | 1 | | | |
| Turn Type | | Perm | | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | | 8 | | | | | | 6 | |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 545 | | 1154 | | | | | 832 | 1741 | 818 |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.06 | | | | | c0.36 | 0.36 | 0.12 |
| v/c Ratio | | 0.25 | 0.02 | | 0.16 | | | | | 0.70 | 0.70 | 0.24 |
| Uniform Delay, d1 | | 13.9 | 12.8 | | 13.4 | | | | | 11.0 | 11.0 | 8.0 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.5 | 0.1 | | 0.3 | | | | | 4.9 | 2.4 | 0.7 |
| Delay (s) | | 14.3 | 12.8 | | 13.7 | | | | | 15.9 | 13.4 | 8.7 |
| Level of Service | | B | B | | B | | | | | B | B | A |
| Approach Delay (s) | | 14.2 | | | 13.7 | | 0.0 | | | | 13.2 | |
| Approach LOS | | B | | | B | | A | | | | B | |

Intersection Summary

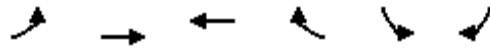
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 68.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 195 | 568 | 669 | 122 | 765 | 197 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.98 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3441 | | 3431 | 1414 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3441 | | 3431 | 1414 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 212 | 617 | 727 | 133 | 832 | 214 |
| RTOR Reduction (vph) | 0 | 0 | 17 | 0 | 2 | 136 |
| Lane Group Flow (vph) | 212 | 617 | 843 | 0 | 851 | 57 |
| Confl. Peds. (#/hr) | 14 | | | 11 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 10 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 12.8 | 48.2 | 31.4 | | 23.8 | 23.8 |
| Effective Green, g (s) | 12.8 | 48.2 | 31.4 | | 23.8 | 23.8 |
| Actuated g/C Ratio | 0.16 | 0.60 | 0.39 | | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 283 | 2132 | 1351 | | 1021 | 421 |
| v/s Ratio Prot | c0.12 | 0.17 | c0.24 | | c0.25 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 0.75 | 0.29 | 0.62 | | 0.83 | 0.14 |
| Uniform Delay, d1 | 32.1 | 7.7 | 19.6 | | 26.2 | 20.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 9.1 | 0.3 | 2.2 | | 5.7 | 0.1 |
| Delay (s) | 41.2 | 8.0 | 21.7 | | 31.9 | 20.6 |
| Level of Service | D | A | C | | C | C |
| Approach Delay (s) | | 16.5 | 21.7 | | 29.9 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 23.2 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.72 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 67.3% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|-------|-------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 108 | 776 | 357 | 68 | 419 | 65 | 201 | 256 | 31 | 86 | 354 | 77 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1766 | 3427 | 1553 | 1768 | 3348 | | 1768 | 3470 | | 1757 | 3430 | |
| Flt Permitted | 0.32 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.41 | 1.00 | | 0.57 | 1.00 | |
| Satd. Flow (perm) | 599 | 3427 | 1553 | 304 | 3348 | | 761 | 3470 | | 1049 | 3430 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 117 | 808 | 388 | 74 | 455 | 71 | 218 | 269 | 34 | 93 | 385 | 84 |
| RTOR Reduction (vph) | 0 | 0 | 276 | 0 | 14 | 0 | 0 | 11 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 117 | 808 | 112 | 74 | 512 | 0 | 218 | 292 | 0 | 93 | 449 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | 4 | | | | 4 | 5 | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | | 50.0 | 50.0 | | 36.2 | 36.2 | |
| Effective Green, g (s) | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | | 50.0 | 50.0 | | 36.2 | 36.2 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | | 0.59 | 0.59 | | 0.43 | 0.43 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 173 | 988 | 448 | 88 | 965 | | 558 | 2041 | | 447 | 1461 | |
| v/s Ratio Prot | | 0.24 | | | 0.15 | | c0.04 | 0.08 | | | 0.13 | |
| v/s Ratio Perm | 0.20 | | 0.07 | c0.24 | | | c0.19 | | | 0.09 | | |
| v/c Ratio | 0.68 | 0.82 | 0.25 | 0.84 | 0.53 | | 0.39 | 0.14 | | 0.21 | 0.31 | |
| Uniform Delay, d1 | 26.7 | 28.2 | 23.2 | 28.4 | 25.4 | | 8.5 | 7.9 | | 15.4 | 16.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.14 | 1.17 | |
| Incremental Delay, d2 | 19.2 | 7.5 | 1.3 | 59.2 | 2.1 | | 0.2 | 0.1 | | 1.0 | 0.5 | |
| Delay (s) | 46.0 | 35.7 | 24.5 | 87.6 | 27.5 | | 8.7 | 8.0 | | 18.5 | 19.4 | |
| Level of Service | D | D | C | F | C | | A | A | | B | B | |
| Approach Delay (s) | | 33.3 | | | 34.9 | | | 8.3 | | | 19.3 | |
| Approach LOS | | C | | | C | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 26.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 73.8% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | ↰ | ↱ | | | ↰ | | ↰ | ↱ | ↱ | ↰ | ↱ | |
| Volume (vph) | 87 | 653 | 62 | 94 | 484 | 72 | 100 | 416 | 90 | 60 | 360 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1753 | 3369 | | | 3324 | | 1763 | 3539 | 1530 | 1761 | 3430 | |
| Flt Permitted | 0.25 | 1.00 | | | 0.64 | | 0.46 | 1.00 | 1.00 | 0.47 | 1.00 | |
| Satd. Flow (perm) | 467 | 3369 | | | 2128 | | 846 | 3539 | 1530 | 873 | 3430 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 95 | 710 | 67 | 102 | 526 | 78 | 109 | 452 | 98 | 65 | 391 | 85 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 13 | 0 | 0 | 0 | 46 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 95 | 767 | 0 | 0 | 693 | 0 | 109 | 452 | 52 | 65 | 457 | 0 |
| Confl. Peds. (#/hr) | 34 | | 34 | 37 | | 37 | 8 | | 8 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 11 | | | 8 | | | 35 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | 2 | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 29.7 | 29.7 | | | 29.7 | | 42.3 | 42.3 | 42.3 | 42.3 | 42.3 | |
| Effective Green, g (s) | 29.7 | 29.7 | | | 29.7 | | 42.3 | 42.3 | 42.3 | 42.3 | 42.3 | |
| Actuated g/C Ratio | 0.37 | 0.37 | | | 0.37 | | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 173 | 1251 | | | 790 | | 447 | 1871 | 809 | 462 | 1814 | |
| v/s Ratio Prot | | 0.23 | | | | | | 0.13 | | | c0.13 | |
| v/s Ratio Perm | 0.20 | | | | c0.33 | | 0.13 | | 0.03 | 0.07 | | |
| v/c Ratio | 0.55 | 0.61 | | | 0.88 | | 0.24 | 0.24 | 0.06 | 0.14 | 0.25 | |
| Uniform Delay, d1 | 19.9 | 20.5 | | | 23.4 | | 10.2 | 10.2 | 9.2 | 9.6 | 10.2 | |
| Progression Factor | 1.00 | 1.00 | | | 1.18 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.9 | 0.6 | | | 10.4 | | 1.3 | 0.3 | 0.2 | 0.6 | 0.3 | |
| Delay (s) | 21.8 | 21.1 | | | 38.2 | | 11.5 | 10.5 | 9.3 | 10.2 | 10.6 | |
| Level of Service | C | C | | | D | | B | B | A | B | B | |
| Approach Delay (s) | | 21.2 | | | 38.2 | | | 10.5 | | | 10.5 | |
| Approach LOS | | C | | | D | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 20.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 82.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|-------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 0 | 386 | 312 | 119 | 439 | 0 | 0 | 0 | 0 | 10 | 158 | 19 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frpb, ped/bikes | | 0.97 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Frt | | 0.93 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 3113 | | 1770 | 3427 | | | | | | 3416 | |
| Flt Permitted | | 1.00 | | 0.22 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 3113 | | 406 | 3427 | | | | | | 3416 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 415 | 339 | 129 | 477 | 0 | 0 | 0 | 0 | 11 | 172 | 21 |
| RTOR Reduction (vph) | 0 | 171 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 583 | 0 | 129 | 477 | 0 | 0 | 0 | 0 | 0 | 193 | 0 |
| Confl. Peds. (#/hr) | 26 | | 26 | 28 | | 28 | 21 | | 21 | 101 | | 101 |
| Confl. Bikes (#/hr) | | | 4 | | | 4 | | | 3 | | | 6 |
| Turn Type | Perm | | pm+pt | | | | | | Perm | | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | | | | 4 | | |
| Actuated Green, G (s) | | 31.6 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | | 31.6 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | | 0.40 | | 0.54 | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1230 | | 327 | 1842 | | | | | | 1238 | |
| v/s Ratio Prot | | c0.19 | | c0.03 | 0.14 | | | | | | | |
| v/s Ratio Perm | | | | 0.18 | | | | | | | 0.06 | |
| v/c Ratio | | 0.47 | | 0.39 | 0.26 | | | | | | 0.16 | |
| Uniform Delay, d1 | | 18.0 | | 10.8 | 9.9 | | | | | | 17.2 | |
| Progression Factor | | 2.64 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | | 1.2 | | 0.3 | 0.3 | | | | | | 0.3 | |
| Delay (s) | | 48.7 | | 11.1 | 10.3 | | | | | | 17.5 | |
| Level of Service | | D | | B | B | | | | | | B | |
| Approach Delay (s) | | 48.7 | | | 10.5 | | | 0.0 | | | 17.5 | |
| Approach LOS | | D | | | B | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 29.8 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.33 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 65.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↔↔↔ | ↗ | | ↔↔↔ | |
| Volume (vph) | 62 | 148 | 77 | 406 | 547 | 119 | 121 | 741 | 341 | 33 | 686 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 1.00 | 0.94 | | 1.00 | 0.90 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 5037 | 1419 | | 4961 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.68 | 1.00 | | 0.86 | |
| Satd. Flow (perm) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 3435 | 1419 | | 4256 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 67 | 161 | 84 | 441 | 595 | 129 | 132 | 805 | 371 | 36 | 738 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 72 | 0 | 0 | 237 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 67 | 161 | 53 | 441 | 595 | 57 | 0 | 937 | 134 | 0 | 855 | 0 |
| Confl. Peds. (#/hr) | 38 | | 38 | 34 | | 34 | 60 | | 60 | 28 | | 28 |
| Confl. Bikes (#/hr) | | | 12 | | | 18 | | | 39 | | | 9 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 5.5 | 33.7 | 33.7 | 15.3 | 44.5 | 44.5 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 5.5 | 33.7 | 33.7 | 15.3 | 44.5 | 44.5 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.06 | 0.34 | 0.34 | 0.15 | 0.44 | 0.44 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 189 | 1193 | 498 | 525 | 1575 | 661 | | 1237 | 511 | | 1532 | |
| v/s Ratio Prot | 0.02 | 0.05 | | c0.13 | c0.17 | | | | | | | |
| v/s Ratio Perm | | | 0.04 | | | 0.04 | | c0.27 | 0.09 | | 0.20 | |
| v/c Ratio | 0.35 | 0.13 | 0.11 | 0.84 | 0.38 | 0.09 | | 0.76 | 0.26 | | 0.56 | |
| Uniform Delay, d1 | 45.5 | 23.0 | 22.8 | 41.2 | 18.5 | 16.0 | | 28.2 | 22.6 | | 25.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.2 | 0.4 | 11.1 | 0.7 | 0.3 | | 4.4 | 1.2 | | 1.5 | |
| Delay (s) | 46.0 | 23.3 | 23.2 | 52.3 | 19.2 | 16.3 | | 32.5 | 23.8 | | 27.1 | |
| Level of Service | D | C | C | D | B | B | | C | C | | C | |
| Approach Delay (s) | | 28.1 | | | 31.4 | | | 30.1 | | | 27.1 | |
| Approach LOS | | C | | | C | | | C | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 29.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.60 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 89.9% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Near-Term AM
Kaiser Center Transportation Study

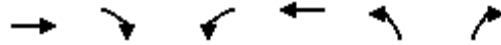


| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|-------|----------------------|------|
| Lane Configurations | WT | | T | TTT | TTT | |
| Volume (vph) | 59 | 38 | 99 | 947 | 1088 | 313 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.97 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.94 | | 1.00 | 1.00 | 0.97 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3199 | | 1766 | 3725 | 6191 | |
| Flt Permitted | 0.97 | | 0.14 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3199 | | 253 | 3725 | 6191 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.93 | 0.92 |
| Adj. Flow (vph) | 64 | 41 | 108 | 986 | 1170 | 340 |
| RTOR Reduction (vph) | 38 | 0 | 0 | 0 | 30 | 0 |
| Lane Group Flow (vph) | 67 | 0 | 108 | 986 | 1480 | 0 |
| Confl. Peds. (#/hr) | 36 | 36 | 109 | | | |
| Confl. Bikes (#/hr) | | 14 | | | | |
| Turn Type | pm+pt | | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 6.0 | | 60.5 | 54.5 | 54.5 | |
| Effective Green, g (s) | 6.0 | | 60.5 | 54.5 | 54.5 | |
| Actuated g/C Ratio | 0.08 | | 0.76 | 0.68 | 0.68 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 240 | | 305 | 2538 | 4218 | |
| v/s Ratio Prot | c0.02 | | c0.03 | c0.26 | 0.24 | |
| v/s Ratio Perm | | | 0.24 | | | |
| v/c Ratio | 0.28 | | 0.35 | 0.39 | 0.35 | |
| Uniform Delay, d1 | 35.0 | | 2.7 | 5.5 | 5.3 | |
| Progression Factor | 1.00 | | 1.49 | 1.17 | 1.00 | |
| Incremental Delay, d2 | 0.6 | | 0.6 | 0.4 | 0.2 | |
| Delay (s) | 35.6 | | 4.6 | 6.9 | 5.6 | |
| Level of Service | D | | A | A | A | |
| Approach Delay (s) | 35.6 | | | 6.7 | 5.6 | |
| Approach LOS | D | | | A | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 7.2 | | HCM Level of Service | A |
| HCM Volume to Capacity ratio | | | 0.38 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | | | 56.5% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

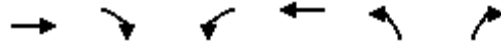
Near-Term AM
Kaiser Center Transportation Study






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 101 | 30 | 87 | 326 | 1 | 1 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 110 | 33 | 95 | 354 | 1 | 1 |
| Pedestrians | 7 | | | 7 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 144 | | 679 | 135 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 144 | | 679 | 135 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 93 | | 100 | 100 |
| cM capacity (veh/h) | | | 1436 | | 387 | 907 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 142 | 449 | 2 | | | |
| Volume Left | 0 | 95 | 1 | | | |
| Volume Right | 33 | 0 | 1 | | | |
| cSH | 1700 | 1436 | 542 | | | |
| Volume to Capacity | 0.08 | 0.07 | 0.00 | | | |
| Queue Length 95th (ft) | 0 | 5 | 0 | | | |
| Control Delay (s) | 0.0 | 2.1 | 11.7 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 2.1 | 11.7 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.6 | | | |
| Intersection Capacity Utilization | | 45.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

Near-Term AM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|----------------------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 128 | 103 | 138 | 190 | 2 | 2 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 139 | 112 | 150 | 207 | 2 | 2 |
| Pedestrians | 24 | | | 24 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 2 | | | 2 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 253 | | 728 | 221 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 253 | | 728 | 221 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 89 | | 99 | 100 |
| cM capacity (veh/h) | | | 1310 | | 338 | 801 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 251 | 357 | 4 | | | |
| Volume Left | 0 | 150 | 2 | | | |
| Volume Right | 112 | 0 | 2 | | | |
| cSH | 1700 | 1310 | 476 | | | |
| Volume to Capacity | 0.15 | 0.11 | 0.01 | | | |
| Queue Length 95th (ft) | 0 | 10 | 1 | | | |
| Control Delay (s) | 0.0 | 4.0 | 12.6 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 4.0 | 12.6 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | 49.6% | | ICU Level of Service | | A | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

16: 21st Street & Garage Entrance West

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 93 | 8 | 39 | 396 | 25 | 15 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 1.00 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 101 | 8 | 42 | 430 | 27 | 16 |
| Pedestrians | 16 | | | 16 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | | 111 | 638 | 123 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | | 111 | 638 | 123 |
| tC, single (s) | | | | 4.1 | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | | 2.2 | 3.5 | 3.3 |
| p0 queue free % | | | | 97 | 94 | 98 |
| cM capacity (veh/h) | | | | 1476 | 422 | 914 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 109 | 473 | 14 | 14 | 8 | 8 |
| Volume Left | 0 | 42 | 14 | 14 | 0 | 0 |
| Volume Right | 8 | 0 | 0 | 0 | 8 | 8 |
| cSH | 1700 | 1476 | 422 | 422 | 914 | 914 |
| Volume to Capacity | 0.06 | 0.03 | 0.03 | 0.03 | 0.01 | 0.01 |
| Queue Length 95th (ft) | 0 | 2 | 2 | 2 | 1 | 1 |
| Control Delay (s) | 0.0 | 0.9 | 13.8 | 13.8 | 9.0 | 9.0 |
| Lane LOS | | A | B | B | A | A |
| Approach Delay (s) | 0.0 | 0.9 | 12.0 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | | 1.5 | | |
| Intersection Capacity Utilization | 43.8% | | | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis

17: 21st Street & Webster Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 190 | 56 | 50 | 51 | 0 | 0 | 0 | 0 | 154 | 400 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.94 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1341 | | 1712 | | | | | | 4795 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.63 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1341 | | 1100 | | | | | | 4795 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 207 | 61 | 54 | 55 | 0 | 0 | 0 | 0 | 167 | 435 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 207 | 11 | 0 | 109 | 0 | 0 | 0 | 0 | 0 | 632 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | 2 | |
| Permitted Phases | | | 4 | | 4 | | | | | | 2 | |
| Actuated Green, G (s) | | 14.8 | 14.8 | | 14.8 | | | | | | 57.2 | |
| Effective Green, g (s) | | 14.8 | 14.8 | | 14.8 | | | | | | 57.2 | |
| Actuated g/C Ratio | | 0.18 | 0.18 | | 0.18 | | | | | | 0.72 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 345 | 248 | | 204 | | | | | | 3428 | |
| v/s Ratio Prot | | c0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.10 | | | | | | 0.13 | |
| v/c Ratio | | 0.60 | 0.05 | | 0.53 | | | | | | 0.18 | |
| Uniform Delay, d1 | | 29.9 | 26.8 | | 29.5 | | | | | | 3.7 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.71 | |
| Incremental Delay, d2 | | 2.9 | 0.1 | | 2.7 | | | | | | 0.1 | |
| Delay (s) | | 32.8 | 26.9 | | 32.2 | | | | | | 2.8 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 31.5 | | | 32.2 | | | 0.0 | | | 2.8 | |
| Approach LOS | | C | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.27 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 54.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↰ | | | ↰↰ | ↰ | | | |
| Volume (vph) | 7 | 172 | 4 | 0 | 39 | 34 | 10 | 202 | 81 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 1.00 | 0.87 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1847 | | | 1643 | | | 3514 | 1376 | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1839 | | | 1643 | | | 3514 | 1376 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 8 | 187 | 4 | 0 | 42 | 37 | 11 | 220 | 88 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 13 | 0 | 0 | 0 | 74 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 198 | 0 | 0 | 66 | 0 | 0 | 231 | 14 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 29.7 | | | 29.7 | | | 7.3 | 7.3 | | | |
| Effective Green, g (s) | | 29.7 | | | 29.7 | | | 7.3 | 7.3 | | | |
| Actuated g/C Ratio | | 0.66 | | | 0.66 | | | 0.16 | 0.16 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1214 | | | 1084 | | | 570 | 223 | | | |
| v/s Ratio Prot | | | | | 0.04 | | | | | | | |
| v/s Ratio Perm | | c0.11 | | | | | | 0.07 | 0.01 | | | |
| v/c Ratio | | 0.16 | | | 0.06 | | | 0.41 | 0.06 | | | |
| Uniform Delay, d1 | | 2.9 | | | 2.7 | | | 16.9 | 16.0 | | | |
| Progression Factor | | 0.89 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.1 | | | 0.2 | 0.0 | | | |
| Delay (s) | | 2.9 | | | 2.8 | | | 17.1 | 16.0 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 2.9 | | | 2.8 | | | 16.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.3 | | | | | | HCM Level of Service | B | | | |
| HCM Volume to Capacity ratio | | 0.21 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 34.7% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 11 | 114 | 17 | 24 | 0 | 35 | 0 | 319 | 38 | 42 | 354 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.92 | | | 0.98 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1751 | 1822 | | | 1649 | | | 3455 | | | 3508 | |
| Flt Permitted | 0.72 | 1.00 | | | 0.89 | | | 1.00 | | | 0.88 | |
| Satd. Flow (perm) | 1319 | 1822 | | | 1499 | | | 3455 | | | 3103 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 12 | 124 | 18 | 26 | 0 | 38 | 0 | 347 | 41 | 46 | 385 | 0 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 22 | 0 | 0 | 20 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 12 | 132 | 0 | 0 | 42 | 0 | 0 | 368 | 0 | 0 | 431 | 0 |
| Confl. Peds. (#/hr) | 16 | | 16 | 17 | | 17 | 43 | | 43 | 44 | | 44 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | 16 |
| Turn Type | Perm | | | Perm | | | | Perm | | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 557 | 769 | | | 633 | | | 1305 | | | 1172 | |
| v/s Ratio Prot | c0.07 | | | | | | | 0.11 | | | | |
| v/s Ratio Perm | 0.01 | | | | 0.03 | | | | | | c0.14 | |
| v/c Ratio | 0.02 | 0.17 | | | 0.07 | | | 0.28 | | | 0.37 | |
| Uniform Delay, d1 | 7.6 | 8.1 | | | 7.7 | | | 9.8 | | | 10.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.22 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.5 | | | 0.2 | | | 0.5 | | | 0.9 | |
| Delay (s) | 7.7 | 8.6 | | | 9.6 | | | 10.3 | | | 11.0 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 8.5 | | | 9.6 | | | 10.3 | | | 11.0 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.26 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 66.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | ↔ | ↔↔ | |
| Volume (vph) | 19 | 77 | 20 | 12 | 196 | 99 | 34 | 458 | 24 | 158 | 163 | 58 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | 0.95 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3401 | | | 3325 | | | 3497 | | 1769 | 3383 | |
| Flt Permitted | | 0.86 | | | 0.94 | | | 0.92 | | 0.38 | 1.00 | |
| Satd. Flow (perm) | | 2947 | | | 3133 | | | 3237 | | 712 | 3383 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 21 | 84 | 22 | 13 | 209 | 108 | 37 | 467 | 26 | 172 | 177 | 63 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 90 | 0 | 0 | 5 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 0 | 109 | 0 | 0 | 240 | 0 | 0 | 526 | 0 | 172 | 220 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 9.9 | | | 9.9 | | | 30.0 | | 41.1 | 41.1 | |
| Effective Green, g (s) | | 9.9 | | | 9.9 | | | 30.0 | | 41.1 | 41.1 | |
| Actuated g/C Ratio | | 0.16 | | | 0.16 | | | 0.50 | | 0.68 | 0.68 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 486 | | | 517 | | | 1619 | | 604 | 2317 | |
| v/s Ratio Prot | | | | | | | | | | c0.03 | 0.07 | |
| v/s Ratio Perm | | 0.04 | | | c0.08 | | | c0.16 | | 0.16 | | |
| v/c Ratio | | 0.22 | | | 0.46 | | | 0.32 | | 0.28 | 0.10 | |
| Uniform Delay, d1 | | 21.7 | | | 22.7 | | | 9.0 | | 3.6 | 3.2 | |
| Progression Factor | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.6 | | | 0.5 | | 0.3 | 0.1 | |
| Delay (s) | | 22.0 | | | 23.1 | | | 9.5 | | 3.9 | 3.3 | |
| Level of Service | | C | | | C | | | A | | A | A | |
| Approach Delay (s) | | 22.0 | | | 23.1 | | | 9.5 | | | 3.5 | |
| Approach LOS | | C | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 12.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.35 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 56.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕↕ | |
| Volume (vph) | 8 | 152 | 61 | 48 | 154 | 111 | 60 | 478 | 68 | 63 | 413 | 26 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.98 | | | 0.96 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.96 | | | 0.95 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | | 3318 | | | 3149 | | | 3412 | | | 4981 | |
| Flt Permitted | | 0.94 | | | 0.88 | | | 0.86 | | | 0.80 | |
| Satd. Flow (perm) | | 3130 | | | 2791 | | | 2958 | | | 4009 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 9 | 165 | 66 | 52 | 167 | 121 | 65 | 514 | 74 | 68 | 449 | 28 |
| RTOR Reduction (vph) | 0 | 42 | 0 | 0 | 77 | 0 | 0 | 17 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 198 | 0 | 0 | 263 | 0 | 0 | 636 | 0 | 0 | 535 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 99 | | 99 | 72 | | 72 | 49 | | 49 |
| Confl. Bikes (#/hr) | | | 7 | | | 33 | | | 10 | | | 6 |
| Turn Type | Perm | | | Perm | | | Prot | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1148 | | | 1023 | | | 1483 | | | 1203 | |
| v/s Ratio Prot | | | | | | | | c0.05 | | | | |
| v/s Ratio Perm | | 0.06 | | | c0.09 | | | c0.16 | | | 0.13 | |
| v/c Ratio | | 0.17 | | | 0.26 | | | 0.43 | | | 0.44 | |
| Uniform Delay, d1 | | 12.8 | | | 13.3 | | | 10.1 | | | 17.0 | |
| Progression Factor | | 0.85 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.6 | | | 0.9 | | | 1.2 | |
| Delay (s) | | 11.2 | | | 13.9 | | | 11.0 | | | 18.2 | |
| Level of Service | | B | | | B | | | B | | | B | |
| Approach Delay (s) | | 11.2 | | | 13.9 | | | 11.0 | | | 18.2 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.35 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 76.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 29 | 277 | 0 | 0 | 252 | 86 | 32 | 190 | 94 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3512 | | | 3366 | 1337 | | 5008 | 1456 | | | |
| Flt Permitted | | 0.91 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3225 | | | 3366 | 1337 | | 5008 | 1456 | | | |
| Peak-hour factor, PHF | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 30 | 301 | 0 | 0 | 274 | 93 | 35 | 207 | 102 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 17 | 0 | 0 | 90 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 331 | 0 | 0 | 282 | 67 | 0 | 242 | 12 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | Perm | | | Perm | Perm | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 63.8 | | | 63.8 | 63.8 | | 9.2 | 9.2 | | | |
| Effective Green, g (s) | | 63.8 | | | 63.8 | 63.8 | | 9.2 | 9.2 | | | |
| Actuated g/C Ratio | | 0.80 | | | 0.80 | 0.80 | | 0.12 | 0.12 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2572 | | | 2684 | 1066 | | 576 | 167 | | | |
| v/s Ratio Prot | | | | | 0.08 | | | | | | | |
| v/s Ratio Perm | | c0.10 | | | | 0.05 | | 0.05 | 0.01 | | | |
| v/c Ratio | | 0.13 | | | 0.11 | 0.06 | | 0.42 | 0.07 | | | |
| Uniform Delay, d1 | | 1.8 | | | 1.8 | 1.7 | | 32.9 | 31.6 | | | |
| Progression Factor | | 1.00 | | | 0.26 | 0.01 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.5 | 0.2 | | | |
| Delay (s) | | 1.9 | | | 0.5 | 0.1 | | 33.4 | 31.8 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 1.9 | | | 0.4 | | | 32.9 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.17 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 55.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

23: 20th Street & Webster Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 226 | 150 | 158 | 249 | 0 | 0 | 0 | 0 | 67 | 340 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.90 | 1.00 | 1.00 | | | | | | 0.94 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 0.99 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1422 | 1610 | 3350 | | | | | | 4452 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.94 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1422 | 1610 | 3148 | | | | | | 4452 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 246 | 158 | 172 | 271 | 0 | 0 | 0 | 0 | 73 | 370 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 112 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 0 |
| Lane Group Flow (vph) | 0 | 246 | 46 | 143 | 300 | 0 | 0 | 0 | 0 | 0 | 497 | 0 |
| Confl. Peds. (#/hr) | 53 | | 53 | 86 | | 86 | 105 | | 105 | 331 | | 331 |
| Confl. Bikes (#/hr) | | | 16 | | | 2 | | | 1 | | | 14 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Effective Green, g (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | 0.20 | 0.51 | | | | | | 0.39 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 929 | 373 | 322 | 1654 | | | | | | 1725 | |
| v/s Ratio Prot | | c0.07 | | c0.09 | 0.04 | | | | | | | |
| v/s Ratio Perm | | | 0.03 | | 0.06 | | | | | | 0.11 | |
| v/c Ratio | | 0.26 | 0.12 | 0.44 | 0.18 | | | | | | 0.29 | |
| Uniform Delay, d1 | | 23.4 | 22.5 | 28.1 | 10.5 | | | | | | 16.9 | |
| Progression Factor | | 1.09 | 1.76 | 1.26 | 1.75 | | | | | | 1.12 | |
| Incremental Delay, d2 | | 0.7 | 0.7 | 0.3 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 26.3 | 40.2 | 35.7 | 18.3 | | | | | | 18.9 | |
| Level of Service | | C | D | D | B | | | | | | B | |
| Approach Delay (s) | | 31.7 | | | 23.9 | | | 0.0 | | | 18.9 | |
| Approach LOS | | C | | | C | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.32 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 87.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Near-Term AM
Kaiser Center Transportation Study

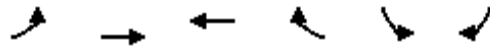









| Movement | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER |
|-----------------------------------|------|-------|-------|-------|----------------------|--------|--------|------|------|------|
| Lane Configurations | 🚗🚗🚗 | | | | 🚗🚗 | 🚗🚗 | 🚗 | 🚗 | | |
| Volume (vph) | 122 | 171 | 61 | 30 | 318 | 400 | 337 | 59 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Lane Util. Factor | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | |
| Frpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Frt | 0.91 | | | | 1.00 | 0.97 | 0.85 | 0.85 | | |
| Flt Protected | 0.98 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (prot) | 4696 | | | | 3500 | 3286 | 1441 | 1583 | | |
| Flt Permitted | 0.98 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (perm) | 4696 | | | | 3500 | 3286 | 1441 | 1583 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.94 | 0.96 | 0.92 | 0.96 | 0.96 | 0.92 | 0.92 |
| Adj. Flow (vph) | 133 | 186 | 65 | 32 | 331 | 435 | 351 | 61 | 0 | 0 |
| RTOR Reduction (vph) | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 |
| Lane Group Flow (vph) | 177 | 0 | 0 | 0 | 428 | 547 | 239 | 37 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | 102 | | |
| Confl. Bikes (#/hr) | | | | | 6 | | | 10 | | |
| Turn Type | | | Split | Split | | custom | custom | | | |
| Protected Phases | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | |
| Permitted Phases | 1 | | | | | | 6 | | | |
| Actuated Green, G (s) | 19.0 | | | | 24.0 | 25.0 | 48.0 | 48.0 | | |
| Effective Green, g (s) | 19.0 | | | | 24.0 | 25.0 | 48.0 | 48.0 | | |
| Actuated g/C Ratio | 0.24 | | | | 0.30 | 0.31 | 0.60 | 0.60 | | |
| Clearance Time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 1115 | | | | 1050 | 1027 | 865 | 950 | | |
| v/s Ratio Prot | 0.04 | | | | c0.12 | c0.17 | c0.17 | 0.02 | | |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.16 | | | | 0.41 | 0.53 | 0.28 | 0.04 | | |
| Uniform Delay, d1 | 24.2 | | | | 22.3 | 22.7 | 7.7 | 6.6 | | |
| Progression Factor | 2.93 | | | | 1.00 | 0.66 | 0.69 | 0.36 | | |
| Incremental Delay, d2 | 0.3 | | | | 0.1 | 0.3 | 0.8 | 0.1 | | |
| Delay (s) | 71.1 | | | | 22.4 | 15.3 | 6.1 | 2.4 | | |
| Level of Service | E | | | | C | B | A | A | | |
| Approach Delay (s) | 71.1 | | | | 22.4 | 11.8 | | | 0.0 | |
| Approach LOS | E | | | | C | B | | | A | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | 26.5 | | | HCM Level of Service | | | | C | |
| HCM Volume to Capacity ratio | | 0.42 | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | | 12.0 | |
| Intersection Capacity Utilization | | 56.6% | | | ICU Level of Service | | | | B | |
| Analysis Period (min) | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

25: 20th Street & Access Road Exit

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR | |
|-----------------------------------|---|---|---|------|----------------------|---|------|
| Lane Configurations |  |    |   | | |  | |
| Volume (veh/h) | 34 | 293 | 398 | 0 | 0 | 37 | |
| Sign Control | | Free | Free | | Stop | | |
| Grade | | 0% | 0% | | 0% | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Hourly flow rate (vph) | 37 | 318 | 433 | 0 | 0 | 40 | |
| Pedestrians | | | | | | | |
| Lane Width (ft) | | | | | | | |
| Walking Speed (ft/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | None | None | | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (ft) | | 431 | 98 | | | | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 433 | | | | 613 | 216 | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 433 | | | | 613 | 216 | |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 | |
| p0 queue free % | 97 | | | | 100 | 95 | |
| cM capacity (veh/h) | 1123 | | | | 410 | 788 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | EB 4 | WB 1 | WB 2 | SB 1 |
| Volume Total | 37 | 106 | 106 | 106 | 216 | 216 | 40 |
| Volume Left | 37 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 40 |
| cSH | 1123 | 1700 | 1700 | 1700 | 1700 | 1700 | 788 |
| Volume to Capacity | 0.03 | 0.06 | 0.06 | 0.06 | 0.13 | 0.13 | 0.05 |
| Queue Length 95th (ft) | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| Control Delay (s) | 8.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.8 |
| Lane LOS | A | | | | | | A |
| Approach Delay (s) | 0.9 | | | | 0.0 | | 9.8 |
| Approach LOS | | | | | | | A |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.8 | | | | |
| Intersection Capacity Utilization | | 21.0% | | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | | |
| | | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: 20th Street & Lakeside Drive

Near-Term AM
Kaiser Center Transportation Study

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖↗ | ↑↑↑ | ↖↗ | ↗ |
| Volume (vph) | 391 | 29 | 445 | 587 | 143 | 769 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5032 | | 3433 | 5085 | 3179 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5032 | | 3433 | 5085 | 3179 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.97 |
| Adj. Flow (vph) | 425 | 32 | 464 | 638 | 155 | 793 |
| RTOR Reduction (vph) | 11 | 0 | 0 | 0 | 331 | 330 |
| Lane Group Flow (vph) | 446 | 0 | 464 | 638 | 221 | 66 |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 33.0 | | 20.6 | 58.6 | 13.4 | 13.4 |
| Effective Green, g (s) | 33.0 | | 20.6 | 58.6 | 13.4 | 13.4 |
| Actuated g/C Ratio | 0.41 | | 0.26 | 0.73 | 0.17 | 0.17 |
| Clearance Time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 2076 | | 884 | 3725 | 532 | 241 |
| v/s Ratio Prot | c0.09 | | c0.14 | 0.13 | c0.07 | |
| v/s Ratio Perm | | | | | | 0.05 |
| v/c Ratio | 0.22 | | 0.52 | 0.17 | 0.42 | 0.28 |
| Uniform Delay, d1 | 15.2 | | 25.5 | 3.3 | 29.8 | 29.1 |
| Progression Factor | 0.59 | | 0.80 | 1.29 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.2 | | 2.1 | 0.1 | 0.5 | 0.6 |
| Delay (s) | 9.2 | | 22.5 | 4.3 | 30.3 | 29.7 |
| Level of Service | A | | C | A | C | C |
| Approach Delay (s) | 9.2 | | | 12.0 | 30.1 | |
| Approach LOS | A | | | B | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 18.3 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.35 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | 13.0 |
| Intersection Capacity Utilization | | 47.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱↱↱ | |
| Volume (vph) | 0 | 0 | 0 | 82 | 110 | 0 | 0 | 0 | 0 | 0 | 2982 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1770 | 3539 | | | | | | 6403 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1770 | 3539 | | | | | | 6403 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 88 | 120 | 0 | 0 | 0 | 0 | 0 | 3106 | 13 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 88 | 120 | 0 | 0 | 0 | 0 | 0 | 3119 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | 14 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Effective Green, g (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Actuated g/C Ratio | | | | 0.12 | 0.12 | | | | | | 0.76 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 217 | 434 | | | | | | 4849 | |
| v/s Ratio Prot | | | | | 0.03 | | | | | | c0.49 | |
| v/s Ratio Perm | | | | c0.05 | | | | | | | | |
| v/c Ratio | | | | 0.41 | 0.28 | | | | | | 0.64 | |
| Uniform Delay, d1 | | | | 30.4 | 29.9 | | | | | | 4.3 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.95 | |
| Incremental Delay, d2 | | | | 5.5 | 1.6 | | | | | | 0.3 | |
| Delay (s) | | | | 35.9 | 31.5 | | | | | | 4.4 | |
| Level of Service | | | | D | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 33.3 | | | 0.0 | | | 4.4 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 6.2 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.61 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 56.8% | | | ICU Level of Service | | | B | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|------|-------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 219 | 1172 | 528 | 68 | 486 | 107 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.98 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 4971 | | 3377 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 4971 | | 3377 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.95 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 238 | 1221 | 556 | 74 | 517 | 116 |
| RTOR Reduction (vph) | 50 | 0 | 26 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 188 | 1221 | 604 | 0 | 633 | 0 |
| Confl. Peds. (#/hr) | | | | 22 | | |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 33.7 | 33.7 | 15.0 | | 14.3 | |
| Effective Green, g (s) | 33.7 | 33.7 | 15.0 | | 14.3 | |
| Actuated g/C Ratio | 0.45 | 0.45 | 0.20 | | 0.19 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 795 | 2285 | 994 | | 644 | |
| v/s Ratio Prot | | c0.24 | c0.12 | | c0.19 | |
| v/s Ratio Perm | 0.11 | | | | | |
| v/c Ratio | 0.24 | 0.53 | 0.61 | | 0.98 | |
| Uniform Delay, d1 | 12.7 | 15.0 | 27.3 | | 30.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.9 | 1.1 | | 31.0 | |
| Delay (s) | 13.4 | 15.9 | 28.4 | | 61.2 | |
| Level of Service | B | B | C | | E | |
| Approach Delay (s) | | 15.5 | 28.4 | | 61.2 | |
| Approach LOS | | B | C | | E | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 29.1 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.65 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 63.8% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th St. & Castro Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 154 | 241 | 314 | 316 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.99 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.99 | 1.00 | | | | |
| Frt | | | | | 0.93 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3150 | 1423 | 1425 | 5925 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3150 | 1423 | 1425 | 5925 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 164 | 262 | 341 | 343 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 48 | 50 | 135 | 136 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 244 | 84 | 35 | 378 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 5 | | 5 | | | |
| Confl. Bikes (#/hr) | | | 6 | | | 2 | | | 5 | | | |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 37.6 | 37.6 | 12.4 | 12.4 | | | | |
| Effective Green, g (s) | | | | | 37.6 | 37.6 | 12.4 | 12.4 | | | | |
| Actuated g/C Ratio | | | | | 0.63 | 0.63 | 0.21 | 0.21 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1974 | 892 | 295 | 1225 | | | | |
| v/s Ratio Prot | | | | | c0.08 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.06 | 0.02 | 0.06 | | | | |
| v/c Ratio | | | | | 0.12 | 0.09 | 0.12 | 0.31 | | | | |
| Uniform Delay, d1 | | | | | 4.5 | 4.4 | 19.4 | 20.2 | | | | |
| Progression Factor | | | | | 4.13 | 7.37 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.1 | 0.2 | 0.2 | 0.1 | | | | |
| Delay (s) | | | | | 18.8 | 32.9 | 19.5 | 20.3 | | | | |
| Level of Service | | | | | B | C | B | C | | | | |
| Approach Delay (s) | | 0.0 | | | 23.3 | | | 20.1 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.3 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.17 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 28.7% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↵ | ↑↑↑ | |
| Volume (vph) | 0 | 170 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 1085 | 1218 | 34 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3429 | | | | | | | | 1522 | 4722 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3429 | | | | | | | | 1522 | 4722 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 183 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 1179 | 1324 | 37 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 345 | 63 | 0 |
| Lane Group Flow (vph) | 0 | 216 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 280 | 1852 | 0 |
| Confl. Peds. (#/hr) | 6 | | 6 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | 1 | | 1 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Effective Green, g (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Actuated g/C Ratio | | 0.52 | | | | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1772 | | | | | | | | 634 | 1968 | |
| v/s Ratio Prot | | c0.06 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.18 | 0.39 | |
| v/c Ratio | | 0.12 | | | | | | | | 0.44 | 0.94 | |
| Uniform Delay, d1 | | 15.0 | | | | | | | | 25.0 | 33.6 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | | | | | | | | 2.2 | 10.5 | |
| Delay (s) | | 15.1 | | | | | | | | 27.3 | 44.1 | |
| Level of Service | | B | | | | | | | | C | D | |
| Approach Delay (s) | | 15.1 | | | 0.0 | | | 0.0 | | | 39.9 | |
| Approach LOS | | B | | | A | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 37.9 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.49 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 57.2% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕ | ↗ | | | |
| Volume (vph) | 40 | 307 | 0 | 0 | 644 | 565 | 136 | 594 | 27 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | | 1.00 | 0.97 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3515 | | | 3539 | 1548 | | 3491 | 1531 | | | |
| Flt Permitted | | 0.79 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2782 | | | 3539 | 1548 | | 3491 | 1531 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 43 | 334 | 0 | 0 | 700 | 589 | 148 | 619 | 29 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 147 | 0 | 0 | 14 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 377 | 0 | 0 | 700 | 442 | 0 | 767 | 15 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 35 | | 35 | 6 | | 6 | 26 | | 26 | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 33 | | | 6 | | 10 | | | | 5 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 835 | | | 1062 | 464 | | 1862 | 817 | | | |
| v/s Ratio Prot | | | | | 0.20 | | | | | | | |
| v/s Ratio Perm | | 0.14 | | | | 0.29 | | 0.22 | 0.01 | | | |
| v/c Ratio | | 0.45 | | | 0.66 | 0.95 | | 0.41 | 0.02 | | | |
| Uniform Delay, d1 | | 17.0 | | | 18.3 | 20.6 | | 8.4 | 6.6 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 1.8 | | | 3.2 | 31.5 | | 0.7 | 0.0 | | | |
| Delay (s) | | 18.8 | | | 21.5 | 52.1 | | 9.0 | 6.6 | | | |
| Level of Service | | B | | | C | D | | A | A | | | |
| Approach Delay (s) | | 18.8 | | | 35.5 | | | 9.0 | | | 0.0 | |
| Approach LOS | | B | | | D | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 83.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 274 | 46 | 25 | 731 | 0 | 0 | 0 | 0 | 59 | 362 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.99 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3441 | | | 3531 | | | | | 1746 | 3505 | |
| Flt Permitted | | 1.00 | | | 0.94 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3441 | | | 3321 | | | | | 1746 | 3505 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 298 | 50 | 27 | 761 | 0 | 0 | 0 | 0 | 64 | 377 | 22 |
| RTOR Reduction (vph) | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 0 | 319 | 0 | 0 | 788 | 0 | 0 | 0 | 0 | 64 | 390 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 28 | | 28 | 18 | | 18 | 16 | | 16 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 3 | | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1453 | | | 1402 | | | | | 737 | 1480 | |
| v/s Ratio Prot | | 0.09 | | | | | | | | | c0.11 | |
| v/s Ratio Perm | | | | | c0.24 | | | | | 0.04 | | |
| v/c Ratio | | 0.22 | | | 0.56 | | | | | 0.09 | 0.26 | |
| Uniform Delay, d1 | | 8.3 | | | 9.8 | | | | | 7.8 | 8.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 1.6 | | | | | 0.2 | 0.4 | |
| Delay (s) | | 8.6 | | | 11.5 | | | | | 8.0 | 8.9 | |
| Level of Service | | A | | | B | | | | | A | A | |
| Approach Delay (s) | | 8.6 | | | 11.5 | | | 0.0 | | | 8.8 | |
| Approach LOS | | A | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 57.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| Volume (vph) | 45 | 166 | 12 | 8 | 400 | 99 | 66 | 415 | 27 | 29 | 74 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | 0.97 | | | 0.99 | | | 0.97 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3460 | | | 3387 | | | 3467 | | | 3344 | |
| Flt Permitted | | 0.83 | | | 0.95 | | | 0.90 | | | 0.82 | |
| Satd. Flow (perm) | | 2907 | | | 3224 | | | 3129 | | | 2777 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 49 | 180 | 13 | 9 | 435 | 108 | 72 | 451 | 29 | 32 | 80 | 30 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 40 | 0 | 0 | 10 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 0 | 236 | 0 | 0 | 512 | 0 | 0 | 542 | 0 | 0 | 122 | 0 |
| Confl. Peds. (#/hr) | 30 | | 30 | 55 | | 55 | 41 | | 41 | 40 | | 40 |
| Confl. Bikes (#/hr) | | | 7 | | | 19 | | | 6 | | | 4 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 23.2 | | | 23.2 | | | 14.3 | | | 14.3 | |
| Effective Green, g (s) | | 23.2 | | | 23.2 | | | 14.3 | | | 14.3 | |
| Actuated g/C Ratio | | 0.52 | | | 0.52 | | | 0.32 | | | 0.32 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1499 | | | 1662 | | | 994 | | | 882 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | 0.16 | | | 0.17 | | | 0.04 | |
| v/c Ratio | | 0.16 | | | 0.31 | | | 0.55 | | | 0.14 | |
| Uniform Delay, d1 | | 5.7 | | | 6.3 | | | 12.7 | | | 11.0 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.5 | | | 0.6 | | | 0.1 | |
| Delay (s) | | 6.0 | | | 6.8 | | | 13.3 | | | 11.0 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 6.0 | | | 6.8 | | | 13.3 | | | 11.0 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.5 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 64.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

35: 12th St. & Madison Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 0 | 0 | 415 | 1502 | 0 | 0 | 0 | 0 | 0 | 372 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.97 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6291 | | | | | | 4912 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6291 | | | | | | 4912 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 451 | 1548 | 0 | 0 | 0 | 0 | 0 | 380 | 83 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1911 | 0 | 0 | 0 | 0 | 0 | 460 | 0 |
| Confl. Peds. (#/hr) | 48 | | 48 | 30 | | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | 9 | | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2726 | | | | | | 2169 | |
| v/s Ratio Prot | | | | | | | | | | | c0.09 | |
| v/s Ratio Perm | | | | | 0.30 | | | | | | | |
| v/c Ratio | | | | | 0.70 | | | | | | 0.21 | |
| Uniform Delay, d1 | | | | | 13.8 | | | | | | 10.3 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 1.3 | | | | | | 0.2 | |
| Delay (s) | | | | | 7.9 | | | | | | 10.5 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 7.9 | | | 0.0 | | | 10.5 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.4 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.45 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 50.1% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th St. & Oak St.

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1684 | 78 | 324 | 786 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6341 | | | 6163 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6341 | | | 6163 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 85 | 348 | 854 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1811 | 0 | 0 | 1199 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | 1 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3160 | | | 2116 | | | | |
| v/s Ratio Prot | | | | | 0.29 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.19 | | | | |
| v/c Ratio | | | | | 0.57 | | | 0.57 | | | | |
| Uniform Delay, d1 | | | | | 10.6 | | | 16.1 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.8 | | | 1.1 | | | | |
| Delay (s) | | | | | 11.3 | | | 17.2 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 11.3 | | | 17.2 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.5 |
| Intersection Capacity Utilization | 58.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 66 | 0 | 0 | 1062 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 72 | 0 | 0 | 1073 | 0 | 0 |
| Pedestrians | 12 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 1 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 280 | 12 | 12 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 280 | 12 | 12 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 680 | 1055 | 1589 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 72 | 268 | 268 | 268 | 268 | |
| Volume Left | 72 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 680 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.16 | 0.16 | 0.16 | 0.16 | |
| Queue Length 95th (ft) | 9 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 10.9 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 10.9 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 25.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 398 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 772 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6074 | | | | | | | | | 5074 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6074 | | | | | | | | | 5074 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 433 | 154 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 813 | 0 |
| RTOR Reduction (vph) | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 0 | 537 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 835 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2328 | | | | | | | | | 2199 | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.16 | |
| v/c Ratio | | 0.23 | | | | | | | | | 0.38 | |
| Uniform Delay, d1 | | 12.5 | | | | | | | | | 11.5 | |
| Progression Factor | | 0.77 | | | | | | | | | 1.16 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | | 0.4 | |
| Delay (s) | | 9.9 | | | | | | | | | 13.9 | |
| Level of Service | | A | | | | | | | | | B | |
| Approach Delay (s) | | 9.9 | | | 0.0 | | | 0.0 | | | 13.9 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.2 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.31 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | 11.0 | | |
| Intersection Capacity Utilization | | | 38.8% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTL | | | | | | 4TTL | | | | |
| Volume (vph) | 86 | 402 | 0 | 0 | 0 | 0 | 0 | 328 | 59 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6305 | | | | | | 6232 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6305 | | | | | | 6232 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 93 | 432 | 0 | 0 | 0 | 0 | 0 | 357 | 64 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 79 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 446 | 0 | 0 | 0 | 0 | 0 | 404 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | 56 | 21 | | 21 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 5 | | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 9.0 | | | | | | 44.0 | | | | |
| Effective Green, g (s) | | 9.0 | | | | | | 44.0 | | | | |
| Actuated g/C Ratio | | 0.15 | | | | | | 0.73 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 946 | | | | | | 4570 | | | | |
| v/s Ratio Prot | | | | | | | | c0.06 | | | | |
| v/s Ratio Perm | | 0.07 | | | | | | | | | | |
| v/c Ratio | | 0.47 | | | | | | 0.09 | | | | |
| Uniform Delay, d1 | | 23.3 | | | | | | 2.3 | | | | |
| Progression Factor | | 1.01 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.0 | | | | |
| Delay (s) | | 23.6 | | | | | | 2.3 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 23.6 | | | 0.0 | | | 2.3 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.1 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.15 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.7% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 135 | 568 | 0 | 0 | 0 | 0 | 0 | 1104 | 291 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.97 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6328 | | | | | | 4904 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6328 | | | | | | 4904 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 145 | 617 | 0 | 0 | 0 | 0 | 0 | 1200 | 316 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 74 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 752 | 0 | 0 | 0 | 0 | 0 | 1442 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 59 | | 59 | 12 | | 12 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 2 | | | 1 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2531 | | | | | | 1962 | | | | |
| v/s Ratio Prot | | | | | | | | c0.29 | | | | |
| v/s Ratio Perm | | 0.12 | | | | | | | | | | |
| v/c Ratio | | 0.30 | | | | | | 0.74 | | | | |
| Uniform Delay, d1 | | 9.2 | | | | | | 11.5 | | | | |
| Progression Factor | | 0.78 | | | | | | 0.75 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 1.9 | | | | |
| Delay (s) | | 7.4 | | | | | | 10.5 | | | | |
| Level of Service | | A | | | | | | B | | | | |
| Approach Delay (s) | | 7.4 | | | 0.0 | | | 10.5 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.5 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 50.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑↑ | | | | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 552 | 282 | 0 | 0 | 0 | 0 | 0 | 0 | 147 | 616 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.95 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6051 | | | | | | | | | 5027 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6051 | | | | | | | | | 5027 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 600 | 307 | 0 | 0 | 0 | 0 | 0 | 0 | 160 | 629 | 0 |
| RTOR Reduction (vph) | 0 | 95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 0 | 812 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 707 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 10 | | 10 | 8 | | 8 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 7 | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2420 | | | | | | | | | 2234 | |
| v/s Ratio Prot | | c0.13 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.14 | |
| v/c Ratio | | 0.34 | | | | | | | | | 0.32 | |
| Uniform Delay, d1 | | 9.4 | | | | | | | | | 8.1 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | | | | | | | 0.4 | |
| Delay (s) | | 9.7 | | | | | | | | | 8.5 | |
| Level of Service | | A | | | | | | | | | A | |
| Approach Delay (s) | | 9.7 | | | 0.0 | | | 0.0 | | | 8.5 | |
| Approach LOS | | A | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.1 | | | | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.33 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | | | | 7.0 | | |
| Intersection Capacity Utilization | | | 38.7% | | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↰ | | ↕ | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 24 | 348 | 53 | 226 | 282 | 0 | 0 | 167 | 1777 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1736 | 1863 | 1503 | | 1821 | | | 1863 | 1558 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.77 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1736 | 1863 | 1503 | | 1436 | | | 1863 | 1558 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 26 | 362 | 58 | 246 | 307 | 0 | 0 | 182 | 1871 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 94 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 26 | 362 | 16 | 0 | 553 | 0 | 0 | 182 | 1777 |
| Confl. Peds. (#/hr) | 1 | | 1 | 23 | | 23 | 2 | | 2 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 12.2 | 12.2 | 12.2 | | 21.8 | | | 21.8 | 21.8 |
| Effective Green, g (s) | | | | 12.2 | 12.2 | 12.2 | | 21.8 | | | 21.8 | 21.8 |
| Actuated g/C Ratio | | | | 0.27 | 0.27 | 0.27 | | 0.48 | | | 0.48 | 0.48 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 471 | 505 | 407 | | 696 | | | 903 | 755 |
| v/s Ratio Prot | | | | c0.19 | | | | | | | 0.10 | |
| v/s Ratio Perm | | | | 0.01 | | 0.01 | | 0.39 | | | | c1.14 |
| v/c Ratio | | | | 0.06 | 0.72 | 0.04 | | 0.79 | | | 0.20 | 2.35 |
| Uniform Delay, d1 | | | | 12.1 | 14.8 | 12.1 | | 9.7 | | | 6.6 | 11.6 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 4.8 | 0.0 | | 9.1 | | | 0.5 | 613.1 |
| Delay (s) | | | | 12.2 | 19.7 | 12.1 | | 18.8 | | | 7.1 | 624.7 |
| Level of Service | | | | B | B | B | | B | | | A | F |
| Approach Delay (s) | | 0.0 | | | 18.2 | | | 18.8 | | | 569.9 | |
| Approach LOS | | A | | | B | | | B | | | F | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 389.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.77 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 170.0% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Near-Term AM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 145 | 505 | 141 | 56 | 867 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3497 | | 3191 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3497 | | 3191 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 158 | 526 | 153 | 61 | 942 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 684 | 0 | 685 | 471 |
| Confl. Peds. (#/hr) | 51 | 2 | | | | |
| Confl. Bikes (#/hr) | 2 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1267 | | 1149 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.20 | | 0.21 | 0.33 |
| v/c Ratio | | | 0.54 | | 0.60 | 0.91 |
| Uniform Delay, d1 | | | 11.4 | | 11.7 | 13.7 |
| Progression Factor | | | 0.81 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.5 | | 2.3 | 22.2 |
| Delay (s) | | | 9.7 | | 14.0 | 35.9 |
| Level of Service | | | A | | B | D |
| Approach Delay (s) | | | 9.7 | | 22.9 | |
| Approach LOS | | | A | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 18.0 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.71 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 68.0% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 356 | 648 | 179 | 0 | 0 | 0 | 0 | 271 | 80 | 4 | 138 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.97 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4856 | | | | | | 1800 | | | 1860 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.99 | |
| Satd. Flow (perm) | | 1850 | | | | | | 1500 | | | 1600 | |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 375 | 704 | 195 | 0 | 0 | 0 | 0 | 295 | 87 | 4 | 150 | 0 |
| RTOR Reduction (vph) | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1217 | 0 | 0 | 0 | 0 | 0 | 358 | 0 | 0 | 154 | 0 |
| Confl. Peds. (#/hr) | 14 | | 14 | 52 | | 52 | 1 | | 1 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 5 | | | 2 | | | | | | |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 925 | | | | | | 620 | | | 551 | |
| v/s Ratio Prot | | | | | | | | c0.20 | | | | |
| v/s Ratio Perm | | c0.66 | | | | | | | | | 0.10 | |
| v/c Ratio | | 1.32 | | | | | | 0.58 | | | 0.28 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 12.1 | | | 10.7 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.95 | |
| Incremental Delay, d2 | | 149.5 | | | | | | 3.9 | | | 1.0 | |
| Delay (s) | | 160.8 | | | | | | 16.0 | | | 11.2 | |
| Level of Service | | F | | | | | | B | | | B | |
| Approach Delay (s) | | 160.8 | | | 0.0 | | | 16.0 | | | 11.2 | |
| Approach LOS | | F | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 117.5 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.01 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 52.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Near-Term AM
Kaiser Center Transportation Study



| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|------|------|------|-------|
| Lane Configurations | ↰ | ↱ | ↕ | ↱ | ↰ | ↕ |
| Volume (vph) | 361 | 213 | 521 | 286 | 115 | 1094 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.95 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3351 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3351 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 392 | 232 | 566 | 311 | 125 | 1189 |
| RTOR Reduction (vph) | 0 | 171 | 75 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 392 | 61 | 802 | 0 | 125 | 1189 |
| Turn Type | Perm | | | Prot | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 23.5 | 23.5 | 40.6 | | 13.9 | 58.5 |
| Effective Green, g (s) | 23.5 | 23.5 | 40.6 | | 13.9 | 58.5 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.45 | | 0.15 | 0.65 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 462 | 413 | 1512 | | 273 | 2300 |
| v/s Ratio Prot | c0.22 | | 0.24 | | 0.07 | c0.34 |
| v/s Ratio Perm | | 0.04 | | | | |
| v/c Ratio | 0.85 | 0.15 | 0.53 | | 0.46 | 0.52 |
| Uniform Delay, d1 | 31.6 | 25.5 | 17.8 | | 34.6 | 8.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 13.5 | 0.2 | 1.3 | | 5.4 | 0.8 |
| Delay (s) | 45.1 | 25.7 | 19.2 | | 40.1 | 9.1 |
| Level of Service | D | C | B | | D | A |
| Approach Delay (s) | 37.9 | | 19.2 | | | 12.1 |
| Approach LOS | D | | B | | | B |

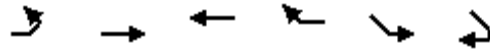
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 20.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 59.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

46: Lakeshore Drive & El Embarcadero (WB)

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | ↱↱ | ↰↱ | | ↰ | ↱ |
| Volume (vph) | 350 | 233 | 416 | 206 | 187 | 199 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.94 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 372 | 243 | 452 | 224 | 203 | 216 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 167 |
| Lane Group Flow (vph) | 372 | 243 | 586 | 0 | 203 | 49 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.2 | 31.5 | 13.3 | | 11.7 | 11.7 |
| Effective Green, g (s) | 14.2 | 31.5 | 13.3 | | 11.7 | 11.7 |
| Actuated g/C Ratio | 0.28 | 0.62 | 0.26 | | 0.23 | 0.23 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 491 | 2177 | 874 | | 404 | 362 |
| v/s Ratio Prot | c0.21 | 0.07 | c0.17 | | c0.11 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.76 | 0.11 | 0.67 | | 0.50 | 0.14 |
| Uniform Delay, d1 | 16.9 | 4.1 | 17.0 | | 17.2 | 15.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 6.6 | 0.0 | 2.0 | | 1.0 | 0.2 |
| Delay (s) | 23.5 | 4.1 | 19.0 | | 18.2 | 15.9 |
| Level of Service | C | A | B | | B | B |
| Approach Delay (s) | | 15.8 | 19.0 | | 17.0 | |
| Approach LOS | | B | B | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 17.4 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.65 | | | |
| Actuated Cycle Length (s) | | | 51.2 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 57.8% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Near-Term AM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|--------|------|------|-------|------|------|-------|------|
| Lane Configurations | | | | 3 1 1 | | | 2 2 | 1 | 1 | 2 2 | |
| Volume (vph) | 0 | 0 | 671 | 706 | 221 | 0 | 424 | 213 | 282 | 1170 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4932 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4932 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 729 | 767 | 240 | 0 | 456 | 232 | 307 | 1272 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 182 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1714 | 0 | 0 | 456 | 50 | 307 | 1272 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1698 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.35 | | | c0.13 | | 0.17 | c0.36 | |
| v/s Ratio Perm | | | | | | | | 0.03 | | | |
| v/c Ratio | | | | 1.16dl | | | 0.78 | 0.19 | 0.47 | 0.63 | |
| Uniform Delay, d1 | | | | 34.8 | | | 42.4 | 38.2 | 25.6 | 15.2 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 24.2 | | | 10.0 | 1.6 | 2.4 | 1.5 | |
| Delay (s) | | | | 59.0 | | | 52.4 | 39.8 | 28.1 | 16.7 | |
| Level of Service | | | | E | | | D | D | C | B | |
| Approach Delay (s) | 0.0 | | | 59.0 | | | 48.1 | | | 18.9 | |
| Approach LOS | A | | | E | | | D | | | B | |

Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 41.3 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.82 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 76.6% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 261 | 490 | 217 | 198 | 341 | 178 | 21 | 345 | 47 | 460 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3101 | 1441 | | 3341 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3101 | 1441 | | 3341 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 284 | 533 | 236 | 215 | 363 | 193 | 23 | 375 | 51 | 500 |
| RTOR Reduction (vph) | 0 | 0 | 80 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 256 | 703 | 229 | 0 | 576 | 0 | 0 | 0 | 426 | 500 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 30.6 | 30.6 | 30.6 | | 34.1 | | | | 28.8 | 66.4 |
| Effective Green, g (s) | 30.6 | 30.6 | 30.6 | | 34.1 | | | | 28.8 | 66.4 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.32 | | | | 0.27 | 0.63 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 465 | 895 | 416 | | 1075 | | | | 481 | 2217 |
| v/s Ratio Prot | 0.16 | c0.23 | 0.16 | | c0.17 | | | | c0.24 | 0.14 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.55 | 0.79 | 0.55 | | 0.54 | | | | 0.89 | 0.23 |
| Uniform Delay, d1 | 31.9 | 34.7 | 31.9 | | 29.5 | | | | 37.0 | 8.6 |
| Progression Factor | 0.70 | 0.71 | 0.57 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.8 | 2.7 | 0.9 | | 1.9 | | | | 17.5 | 0.2 |
| Delay (s) | 23.2 | 27.3 | 18.9 | | 31.4 | | | | 54.5 | 8.9 |
| Level of Service | C | C | B | | C | | | | D | A |
| Approach Delay (s) | | 24.4 | | | 31.4 | | | | | 29.9 |
| Approach LOS | | C | | | C | | | | | C |

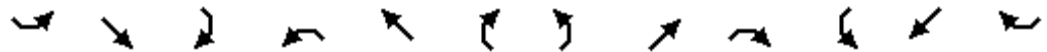
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 27.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.73 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 67.3% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Near-Term AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2572 | 126 | 466 | 407 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4789 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4789 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.93 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2679 | 137 | 501 | 428 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2679 | 68 | 0 | 929 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | 0.48 | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2415 | 752 | | 2035 | | | | |
| v/s Ratio Prot | | | | | c0.53 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.04 | | 0.19 | | | | |
| v/c Ratio | | | | | 1.11 | 0.09 | | 0.46 | | | | |
| Uniform Delay, d1 | | | | | 21.0 | 11.5 | | 16.4 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 55.9 | 0.2 | | 0.7 | | | | |
| Delay (s) | | | | | 76.9 | 11.8 | | 17.1 | | | | |
| Level of Service | | | | | E | B | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 73.7 | | | 17.1 | | | 0.0 | |
| Approach LOS | | A | | | E | | | B | | | A | |

Intersection Summary

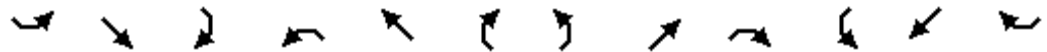
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 59.7 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 84.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

50: MacArthur Blvd (WB) & Harrison Street


















Near-Term AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1189 | 1734 | 0 | 0 | 0 | 0 | 0 | 1210 | 37 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4759 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4759 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1226 | 1885 | 0 | 0 | 0 | 0 | 0 | 1287 | 39 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 758 | 2349 | 0 | 0 | 0 | 0 | 0 | 1323 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2736 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.38 | |
| v/s Ratio Perm | | | | c0.50 | 0.49 | | | | | | | |
| v/c Ratio | | | | 0.87 | 0.86 | | | | | | 1.16 | |
| Uniform Delay, d1 | | | | 14.4 | 14.3 | | | | | | 27.0 | |
| Progression Factor | | | | 1.41 | 1.41 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 1.2 | 0.4 | | | | | | 80.3 | |
| Delay (s) | | | | 21.4 | 20.5 | | | | | | 107.3 | |
| Level of Service | | | | C | C | | | | | | F | |
| Approach Delay (s) | | 0.0 | | | 20.8 | | | 0.0 | | | 107.3 | |
| Approach LOS | | A | | | C | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 46.6 | | | HCM Level of Service | | | | | D | |
| HCM Volume to Capacity ratio | | | 0.97 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 84.7% | | | ICU Level of Service | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Near-Term AM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 90 | 231 | 7 | 11 | 478 | 16 | 11 | 7 | 10 | 22 | 17 | 16 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 98 | 246 | 8 | 12 | 520 | 17 | 12 | 8 | 11 | 24 | 18 | 17 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 98 | 253 | 549 | 30 | 60 | | | | | | | |
| Volume Left (vph) | 98 | 0 | 12 | 12 | 24 | | | | | | | |
| Volume Right (vph) | 0 | 8 | 17 | 11 | 17 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.8 | 5.3 | 4.7 | 6.0 | 6.0 | | | | | | | |
| Degree Utilization, x | 0.16 | 0.37 | 0.72 | 0.05 | 0.10 | | | | | | | |
| Capacity (veh/h) | 607 | 665 | 752 | 531 | 534 | | | | | | | |
| Control Delay (s) | 8.7 | 10.1 | 18.8 | 9.3 | 9.6 | | | | | | | |
| Approach Delay (s) | 9.7 | | 18.8 | 9.3 | 9.6 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 14.7 | | | | | | | | | |
| HCM Level of Service | | | B | | | | | | | | | |
| Intersection Capacity Utilization | | | 53.3% | ICU Level of Service | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 4.3 Worst Case Level Of Service: B[14.2]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 1 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 781 0 0 0 343 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 781 0 0 0 343 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 781 0 0 0 343 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.92 1.00 1.00 1.00

PHF Volume: 0 0 0 0 849 0 0 0 373 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 849 0 0 0 373 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 283 xxxxx xxxx xxxxx

Potent Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 761 xxxxx xxxx xxxxx

Move Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 761 xxxxx xxxx xxxxx

Volume/Cap: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 0.49 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 2.7 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 14.2 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * B * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 14.2 xxxxxx

ApproachLOS: * * B *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: Oakland Avenue & I-580 Off-ramp

Near-Term PM
Kaiser Center Transportation Study

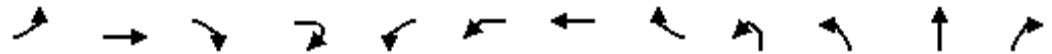


| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|-------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 738 | 349 | 1244 | 597 | 98 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1738 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1738 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 802 | 379 | 1352 | 649 | 107 |
| RTOR Reduction (vph) | 41 | 34 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 544 | 562 | 1352 | 756 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Effective Green, g (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.61 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 448 | 463 | 2153 | 356 | |
| v/s Ratio Prot | | | c0.38 | c0.48 | |
| v/s Ratio Perm | c0.32 | 0.32 | | | |
| v/c Ratio | 1.21 | 1.21 | 0.63 | 2.12 | |
| Uniform Delay, d1 | 22.0 | 22.0 | 7.4 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 115.4 | 114.3 | 1.4 | 515.0 | |
| Delay (s) | 137.4 | 136.3 | 8.8 | 538.3 | |
| Level of Service | F | F | A | F | |
| Approach Delay (s) | | 136.9 | 198.7 | | |
| Approach LOS | | F | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 176.5 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 1.18 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 79.5% | | ICU Level of Service | D |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
|------------------------|-------|------|------|------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 212 | 425 | 99 | 20 | 52 | 16 | 180 | 206 | 10 | 342 | 978 | 103 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1522 | | 3433 | 3476 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1522 | | 3433 | 3476 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 226 | 452 | 105 | 21 | 57 | 17 | 196 | 224 | 11 | 372 | 1063 | 112 |
| RTOR Reduction (vph) | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 187 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 226 | 452 | 118 | 0 | 0 | 74 | 196 | 37 | 0 | 383 | 1166 | 0 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | 20 | | | | 9 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 13.9 | 27.2 | |
| Effective Green, g (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 13.9 | 27.2 | |
| Actuated g/C Ratio | 0.21 | 0.29 | 0.29 | | | 0.09 | 0.17 | 0.17 | | 0.15 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 372 | 1026 | 459 | | | 151 | 308 | 252 | | 530 | 1051 | |
| v/s Ratio Prot | c0.13 | 0.13 | | | | 0.04 | c0.11 | | | 0.11 | c0.34 | |
| v/s Ratio Perm | | | 0.07 | | | | | 0.02 | | | | |
| v/c Ratio | 0.61 | 0.44 | 0.26 | | | 0.49 | 0.64 | 0.15 | | 0.72 | 1.11 | |
| Uniform Delay, d1 | 32.2 | 26.0 | 24.5 | | | 39.3 | 35.0 | 32.1 | | 36.2 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.8 | 0.3 | 0.3 | | | 2.5 | 4.3 | 0.3 | | 4.8 | 62.8 | |
| Delay (s) | 35.0 | 26.3 | 24.8 | | | 41.8 | 39.3 | 32.4 | | 41.1 | 94.2 | |
| Level of Service | C | C | C | | | D | D | C | | D | F | |
| Approach Delay (s) | | 28.5 | | | | | 36.5 | | | | 81.1 | |
| Approach LOS | | C | | | | | D | | | | F | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 59.3 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.88 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 18.0 |
| Intersection Capacity Utilization | 79.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|-------|------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 222 | 475 | 47 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3428 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3428 | | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 239 | 511 | 51 | 84 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 |
| Lane Group Flow (vph) | 239 | 633 | 0 | 0 |
| Confl. Peds. (#/hr) | 26 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 11.0 | 23.3 | | |
| Effective Green, g (s) | 11.0 | 23.3 | | |
| Actuated g/C Ratio | 0.12 | 0.26 | | |
| Clearance Time (s) | 4.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 216 | 887 | | |
| v/s Ratio Prot | c0.14 | 0.18 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 1.11 | 0.71 | | |
| Uniform Delay, d1 | 39.5 | 30.3 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 92.7 | 4.9 | | |
| Delay (s) | 132.2 | 35.2 | | |
| Level of Service | F | D | | |
| Approach Delay (s) | | 61.4 | | |
| Approach LOS | | E | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 91 | 248 | 70 | 48 | 341 | 269 | 141 | 643 | 33 | 202 | 616 | 95 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.98 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1743 | 3386 | | | 3514 | 1536 | 1767 | 3509 | | 1767 | 3446 | |
| Flt Permitted | 0.50 | 1.00 | | | 0.86 | 1.00 | 0.28 | 1.00 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | 912 | 3386 | | | 3048 | 1536 | 523 | 3509 | | 559 | 3446 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 99 | 270 | 76 | 52 | 355 | 292 | 153 | 699 | 36 | 220 | 670 | 103 |
| RTOR Reduction (vph) | 0 | 31 | 0 | 0 | 0 | 77 | 0 | 4 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 99 | 315 | 0 | 0 | 407 | 215 | 153 | 731 | 0 | 220 | 759 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 10 | | 10 | 6 | | 6 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 20 | | | 18 | | | 17 | | | 66 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 386 | 1434 | | | 1291 | 651 | 234 | 1569 | | 250 | 1541 | |
| v/s Ratio Prot | | 0.09 | | | | | | 0.21 | | | 0.22 | |
| v/s Ratio Perm | 0.11 | | | | 0.13 | c0.14 | 0.29 | | | c0.39 | | |
| v/c Ratio | 0.26 | 0.22 | | | 0.32 | 0.33 | 0.65 | 0.47 | | 0.88 | 0.49 | |
| Uniform Delay, d1 | 15.8 | 15.6 | | | 16.3 | 16.4 | 18.4 | 16.4 | | 21.4 | 16.7 | |
| Progression Factor | 0.86 | 0.84 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.3 | 0.3 | | | 0.6 | 1.4 | 13.4 | 1.0 | | 32.8 | 1.1 | |
| Delay (s) | 15.0 | 13.4 | | | 16.9 | 17.8 | 31.7 | 17.4 | | 54.3 | 17.8 | |
| Level of Service | B | B | | | B | B | C | B | | D | B | |
| Approach Delay (s) | | 13.8 | | | 17.3 | | | 19.9 | | | 25.9 | |
| Approach LOS | | B | | | B | | | B | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 20.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 107.0% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-----------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 210 | 403 | 136 | 64 | 530 | 114 | 175 | 479 | 46 | 133 | 459 | 350 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1554 | 1769 | 1863 | 1552 | 1763 | 3481 | | 1763 | 3257 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | 0.20 | 1.00 | | 0.37 | 1.00 | |
| Satd. Flow (perm) | 226 | 1863 | 1554 | 664 | 1863 | 1552 | 373 | 3481 | | 690 | 3257 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 228 | 438 | 148 | 70 | 576 | 124 | 190 | 521 | 50 | 145 | 499 | 380 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 83 | 0 | 9 | 0 | 0 | 163 | 0 |
| Lane Group Flow (vph) | 228 | 438 | 58 | 70 | 576 | 41 | 190 | 562 | 0 | 145 | 716 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 17 | | | 28 |
| Turn Type | pm+pt | | | Permpm+pt | | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.40 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 298 | 725 | 605 | 334 | 622 | 519 | 145 | 1351 | | 268 | 1264 | |
| v/s Ratio Prot | c0.09 | 0.24 | | 0.01 | c0.31 | | | 0.16 | | | 0.22 | |
| v/s Ratio Perm | 0.30 | | 0.04 | 0.07 | | 0.03 | c0.51 | | | 0.21 | | |
| v/c Ratio | 0.77 | 0.60 | 0.10 | 0.21 | 0.93 | 0.08 | 1.31 | 0.42 | | 0.54 | 0.57 | |
| Uniform Delay, d1 | 17.4 | 20.7 | 16.5 | 16.5 | 27.3 | 19.4 | 26.0 | 19.0 | | 20.1 | 20.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.52 | 1.39 | 2.65 | 0.75 | 0.66 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.1 | 3.7 | 0.3 | 0.1 | 21.2 | 0.3 | 177.9 | 0.1 | | 1.2 | 0.3 | |
| Delay (s) | 27.5 | 24.4 | 16.8 | 25.2 | 59.1 | 51.5 | 197.6 | 12.6 | | 21.3 | 20.7 | |
| Level of Service | C | C | B | C | E | D | F | B | | C | C | |
| Approach Delay (s) | | 23.9 | | | 54.8 | | | 58.8 | | | 20.8 | |
| Approach LOS | | C | | | D | | | E | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 37.9 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 1.08 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 89.8% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

6: 27th Street & Northgate Avenue (NB)

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 246 | 653 | 0 | 0 | 257 | 904 | 21 | 811 | 75 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1609 | 3384 | | | 3539 | 2787 | | 5008 | | | | |
| Flt Permitted | 0.58 | 0.94 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 983 | 3181 | | | 3539 | 2787 | | 5008 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 265 | 710 | 0 | 0 | 279 | 932 | 23 | 882 | 82 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 59 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 238 | 737 | 0 | 0 | 279 | 873 | 0 | 961 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 4 | | 4 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | 5 | | | 7 |
| Turn Type | Perm | | | | | Perm | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 393 | 1272 | | | 1416 | 1115 | | 2003 | | | | |
| v/s Ratio Prot | | | | | 0.08 | | | | | | | |
| v/s Ratio Perm | 0.24 | 0.23 | | | | 0.31 | | 0.19 | | | | |
| v/c Ratio | 0.61 | 0.58 | | | 0.20 | 0.78 | | 0.48 | | | | |
| Uniform Delay, d1 | 9.5 | 9.4 | | | 7.8 | 10.5 | | 8.9 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 6.8 | 1.9 | | | 0.3 | 5.5 | | 0.8 | | | | |
| Delay (s) | 16.3 | 11.3 | | | 8.1 | 16.0 | | 9.7 | | | | |
| Level of Service | B | B | | | A | B | | A | | | | |
| Approach Delay (s) | | 12.5 | | | 14.2 | | | 9.7 | | | 0.0 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 12.3 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.63 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 77.5% | | | ICU Level of Service | | | D | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 492 | 38 | 12 | 243 | 0 | 0 | 0 | 0 | 404 | 288 | 205 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1552 | | 3531 | | | | | 1605 | 3322 | 1558 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1552 | | 3285 | | | | | 1605 | 3322 | 1558 |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 518 | 41 | 13 | 264 | 0 | 0 | 0 | 0 | 439 | 313 | 223 |
| RTOR Reduction (vph) | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 |
| Lane Group Flow (vph) | 0 | 518 | 14 | 0 | 277 | 0 | 0 | 0 | 0 | 246 | 506 | 115 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 1 | | 1 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 5 | | | 9 | | | 1 | | | 1 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | | 8 | | | | | | 6 | |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 543 | | 1150 | | | | | 829 | 1716 | 805 |
| v/s Ratio Prot | | c0.15 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.08 | | | | | c0.15 | 0.15 | 0.07 |
| v/c Ratio | | 0.42 | 0.03 | | 0.24 | | | | | 0.30 | 0.29 | 0.14 |
| Uniform Delay, d1 | | 14.8 | 12.8 | | 13.8 | | | | | 8.3 | 8.3 | 7.6 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 1.0 | 0.1 | | 0.5 | | | | | 0.9 | 0.4 | 0.4 |
| Delay (s) | | 15.9 | 12.9 | | 14.3 | | | | | 9.2 | 8.7 | 7.9 |
| Level of Service | | B | B | | B | | | | | A | A | A |
| Approach Delay (s) | | 15.7 | | | 14.3 | | | 0.0 | | | 8.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |

Intersection Summary

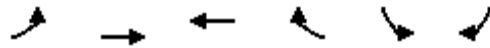
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.35 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 50.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 274 | 567 | 617 | 428 | 188 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.94 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3281 | | 3412 | 1421 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3281 | | 3412 | 1421 |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 298 | 610 | 671 | 441 | 204 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 103 | 0 | 10 | 87 |
| Lane Group Flow (vph) | 298 | 610 | 1009 | 0 | 210 | 12 |
| Confl. Peds. (#/hr) | 14 | | | 18 | | |
| Confl. Bikes (#/hr) | | | | 7 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 18.9 | 62.7 | 39.8 | | 9.3 | 9.3 |
| Effective Green, g (s) | 18.9 | 62.7 | 39.8 | | 9.3 | 9.3 |
| Actuated g/C Ratio | 0.24 | 0.78 | 0.50 | | 0.12 | 0.12 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 418 | 2774 | 1632 | | 397 | 165 |
| v/s Ratio Prot | c0.17 | 0.17 | c0.31 | | c0.06 | |
| v/s Ratio Perm | | | | | | 0.01 |
| v/c Ratio | 0.71 | 0.22 | 0.62 | | 0.53 | 0.07 |
| Uniform Delay, d1 | 28.1 | 2.3 | 14.6 | | 33.3 | 31.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 4.7 | 0.2 | 1.8 | | 0.6 | 0.1 |
| Delay (s) | 32.8 | 2.4 | 16.4 | | 33.9 | 31.6 |
| Level of Service | C | A | B | | C | C |
| Approach Delay (s) | | 12.4 | 16.4 | | 33.2 | |
| Approach LOS | | B | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 17.1 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.63 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 63.2% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|-------|------|-------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 27 | 677 | 32 | 19 | 810 | 116 | 95 | 531 | 33 | 137 | 429 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1760 | 3347 | | 1769 | 3504 | | 1760 | 3406 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.37 | 1.00 | | 0.42 | 1.00 | |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 315 | 3347 | | 682 | 3504 | | 778 | 3406 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 29 | 736 | 35 | 21 | 880 | 126 | 103 | 577 | 36 | 149 | 452 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 13 | 0 | 0 | 5 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 29 | 736 | 10 | 21 | 993 | 0 | 103 | 608 | 0 | 149 | 544 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 50.3 | 50.3 | | 40.2 | 40.2 | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 50.3 | 50.3 | | 40.2 | 40.2 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | | 0.59 | 0.59 | | 0.47 | 0.47 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 90 | 953 | | 475 | 2074 | | 368 | 1611 | |
| v/s Ratio Prot | | 0.21 | | | c0.30 | | 0.01 | c0.17 | | | 0.16 | |
| v/s Ratio Perm | 0.09 | | 0.01 | 0.07 | | | 0.11 | | | c0.19 | | |
| v/c Ratio | 0.33 | 0.75 | 0.02 | 0.23 | 1.04 | | 0.22 | 0.29 | | 0.40 | 0.34 | |
| Uniform Delay, d1 | 24.0 | 27.7 | 21.9 | 23.3 | 30.4 | | 7.9 | 8.6 | | 14.6 | 14.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.27 | 1.29 | |
| Incremental Delay, d2 | 9.7 | 5.4 | 0.1 | 6.0 | 40.7 | | 0.1 | 0.4 | | 2.9 | 0.5 | |
| Delay (s) | 33.7 | 33.1 | 22.0 | 29.3 | 71.1 | | 8.0 | 8.9 | | 21.4 | 18.6 | |
| Level of Service | C | C | C | C | E | | A | A | | C | B | |
| Approach Delay (s) | | 32.6 | | | 70.3 | | | 8.8 | | | 19.2 | |
| Approach LOS | | C | | | E | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 36.3 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 68.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 81 | 456 | 36 | 105 | 343 | 34 | 247 | 622 | 172 | 51 | 499 | 108 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3384 | | | 3350 | | 1765 | 3539 | 1551 | 1750 | 3414 | |
| Flt Permitted | 0.31 | 1.00 | | | 0.62 | | 0.38 | 1.00 | 1.00 | 0.38 | 1.00 | |
| Satd. Flow (perm) | 579 | 3384 | | | 2110 | | 697 | 3539 | 1551 | 695 | 3414 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 88 | 496 | 39 | 114 | 373 | 37 | 268 | 655 | 187 | 55 | 542 | 117 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 9 | 0 | 0 | 0 | 71 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 88 | 526 | 0 | 0 | 515 | 0 | 268 | 655 | 116 | 55 | 643 | 0 |
| Confl. Peds. (#/hr) | 8 | | 8 | 2 | | 2 | 8 | | 8 | 32 | | 32 |
| Confl. Bikes (#/hr) | | | 6 | | | 6 | | | 4 | | | 28 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 22.3 | 22.3 | | | 22.3 | | 49.7 | 49.7 | 49.7 | 49.7 | 49.7 | |
| Effective Green, g (s) | 22.3 | 22.3 | | | 22.3 | | 49.7 | 49.7 | 49.7 | 49.7 | 49.7 | |
| Actuated g/C Ratio | 0.28 | 0.28 | | | 0.28 | | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 161 | 943 | | | 588 | | 433 | 2199 | 964 | 432 | 2121 | |
| v/s Ratio Prot | | 0.16 | | | | | | 0.19 | | | 0.19 | |
| v/s Ratio Perm | 0.15 | | | | c0.24 | | c0.38 | | 0.07 | 0.08 | | |
| v/c Ratio | 0.55 | 0.56 | | | 0.88 | | 0.62 | 0.30 | 0.12 | 0.13 | 0.30 | |
| Uniform Delay, d1 | 24.5 | 24.6 | | | 27.5 | | 9.3 | 7.0 | 6.2 | 6.2 | 7.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.05 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.0 | 0.4 | | | 13.2 | | 6.5 | 0.3 | 0.3 | 0.6 | 0.4 | |
| Delay (s) | 26.6 | 25.0 | | | 42.2 | | 15.8 | 7.4 | 6.5 | 6.8 | 7.4 | |
| Level of Service | C | C | | | D | | B | A | A | A | A | |
| Approach Delay (s) | | 25.3 | | | 42.2 | | | 9.3 | | | 7.4 | |
| Approach LOS | | C | | | D | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 18.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 78.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 6 | 666 | 191 | 117 | 373 | 2 | 0 | 0 | 0 | 80 | 249 | 71 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frbp, ped/bikes | | 0.95 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | 0.96 | | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3149 | | 1770 | 3424 | | | | | | 3385 | |
| Flt Permitted | | 0.95 | | 0.16 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 2998 | | 300 | 3424 | | | | | | 3385 | |
| Peak-hour factor, PHF | 0.92 | 0.99 | 0.92 | 0.93 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 7 | 673 | 208 | 126 | 405 | 2 | 0 | 0 | 0 | 87 | 265 | 77 |
| RTOR Reduction (vph) | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 0 | 857 | 0 | 126 | 407 | 0 | 0 | 0 | 0 | 0 | 406 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 8 | | 8 | 36 | | 36 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 18 | | | 14 | | | 2 | | | 8 |
| Turn Type | Perm | | pm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 31.7 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | 31.7 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | 0.40 | | 0.54 | | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | 1188 | | 277 | | 1840 | | | | | | 1227 | |
| v/s Ratio Prot | | | c0.04 | | 0.12 | | | | | | | |
| v/s Ratio Perm | c0.29 | | 0.21 | | | | | | | | 0.12 | |
| v/c Ratio | 0.72 | | 0.45 | | 0.22 | | | | | | 0.33 | |
| Uniform Delay, d1 | 20.4 | | 11.7 | | 9.7 | | | | | | 18.5 | |
| Progression Factor | 1.66 | | 1.00 | | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | 3.7 | | 0.4 | | 0.3 | | | | | | 0.7 | |
| Delay (s) | 37.7 | | 12.1 | | 10.0 | | | | | | 19.2 | |
| Level of Service | D | | B | | A | | | | | | B | |
| Approach Delay (s) | 37.7 | | | | 10.5 | | 0.0 | | | | 19.2 | |
| Approach LOS | D | | | | B | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 25.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 69.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|-------|-------|------|------|------|
| Lane Configurations | ↰↱ | ↰↱ | ↱ | ↰↱ | ↰↱ | ↱ | | ↰↱↱ | ↱ | | ↰↱↱ | |
| Volume (vph) | 133 | 629 | 129 | 326 | 846 | 42 | 11 | 1150 | 997 | 2 | 604 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1484 | 3433 | 3539 | 1460 | | 5082 | 1466 | | 4984 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.93 | 1.00 | | 0.94 | |
| Satd. Flow (perm) | 3433 | 3539 | 1484 | 3433 | 3539 | 1460 | | 4731 | 1466 | | 4670 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 145 | 684 | 140 | 333 | 910 | 46 | 12 | 1250 | 1084 | 2 | 629 | 65 |
| RTOR Reduction (vph) | 0 | 0 | 50 | 0 | 0 | 27 | 0 | 0 | 251 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 145 | 684 | 90 | 333 | 910 | 19 | 0 | 1262 | 833 | 0 | 684 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 8.6 | 35.4 | 35.4 | 13.6 | 41.4 | 41.4 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 8.6 | 35.4 | 35.4 | 13.6 | 41.4 | 41.4 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.09 | 0.35 | 0.35 | 0.14 | 0.41 | 0.41 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 295 | 1253 | 525 | 467 | 1465 | 604 | | 1703 | 528 | | 1681 | |
| v/s Ratio Prot | 0.04 | 0.19 | | c0.10 | c0.26 | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | | 0.01 | | 0.27 | c0.57 | | 0.15 | |
| v/c Ratio | 0.49 | 0.55 | 0.17 | 0.71 | 0.62 | 0.03 | | 0.74 | 1.58 | | 0.41 | |
| Uniform Delay, d1 | 43.6 | 25.9 | 22.2 | 41.3 | 23.1 | 17.4 | | 27.9 | 32.0 | | 24.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.5 | 1.7 | 0.7 | 4.3 | 2.0 | 0.1 | | 2.9 | 269.0 | | 0.7 | |
| Delay (s) | 44.1 | 27.6 | 22.9 | 45.6 | 25.1 | 17.5 | | 30.9 | 301.0 | | 24.7 | |
| Level of Service | D | C | C | D | C | B | | C | F | | C | |
| Approach Delay (s) | | 29.4 | | | 30.1 | | | 155.7 | | | 24.7 | |
| Approach LOS | | C | | | C | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 84.9 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.00 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 118.6% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Near-Term PM
Kaiser Center Transportation Study






| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|-------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 309 | 83 | 101 | 1512 | 917 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.99 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 0.99 | 1.00 | 1.00 | |
| Frt | 0.97 | | 1.00 | 1.00 | 0.99 | |
| Flt Protected | 0.96 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3340 | | 1757 | 3725 | 6323 | |
| Flt Permitted | 0.96 | | 0.22 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3340 | | 404 | 3725 | 6323 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 |
| Adj. Flow (vph) | 336 | 90 | 110 | 1575 | 997 | 97 |
| RTOR Reduction (vph) | 44 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 382 | 0 | 110 | 1575 | 1082 | 0 |
| Confl. Peds. (#/hr) | 30 | 30 | 106 | | | |
| Confl. Bikes (#/hr) | | 2 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 14.5 | | 52.0 | 45.8 | 45.8 | |
| Effective Green, g (s) | 14.5 | | 52.0 | 45.8 | 45.8 | |
| Actuated g/C Ratio | 0.18 | | 0.65 | 0.57 | 0.57 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 605 | | 367 | 2133 | 3620 | |
| v/s Ratio Prot | c0.11 | | c0.02 | c0.42 | 0.17 | |
| v/s Ratio Perm | | | 0.17 | | | |
| v/c Ratio | 0.63 | | 0.30 | 0.74 | 0.30 | |
| Uniform Delay, d1 | 30.3 | | 5.3 | 12.7 | 8.8 | |
| Progression Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.2 | | 0.5 | 2.3 | 0.2 | |
| Delay (s) | 32.4 | | 5.8 | 15.0 | 9.0 | |
| Level of Service | C | | A | B | A | |
| Approach Delay (s) | 32.4 | | | 14.4 | 9.0 | |
| Approach LOS | C | | | B | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 15.0 | | HCM Level of Service | B | |
| HCM Volume to Capacity ratio | | 0.67 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | 13.5 | |
| Intersection Capacity Utilization | | 51.8% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

Near-Term PM
Kaiser Center Transportation Study

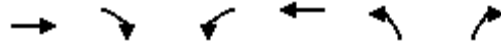


| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 301 | 10 | 22 | 180 | 11 | 55 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 320 | 11 | 24 | 196 | 12 | 60 |
| Pedestrians | 18 | | | 18 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 331 | | 587 | 344 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 331 | | 587 | 344 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 98 | | 97 | 91 |
| cM capacity (veh/h) | | | 1228 | | 456 | 689 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 331 | 220 | 72 | | | |
| Volume Left | 0 | 24 | 12 | | | |
| Volume Right | 11 | 0 | 60 | | | |
| cSH | 1700 | 1228 | 635 | | | |
| Volume to Capacity | 0.19 | 0.02 | 0.11 | | | |
| Queue Length 95th (ft) | 0 | 1 | 10 | | | |
| Control Delay (s) | 0.0 | 1.0 | 11.4 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.0 | 11.4 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.7 | | | |
| Intersection Capacity Utilization | | | 43.6% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

15: 21st Street & Garage Entrance East

Near-Term PM
Kaiser Center Transportation Study

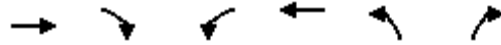


| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 249 | 9 | 9 | 183 | 30 | 62 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 271 | 10 | 10 | 199 | 33 | 67 |
| Pedestrians | 27 | | | 27 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 280 | | 521 | 303 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 280 | | 521 | 303 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 99 | | 93 | 91 |
| cM capacity (veh/h) | | | 1282 | | 500 | 721 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 280 | 209 | 100 | | | |
| Volume Left | 0 | 10 | 33 | | | |
| Volume Right | 10 | 0 | 67 | | | |
| cSH | 1700 | 1282 | 630 | | | |
| Volume to Capacity | 0.16 | 0.01 | 0.16 | | | |
| Queue Length 95th (ft) | 0 | 1 | 14 | | | |
| Control Delay (s) | 0.0 | 0.4 | 11.8 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 0.4 | 11.8 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.2 | | | |
| Intersection Capacity Utilization | | 34.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

16: 21st Street & Garage Entrance West

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|-------|------|----------------------|------|-------|------|
| Lane Configurations | ↰ | | | ↰ | ↰ | ↰ |
| Volume (veh/h) | 366 | 3 | 15 | 150 | 46 | 84 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 377 | 3 | 16 | 160 | 50 | 91 |
| Pedestrians | 20 | | | 20 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.90 | | 0.90 | 0.90 |
| vC, conflicting volume | | | 381 | | 591 | 399 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 257 | | 491 | 277 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 99 | | 89 | 86 |
| cM capacity (veh/h) | | | 1178 | | 469 | 674 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 381 | 176 | 25 | 25 | 46 | 46 |
| Volume Left | 0 | 16 | 25 | 25 | 0 | 0 |
| Volume Right | 3 | 0 | 0 | 0 | 46 | 46 |
| cSH | 1700 | 1178 | 469 | 469 | 674 | 674 |
| Volume to Capacity | 0.22 | 0.01 | 0.05 | 0.05 | 0.07 | 0.07 |
| Queue Length 95th (ft) | 0 | 1 | 4 | 4 | 5 | 5 |
| Control Delay (s) | 0.0 | 0.9 | 13.1 | 13.1 | 10.7 | 10.7 |
| Lane LOS | | A | B | B | B | B |
| Approach Delay (s) | 0.0 | 0.9 | 11.6 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.6 | | | |
| Intersection Capacity Utilization | 35.2% | | ICU Level of Service | | A | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis

17: 21st Street & Webster Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 203 | 102 | 75 | 170 | 0 | 0 | 0 | 0 | 51 | 521 | 29 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.97 | | | | | | 0.98 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 1863 | 1435 | | 1786 | | | | | | 4856 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.74 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 1863 | 1435 | | 1339 | | | | | | 4856 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 221 | 111 | 82 | 185 | 0 | 0 | 0 | 0 | 55 | 537 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 221 | 90 | 0 | 267 | 0 | 0 | 0 | 0 | 0 | 620 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | | 4 | | | | | | 2 | |
| Actuated Green, G (s) | | 20.7 | 20.7 | | 20.7 | | | | | | 51.3 | |
| Effective Green, g (s) | | 20.7 | 20.7 | | 20.7 | | | | | | 51.3 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | | 0.26 | | | | | | 0.64 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 482 | 371 | | 346 | | | | | | 3114 | |
| v/s Ratio Prot | | 0.12 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | 0.20 | | | | | | 0.13 | |
| v/c Ratio | | 0.46 | 0.24 | | 0.77 | | | | | | 0.20 | |
| Uniform Delay, d1 | | 24.9 | 23.5 | | 27.5 | | | | | | 5.9 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 1.20 | |
| Incremental Delay, d2 | | 0.7 | 0.3 | | 10.2 | | | | | | 0.1 | |
| Delay (s) | | 25.6 | 23.8 | | 37.7 | | | | | | 7.2 | |
| Level of Service | | C | C | | D | | | | | | A | |
| Approach Delay (s) | | 25.0 | | | 37.7 | | | 0.0 | | | 7.2 | |
| Approach LOS | | C | | | D | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 18.7 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 54.3% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 13 | 106 | 1 | 0 | 102 | 72 | 21 | 342 | 181 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 1.00 | 0.81 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1841 | | | 1706 | | | 3506 | 1283 | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1801 | | | 1706 | | | 3506 | 1283 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 14 | 115 | 1 | 0 | 111 | 78 | 23 | 368 | 197 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 155 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 130 | 0 | 0 | 158 | 0 | 0 | 391 | 42 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | | 40 | | | 1 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 27.4 | | | 27.4 | | | 9.6 | 9.6 | | | |
| Effective Green, g (s) | | 27.4 | | | 27.4 | | | 9.6 | 9.6 | | | |
| Actuated g/C Ratio | | 0.61 | | | 0.61 | | | 0.21 | 0.21 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1097 | | | 1039 | | | 748 | 274 | | | |
| v/s Ratio Prot | | | | | c0.09 | | | | | | | |
| v/s Ratio Perm | | 0.07 | | | | | | 0.11 | 0.03 | | | |
| v/c Ratio | | 0.12 | | | 0.15 | | | 0.52 | 0.15 | | | |
| Uniform Delay, d1 | | 3.7 | | | 3.8 | | | 15.7 | 14.4 | | | |
| Progression Factor | | 0.39 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.3 | | | 0.3 | 0.1 | | | |
| Delay (s) | | 1.7 | | | 4.1 | | | 16.0 | 14.5 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 1.7 | | | 4.1 | | | 15.5 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.1 | | | | | | HCM Level of Service | B | | | |
| HCM Volume to Capacity ratio | | 0.25 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 38.5% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 14 | 47 | 22 | 64 | 0 | 64 | 0 | 548 | 45 | 32 | 477 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.93 | | | 0.99 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1747 | 1757 | | | 1657 | | | 3476 | | | 3521 | |
| Flt Permitted | 0.74 | 1.00 | | | 0.85 | | | 1.00 | | | 0.88 | |
| Satd. Flow (perm) | 1358 | 1757 | | | 1446 | | | 3476 | | | 3125 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 |
| Adj. Flow (vph) | 15 | 51 | 24 | 70 | 0 | 70 | 0 | 596 | 49 | 35 | 482 | 0 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 40 | 0 | 0 | 14 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 15 | 61 | 0 | 0 | 100 | 0 | 0 | 631 | 0 | 0 | 517 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 24 | | 24 | 40 | | 40 | 48 | | 48 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | 17 | | | 7 |
| Turn Type | Perm | | | Perm | | | | Perm | | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 573 | 742 | | | 611 | | | 1313 | | | 1181 | |
| v/s Ratio Prot | | 0.03 | | | | | | c0.18 | | | | |
| v/s Ratio Perm | 0.01 | | | | c0.07 | | | | | | 0.17 | |
| v/c Ratio | 0.03 | 0.08 | | | 0.16 | | | 0.48 | | | 0.44 | |
| Uniform Delay, d1 | 7.6 | 7.8 | | | 8.1 | | | 10.6 | | | 10.4 | |
| Progression Factor | 1.00 | 1.00 | | | 1.15 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.2 | | | 0.6 | | | 1.3 | | | 1.2 | |
| Delay (s) | 7.7 | 8.0 | | | 9.8 | | | 11.9 | | | 11.6 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 7.9 | | | 9.8 | | | 11.9 | | | 11.6 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.31 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 58.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|------|-------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | ↕ | ↕↕ | |
| Volume (vph) | 29 | 165 | 30 | 12 | 196 | 193 | 26 | 657 | 27 | 40 | 180 | 64 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.98 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.93 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3417 | | | 3219 | | | 3506 | | 1767 | 3370 | |
| Flt Permitted | | 0.81 | | | 0.94 | | | 0.94 | | 0.28 | 1.00 | |
| Satd. Flow (perm) | | 2783 | | | 3031 | | | 3297 | | 529 | 3370 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 32 | 179 | 33 | 13 | 213 | 210 | 28 | 714 | 29 | 41 | 196 | 70 |
| RTOR Reduction (vph) | 0 | 26 | 0 | 0 | 173 | 0 | 0 | 3 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 0 | 218 | 0 | 0 | 263 | 0 | 0 | 768 | 0 | 41 | 243 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 3 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 10.7 | | | 10.7 | | | 33.1 | | 40.3 | 40.3 | |
| Effective Green, g (s) | | 10.7 | | | 10.7 | | | 33.1 | | 40.3 | 40.3 | |
| Actuated g/C Ratio | | 0.18 | | | 0.18 | | | 0.55 | | 0.67 | 0.67 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 496 | | | 541 | | | 1819 | | 411 | 2264 | |
| v/s Ratio Prot | | | | | | | | | | 0.00 | c0.07 | |
| v/s Ratio Perm | | 0.08 | | | c0.09 | | | c0.23 | | 0.06 | | |
| v/c Ratio | | 0.44 | | | 0.49 | | | 0.42 | | 0.10 | 0.11 | |
| Uniform Delay, d1 | | 22.0 | | | 22.2 | | | 7.9 | | 3.9 | 3.5 | |
| Progression Factor | | 1.00 | | | 0.73 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | 0.6 | | | 0.7 | | 0.1 | 0.1 | |
| Delay (s) | | 22.6 | | | 16.7 | | | 8.6 | | 4.0 | 3.6 | |
| Level of Service | | C | | | B | | | A | | A | A | |
| Approach Delay (s) | | 22.6 | | | 16.7 | | | 8.6 | | | 3.6 | |
| Approach LOS | | C | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 11.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.42 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 74.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔↔ | |
| Volume (vph) | 23 | 152 | 95 | 61 | 237 | 102 | 109 | 803 | 113 | 44 | 554 | 39 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.97 | | | 0.97 | | | 0.99 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | | 0.96 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Satd. Flow (prot) | | 3215 | | | 3229 | | | 3413 | | | 4988 | |
| Flt Permitted | | 0.91 | | | 0.86 | | | 0.73 | | | 0.81 | |
| Satd. Flow (perm) | | 2922 | | | 2807 | | | 2494 | | | 4033 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 25 | 165 | 103 | 66 | 258 | 111 | 118 | 873 | 119 | 48 | 602 | 42 |
| RTOR Reduction (vph) | 0 | 65 | 0 | 0 | 46 | 0 | 0 | 16 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 228 | 0 | 0 | 389 | 0 | 0 | 1095 | 0 | 0 | 680 | 0 |
| Confl. Peds. (#/hr) | 74 | | 74 | 120 | | 120 | 85 | | 85 | 65 | | 65 |
| Confl. Bikes (#/hr) | | | 30 | | | 13 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1071 | | | 1029 | | | 1313 | | | 1210 | |
| v/s Ratio Prot | | | | | | | | c0.10 | | | | |
| v/s Ratio Perm | | 0.08 | | | c0.14 | | | c0.31 | | | 0.17 | |
| v/c Ratio | | 0.21 | | | 0.38 | | | 0.83 | | | 0.56 | |
| Uniform Delay, d1 | | 13.1 | | | 14.0 | | | 13.4 | | | 17.7 | |
| Progression Factor | | 2.17 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 1.1 | | | 6.3 | | | 1.9 | |
| Delay (s) | | 28.7 | | | 15.0 | | | 19.7 | | | 19.6 | |
| Level of Service | | C | | | B | | | B | | | B | |
| Approach Delay (s) | | 28.7 | | | 15.0 | | | 19.7 | | | 19.6 | |
| Approach LOS | | C | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 19.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 89.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕↕ | ↗ | | | |
| Volume (vph) | 38 | 331 | 0 | 0 | 389 | 97 | 65 | 391 | 257 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3510 | | | 3372 | 1319 | | 5003 | 1458 | | | |
| Flt Permitted | | 0.88 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3119 | | | 3372 | 1319 | | 5003 | 1458 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 41 | 360 | 0 | 0 | 423 | 103 | 71 | 425 | 276 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 25 | 0 | 0 | 226 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 401 | 0 | 0 | 432 | 68 | 0 | 496 | 50 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | 12 | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | Perm | | | Perm | Perm | | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 58.4 | | | 58.4 | 58.4 | | 14.6 | 14.6 | | | |
| Effective Green, g (s) | | 58.4 | | | 58.4 | 58.4 | | 14.6 | 14.6 | | | |
| Actuated g/C Ratio | | 0.73 | | | 0.73 | 0.73 | | 0.18 | 0.18 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2277 | | | 2462 | 963 | | 913 | 266 | | | |
| v/s Ratio Prot | | | | | 0.13 | | | | | | | |
| v/s Ratio Perm | | c0.13 | | | | 0.05 | | 0.10 | 0.03 | | | |
| v/c Ratio | | 0.18 | | | 0.18 | 0.07 | | 0.54 | 0.19 | | | |
| Uniform Delay, d1 | | 3.3 | | | 3.3 | 3.1 | | 29.7 | 27.7 | | | |
| Progression Factor | | 1.00 | | | 0.71 | 0.31 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.1 | 0.1 | | 0.7 | 0.3 | | | |
| Delay (s) | | 3.5 | | | 2.5 | 1.1 | | 30.3 | 28.0 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 3.5 | | | 2.3 | | | 29.5 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.25 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 57.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

23: 20th Street & Webster Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 408 | 178 | 141 | 366 | 0 | 0 | 0 | 0 | 82 | 522 | 119 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.91 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1439 | 1610 | 3376 | | | | | | 4521 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.94 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1439 | 1610 | 3196 | | | | | | 4521 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 443 | 193 | 153 | 398 | 0 | 0 | 0 | 0 | 89 | 567 | 129 |
| RTOR Reduction (vph) | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 0 | 443 | 148 | 138 | 413 | 0 | 0 | 0 | 0 | 0 | 749 | 0 |
| Confl. Peds. (#/hr) | 51 | | 51 | 114 | | 114 | 115 | | 115 | 333 | | 333 |
| Confl. Bikes (#/hr) | | | 8 | | | 3 | | | 17 | | | 6 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Effective Green, g (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Actuated g/C Ratio | | 0.35 | 0.35 | 0.12 | 0.52 | | | | | | 0.38 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1239 | 504 | 201 | 1700 | | | | | | 1695 | |
| v/s Ratio Prot | | c0.13 | | c0.09 | 0.03 | | | | | | | |
| v/s Ratio Perm | | | 0.10 | | 0.10 | | | | | | 0.17 | |
| v/c Ratio | | 0.36 | 0.29 | 0.69 | 0.24 | | | | | | 0.44 | |
| Uniform Delay, d1 | | 19.3 | 18.8 | 33.5 | 10.3 | | | | | | 18.7 | |
| Progression Factor | | 1.11 | 1.16 | 1.00 | 1.00 | | | | | | 1.37 | |
| Incremental Delay, d2 | | 0.8 | 1.4 | 7.5 | 0.0 | | | | | | 0.1 | |
| Delay (s) | | 22.2 | 23.3 | 41.0 | 10.4 | | | | | | 25.7 | |
| Level of Service | | C | C | D | B | | | | | | C | |
| Approach Delay (s) | | 22.6 | | | 18.0 | | | 0.0 | | | 25.7 | |
| Approach LOS | | C | | | B | | | A | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 22.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 93.3% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

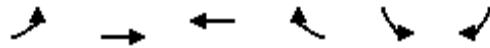
Near-Term PM
Kaiser Center Transportation Study












| Movement | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER |
|-----------------------------------|-------|-------|-------|-------|----------------------|--------|--------|------|------|------|
| Lane Configurations | 🚗🚗🚗 | | | | 🚗🚗 | 🚗🚗 | 🚗 | 🚗 | | |
| Volume (vph) | 389 | 103 | 97 | 21 | 828 | 188 | 268 | 51 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Lane Util. Factor | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | |
| Frpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Frt | 0.97 | | | | 1.00 | 0.94 | 0.85 | 0.85 | | |
| Flt Protected | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (prot) | 4894 | | | | 3517 | 3186 | 1441 | 1583 | | |
| Flt Permitted | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (perm) | 4894 | | | | 3517 | 3186 | 1441 | 1583 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 |
| Adj. Flow (vph) | 423 | 112 | 105 | 23 | 900 | 204 | 291 | 55 | 0 | 0 |
| RTOR Reduction (vph) | 66 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 0 |
| Lane Group Flow (vph) | 469 | 0 | 0 | 0 | 1028 | 341 | 154 | 28 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | 74 | | |
| Confl. Bikes (#/hr) | | | | | 7 | | | 8 | | |
| Turn Type | | | Split | Split | | custom | custom | | | |
| Protected Phases | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | |
| Permitted Phases | 1 | | | | | | 6 | | | |
| Actuated Green, G (s) | 18.1 | | | | 25.9 | 14.0 | 36.1 | 36.1 | | |
| Effective Green, g (s) | 18.1 | | | | 25.9 | 14.0 | 36.1 | 36.1 | | |
| Actuated g/C Ratio | 0.26 | | | | 0.37 | 0.20 | 0.52 | 0.52 | | |
| Clearance Time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 1265 | | | | 1301 | 637 | 743 | 816 | | |
| v/s Ratio Prot | c0.10 | | | | c0.29 | c0.11 | 0.11 | 0.02 | | |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.37 | | | | 0.79 | 0.54 | 0.21 | 0.03 | | |
| Uniform Delay, d1 | 21.3 | | | | 19.6 | 25.1 | 9.2 | 8.4 | | |
| Progression Factor | 1.00 | | | | 1.00 | 0.84 | 0.88 | 0.74 | | |
| Incremental Delay, d2 | 0.8 | | | | 3.1 | 0.4 | 0.6 | 0.1 | | |
| Delay (s) | 22.1 | | | | 22.8 | 21.5 | 8.7 | 6.3 | | |
| Level of Service | C | | | | C | C | A | A | | |
| Approach Delay (s) | 22.1 | | | | 22.8 | 16.4 | | | 0.0 | |
| Approach LOS | C | | | | C | B | | | A | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | 20.9 | | | HCM Level of Service | | | | C | |
| HCM Volume to Capacity ratio | | 0.60 | | | | | | | | |
| Actuated Cycle Length (s) | | 70.0 | | | Sum of lost time (s) | | | | 12.0 | |
| Intersection Capacity Utilization | | 58.9% | | | ICU Level of Service | | | | B | |
| Analysis Period (min) | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 25: 20th Street & Access Road Exit

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR | |
|-----------------------------------|---|---|---|------|----------------------|---|------|
| Lane Configurations |  |     |   | | |   | |
| Volume (veh/h) | 0 | 493 | 365 | 0 | 0 | 96 | |
| Sign Control | | Free | Free | | Stop | | |
| Grade | | 0% | 0% | | 0% | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Hourly flow rate (vph) | 0 | 536 | 397 | 0 | 0 | 104 | |
| Pedestrians | | | | | | | |
| Lane Width (ft) | | | | | | | |
| Walking Speed (ft/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | None | None | | | | |
| Median storage veh | | | | | | | |
| Upstream signal (ft) | | 420 | 110 | | | | |
| pX, platoon unblocked | | | | | 0.99 | | |
| vC, conflicting volume | 397 | | | | 575 | 198 | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 397 | | | | 541 | 198 | |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 | |
| p0 queue free % | 100 | | | | 100 | 87 | |
| cM capacity (veh/h) | 1158 | | | | 467 | 809 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | EB 4 | WB 1 | WB 2 | SB 1 |
| Volume Total | 0 | 179 | 179 | 179 | 198 | 198 | 104 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 104 |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 | 809 |
| Volume to Capacity | 0.00 | 0.11 | 0.11 | 0.11 | 0.12 | 0.12 | 0.13 |
| Queue Length 95th (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.1 |
| Lane LOS | | | | | | | B |
| Approach Delay (s) | 0.0 | | | | 0.0 | | 10.1 |
| Approach LOS | | | | | | | B |
| Intersection Summary | | | | | | | |
| Average Delay | | | 1.0 | | | | |
| Intersection Capacity Utilization | | 22.7% | | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | | |
| | | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: 20th Street & Lakeside Drive

Near-Term PM
Kaiser Center Transportation Study

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖↗ | ↑↑↑ | ↖↗ | ↖ |
| Volume (vph) | 1069 | 71 | 747 | 326 | 153 | 842 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5036 | | 3433 | 5085 | 3174 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5036 | | 3433 | 5085 | 3174 | 1441 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.99 | 0.92 | 0.92 | 0.93 |
| Adj. Flow (vph) | 1125 | 77 | 755 | 354 | 166 | 905 |
| RTOR Reduction (vph) | 11 | 0 | 0 | 0 | 317 | 316 |
| Lane Group Flow (vph) | 1191 | 0 | 755 | 354 | 302 | 136 |
| Confl. Bikes (#/hr) | | | | 16 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Effective Green, g (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Actuated g/C Ratio | 0.26 | | 0.27 | 0.59 | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 1295 | | 932 | 2978 | 952 | 432 |
| v/s Ratio Prot | c0.24 | | c0.22 | 0.07 | c0.10 | |
| v/s Ratio Perm | | | | | | 0.09 |
| v/c Ratio | 0.92 | | 0.81 | 0.12 | 0.32 | 0.31 |
| Uniform Delay, d1 | 25.3 | | 23.8 | 6.5 | 19.0 | 18.9 |
| Progression Factor | 0.73 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 9.8 | | 7.6 | 0.1 | 0.9 | 1.9 |
| Delay (s) | 28.3 | | 31.4 | 6.5 | 19.8 | 20.8 |
| Level of Service | C | | C | A | B | C |
| Approach Delay (s) | 28.3 | | | 23.5 | 20.3 | |
| Approach LOS | C | | | C | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 24.2 | | HCM Level of Service | | C |
| HCM Volume to Capacity ratio | | 0.67 | | | | |
| Actuated Cycle Length (s) | | 70.0 | | Sum of lost time (s) | 12.0 | |
| Intersection Capacity Utilization | | 66.8% | | ICU Level of Service | | C |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱↱↱ | |
| Volume (vph) | 0 | 0 | 0 | 146 | 151 | 0 | 0 | 0 | 0 | 0 | 1270 | 147 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1766 | 3539 | | | | | | 6292 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1766 | 3539 | | | | | | 6292 | |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 159 | 164 | 0 | 0 | 0 | 0 | 0 | 1309 | 160 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 156 | 164 | 0 | 0 | 0 | 0 | 0 | 1450 | 0 |
| Confl. Peds. (#/hr) | 15 | | 15 | 2 | | 2 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 23.5 | 23.5 | | | | | | 42.5 | |
| Effective Green, g (s) | | | | 23.5 | 23.5 | | | | | | 42.5 | |
| Actuated g/C Ratio | | | | 0.31 | 0.31 | | | | | | 0.57 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 553 | 1109 | | | | | | 3565 | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | c0.23 | |
| v/s Ratio Perm | | | | c0.09 | | | | | | | | |
| v/c Ratio | | | | 0.28 | 0.15 | | | | | | 0.41 | |
| Uniform Delay, d1 | | | | 19.4 | 18.5 | | | | | | 9.2 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.73 | |
| Incremental Delay, d2 | | | | 1.3 | 0.3 | | | | | | 0.1 | |
| Delay (s) | | | | 20.7 | 18.8 | | | | | | 6.8 | |
| Level of Service | | | | C | B | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 19.7 | | | 0.0 | | | 6.8 | |
| Approach LOS | | A | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.1 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 45.9% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Near-Term PM
Kaiser Center Transportation Study



















| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 200 | 396 | 1220 | 76 | 346 | 41 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.99 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 5029 | | 3404 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 5029 | | 3404 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 217 | 426 | 1312 | 83 | 376 | 45 |
| RTOR Reduction (vph) | 2 | 0 | 9 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 215 | 426 | 1386 | 0 | 421 | 0 |
| Confl. Peds. (#/hr) | | | | 17 | | |
| Confl. Bikes (#/hr) | | | | 6 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 15.9 | 15.9 | 26.0 | | 21.1 | |
| Effective Green, g (s) | 15.9 | 15.9 | 26.0 | | 21.1 | |
| Actuated g/C Ratio | 0.21 | 0.21 | 0.35 | | 0.28 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 375 | 1078 | 1743 | | 958 | |
| v/s Ratio Prot | | 0.08 | c0.28 | | c0.12 | |
| v/s Ratio Perm | c0.12 | | | | | |
| v/c Ratio | 0.57 | 0.40 | 0.80 | | 0.44 | |
| Uniform Delay, d1 | 26.5 | 25.4 | 22.1 | | 22.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 6.2 | 1.1 | 2.6 | | 0.3 | |
| Delay (s) | 32.7 | 26.5 | 24.7 | | 22.4 | |
| Level of Service | C | C | C | | C | |
| Approach Delay (s) | | 28.6 | 24.7 | | 22.4 | |
| Approach LOS | | C | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 25.3 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.62 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 58.4% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th Street & Castro Street

Near-Term PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | |  |  |  |  | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 262 | 878 | 1024 | 528 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.98 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.98 | 0.99 | | | | |
| Frt | | | | | 0.91 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3041 | 1417 | 1403 | 5828 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3041 | 1417 | 1403 | 5828 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 285 | 954 | 1113 | 568 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 61 | 61 | 351 | 272 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 701 | 416 | 205 | 853 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 4 | | 4 | 14 | | 14 | | | |
| Confl. Bikes (#/hr) | | | | | | 1 | | | | | | 4 |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 42.8 | 42.8 | 22.2 | 22.2 | | | | |
| Effective Green, g (s) | | | | | 42.8 | 42.8 | 22.2 | 22.2 | | | | |
| Actuated g/C Ratio | | | | | 0.57 | 0.57 | 0.30 | 0.30 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1735 | 809 | 415 | 1725 | | | | |
| v/s Ratio Prot | | | | | 0.23 | | | | | | | |
| v/s Ratio Perm | | | | | | c0.29 | 0.15 | 0.15 | | | | |
| v/c Ratio | | | | | 0.40 | 0.51 | 0.49 | 0.49 | | | | |
| Uniform Delay, d1 | | | | | 9.0 | 9.8 | 21.8 | 21.8 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.7 | 2.3 | 0.9 | 0.2 | | | | |
| Delay (s) | | | | | 9.7 | 12.1 | 22.7 | 22.0 | | | | |
| Level of Service | | | | | A | B | C | C | | | | |
| Approach Delay (s) | | 0.0 | | | 10.6 | | | 22.2 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 17.3 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.51 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 73.4% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|----------------------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 249 | 72 | 0 | 0 | 0 | 0 | 0 | 0 | 561 | 908 | 55 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3406 | | | | | | | | 1522 | 4729 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3406 | | | | | | | | 1522 | 4729 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 271 | 78 | 0 | 0 | 0 | 0 | 0 | 0 | 610 | 987 | 60 |
| RTOR Reduction (vph) | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 231 | 42 | 0 |
| Lane Group Flow (vph) | 0 | 323 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 172 | 1212 | 0 |
| Confl. Peds. (#/hr) | 5 | | 5 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Effective Green, g (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Actuated g/C Ratio | | 0.47 | | | | | | | | 0.43 | 0.43 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1589 | | | | | | | | 649 | 2018 | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.11 | 0.26 | |
| v/c Ratio | | 0.20 | | | | | | | | 0.26 | 0.60 | |
| Uniform Delay, d1 | | 11.8 | | | | | | | | 13.9 | 16.6 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | 1.0 | 1.3 | |
| Delay (s) | | 12.1 | | | | | | | | 14.9 | 17.9 | |
| Level of Service | | B | | | | | | | | B | B | |
| Approach Delay (s) | | 12.1 | | | 0.0 | | | 0.0 | | | 17.2 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 16.3 | | | | | | | | HCM Level of Service | B | |
| HCM Volume to Capacity ratio | | 0.39 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | Sum of lost time (s) | 8.0 | |
| Intersection Capacity Utilization | | 45.1% | | | | | | | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔ | ↔ | | | |
| Volume (vph) | 63 | 918 | 0 | 0 | 425 | 261 | 205 | 632 | 42 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.96 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3524 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Flt Permitted | | 0.89 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3130 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.99 | 0.96 | 0.96 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 68 | 998 | 0 | 0 | 443 | 272 | 223 | 687 | 46 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 118 | 0 | 0 | 4 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1066 | 0 | 0 | 443 | 154 | 0 | 910 | 42 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 52 | | 52 | 35 | | 35 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 5 | | | 21 | | | | | | 22 |
| Turn Type | Perm | | Perm | | Perm | | Perm | Perm | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | 8 | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 939 | | | 1062 | 438 | | 1852 | 811 | | | |
| v/s Ratio Prot | | | | | 0.13 | | | | | | | |
| v/s Ratio Perm | | 0.34 | | | | 0.11 | | 0.26 | 0.03 | | | |
| v/c Ratio | | 1.14 | | | 0.42 | 0.35 | | 0.49 | 0.05 | | | |
| Uniform Delay, d1 | | 21.0 | | | 16.8 | 16.4 | | 8.9 | 6.7 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 74.1 | | | 1.2 | 2.2 | | 0.9 | 0.1 | | | |
| Delay (s) | | 95.1 | | | 18.0 | 18.6 | | 9.8 | 6.8 | | | |
| Level of Service | | F | | | B | B | | A | A | | | |
| Approach Delay (s) | | 95.1 | | | 18.2 | | | 9.6 | | | 0.0 | |
| Approach LOS | | F | | | B | | | A | | | A | |

Intersection Summary

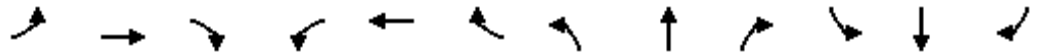
| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 45.2 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 83.4% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 644 | 73 | 26 | 560 | 0 | 0 | 0 | 0 | 344 | 600 | 19 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frbp, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3464 | | | 3531 | | | | | 1734 | 3518 | |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3464 | | | 3232 | | | | | 1734 | 3518 | |
| Peak-hour factor, PHF | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 700 | 79 | 28 | 609 | 0 | 0 | 0 | 0 | 366 | 625 | 21 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 760 | 0 | 0 | 637 | 0 | 0 | 0 | 0 | 366 | 641 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 25 | | 25 | 17 | | 17 | 24 | | 24 |
| Confl. Bikes (#/hr) | | | 16 | | | 17 | | | 2 | | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | 6 | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1463 | | | 1365 | | | | | 732 | 1485 | |
| v/s Ratio Prot | | c0.22 | | | | | | | | | 0.18 | |
| v/s Ratio Perm | | | | | 0.20 | | | | | c0.21 | | |
| v/c Ratio | | 0.52 | | | 0.47 | | | | | 0.50 | 0.43 | |
| Uniform Delay, d1 | | 9.6 | | | 9.4 | | | | | 9.5 | 9.2 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.3 | | | 1.1 | | | | | 2.4 | 0.9 | |
| Delay (s) | | 10.9 | | | 10.5 | | | | | 12.0 | 10.1 | |
| Level of Service | | B | | | B | | | | | B | B | |
| Approach Delay (s) | | 10.9 | | | 10.5 | | | 0.0 | | | 10.8 | |
| Approach LOS | | B | | | B | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 60.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 73 | 430 | 8 | 19 | 401 | 44 | 69 | 445 | 25 | 114 | 178 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 1.00 | | | 0.99 | | | 0.99 | | | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Satd. Flow (prot) | | 3484 | | | 3457 | | | 3474 | | | 3361 | |
| Flt Permitted | | 0.84 | | | 0.93 | | | 0.86 | | | 0.64 | |
| Satd. Flow (perm) | | 2949 | | | 3221 | | | 3009 | | | 2203 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 79 | 467 | 9 | 21 | 436 | 48 | 75 | 484 | 27 | 124 | 184 | 54 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 15 | 0 | 0 | 9 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 0 | 553 | 0 | 0 | 490 | 0 | 0 | 577 | 0 | 0 | 326 | 0 |
| Confl. Peds. (#/hr) | 80 | | 80 | 58 | | 58 | 44 | | 44 | 41 | | 41 |
| Confl. Bikes (#/hr) | | | 14 | | | 10 | | | 7 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 22.9 | | | 22.9 | | | 14.6 | | | 14.6 | |
| Effective Green, g (s) | | 22.9 | | | 22.9 | | | 14.6 | | | 14.6 | |
| Actuated g/C Ratio | | 0.51 | | | 0.51 | | | 0.32 | | | 0.32 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1501 | | | 1639 | | | 976 | | | 715 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | c0.19 | | | 0.15 | | | c0.19 | | | 0.15 | |
| v/c Ratio | | 0.37 | | | 0.30 | | | 0.59 | | | 0.46 | |
| Uniform Delay, d1 | | 6.7 | | | 6.4 | | | 12.7 | | | 12.1 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | 0.5 | | | 1.0 | | | 0.5 | |
| Delay (s) | | 7.4 | | | 6.9 | | | 13.7 | | | 12.5 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 7.4 | | | 6.9 | | | 13.7 | | | 12.5 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.46 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 69.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

35: 12th Street & Madison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | ←←←← | |
| Volume (vph) | 0 | 0 | 0 | 249 | 941 | 0 | 0 | 0 | 0 | 0 | 697 | 46 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6270 | | | | | | 6331 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6270 | | | | | | 6331 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 271 | 970 | 0 | 0 | 0 | 0 | 0 | 758 | 50 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1188 | 0 | 0 | 0 | 0 | 0 | 792 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 47 | | 47 | 36 | | 36 | 29 | | 29 |
| Confl. Bikes (#/hr) | | | 3 | | | 13 | | | 9 | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2717 | | | | | | 2796 | |
| v/s Ratio Prot | | | | | | | | | | | c0.13 | |
| v/s Ratio Perm | | | | | 0.19 | | | | | | | |
| v/c Ratio | | | | | 0.44 | | | | | | 0.28 | |
| Uniform Delay, d1 | | | | | 11.9 | | | | | | 10.7 | |
| Progression Factor | | | | | 0.44 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.5 | | | | | | 0.3 | |
| Delay (s) | | | | | 5.7 | | | | | | 10.9 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 5.7 | | | 0.0 | | | 10.9 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.8 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 40.9% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th Street & Oak St.

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1015 | 60 | 178 | 984 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6330 | | | 6239 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6330 | | | 6239 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 65 | 193 | 1025 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 28 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1129 | 0 | 0 | 1190 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | 121 | 69 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | | | | 15 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3154 | | | 2142 | | | | |
| v/s Ratio Prot | | | | | c0.18 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.19 | | | | |
| v/c Ratio | | | | | 0.36 | | | 0.56 | | | | |
| Uniform Delay, d1 | | | | | 9.2 | | | 16.0 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.3 | | | 1.0 | | | | |
| Delay (s) | | | | | 9.5 | | | 17.0 | | | | |
| Level of Service | | | | | A | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 9.5 | | | 17.0 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 13.4 | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | | 0.44 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | Sum of lost time (s) | | | 9.5 | |
| Intersection Capacity Utilization | | | 46.5% | | | | | ICU Level of Service | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 68 | 0 | 0 | 1079 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.25 | 0.92 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 74 | 0 | 0 | 1173 | 0 | 0 |
| Pedestrians | 6 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 299 | 6 | 6 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 299 | 6 | 6 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 665 | 1069 | 1605 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 74 | 293 | 293 | 293 | 293 | |
| Volume Left | 74 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 665 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.17 | 0.17 | 0.17 | 0.17 | |
| Queue Length 95th (ft) | 9 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.1 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 26.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------------------------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 910 | 194 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 873 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.97 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6193 | | | | | | | | | 5066 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6193 | | | | | | | | | 5066 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 948 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 939 | 0 |
| RTOR Reduction (vph) | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 1126 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 983 | 0 |
| Confl. Peds. (#/hr) | 20 | | 20 | 30 | | 30 | 12 | | 12 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 5 | | | 7 | | | 3 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2374 | | | | | | | | | 2195 | |
| v/s Ratio Prot | | c0.18 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.19 | |
| v/c Ratio | | 0.47 | | | | | | | | | 0.45 | |
| Uniform Delay, d1 | | 13.9 | | | | | | | | | 12.0 | |
| Progression Factor | | 0.83 | | | | | | | | | 0.62 | |
| Incremental Delay, d2 | | 0.7 | | | | | | | | | 0.6 | |
| Delay (s) | | 12.2 | | | | | | | | | 8.0 | |
| Level of Service | | B | | | | | | | | | A | |
| Approach Delay (s) | | 12.2 | | | 0.0 | | | 0.0 | | | 8.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.3 | | | | | | | | | HCM Level of Service B |
| HCM Volume to Capacity ratio | | | 0.46 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 11.0 | Sum of lost time (s) |
| Intersection Capacity Utilization | | | 43.8% | | | | | | | | | ICU Level of Service A |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTH | | | | | | 4TTH | | | | |
| Volume (vph) | 24 | 724 | 0 | 0 | 0 | 0 | 0 | 319 | 134 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6389 | | | | | | 6032 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6389 | | | | | | 6032 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 26 | 787 | 0 | 0 | 0 | 0 | 0 | 347 | 138 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 804 | 0 | 0 | 0 | 0 | 0 | 465 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | 17 | 53 | | 53 | 68 | | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | 1 | | | 6 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 13.3 | | | | | | 39.7 | | | | |
| Effective Green, g (s) | | 13.3 | | | | | | 39.7 | | | | |
| Actuated g/C Ratio | | 0.22 | | | | | | 0.66 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1416 | | | | | | 3991 | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.13 | | | | | | | | | | |
| v/c Ratio | | 0.57 | | | | | | 0.12 | | | | |
| Uniform Delay, d1 | | 20.8 | | | | | | 3.7 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 0.1 | | | | |
| Delay (s) | | 21.1 | | | | | | 3.8 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 21.1 | | | 0.0 | | | 3.8 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.6 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.23 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.9% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTL | | | | | | 4TTL | | | | |
| Volume (vph) | 178 | 1074 | 0 | 0 | 0 | 0 | 0 | 940 | 394 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6345 | | | | | | 4830 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6345 | | | | | | 4830 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.98 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 193 | 1096 | 0 | 0 | 0 | 0 | 0 | 1000 | 410 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1269 | 0 | 0 | 0 | 0 | 0 | 1396 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 50 | | 50 | 14 | | 14 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 16 | | | 1 | | | 2 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2538 | | | | | | 1932 | | | | |
| v/s Ratio Prot | | | | | | | | c0.29 | | | | |
| v/s Ratio Perm | | 0.20 | | | | | | | | | | |
| v/c Ratio | | 0.50 | | | | | | 0.72 | | | | |
| Uniform Delay, d1 | | 10.1 | | | | | | 11.4 | | | | |
| Progression Factor | | 0.95 | | | | | | 1.56 | | | | |
| Incremental Delay, d2 | | 0.5 | | | | | | 1.8 | | | | |
| Delay (s) | | 10.1 | | | | | | 19.6 | | | | |
| Level of Service | | B | | | | | | B | | | | |
| Approach Delay (s) | | 10.1 | | | 0.0 | | | 19.6 | | | 0.0 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 15.1 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.61 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 9.0 | | |
| Intersection Capacity Utilization | | 54.8% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 972 | 285 | 0 | 0 | 0 | 0 | 0 | 0 | 433 | 1471 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6153 | | | | | | | | | 5017 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6153 | | | | | | | | | 5017 | |
| Peak-hour factor, PHF | 0.25 | 0.99 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.95 | 0.25 |
| Adj. Flow (vph) | 0 | 982 | 310 | 0 | 0 | 0 | 0 | 0 | 0 | 471 | 1548 | 0 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 0 |
| Lane Group Flow (vph) | 0 | 1287 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1997 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 8 | | 8 | 2 | | 2 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 2 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2461 | | | | | | | | | 2230 | |
| v/s Ratio Prot | | c0.21 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.40 | |
| v/c Ratio | | 0.52 | | | | | | | | | 0.90 | |
| Uniform Delay, d1 | | 10.2 | | | | | | | | | 11.5 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.8 | | | | | | | | | 6.1 | |
| Delay (s) | | 11.0 | | | | | | | | | 17.7 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 11.0 | | | 0.0 | | | 0.0 | | | 17.7 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 15.1 | | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | 0.72 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 65.0% | | | | | | ICU Level of Service | | C | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↰ | | ↕ | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 7 | 369 | 56 | 351 | 352 | 0 | 0 | 216 | 1629 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frbp, ped/bikes | | | | 1.00 | 1.00 | 0.93 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1726 | 1863 | 1471 | | 1817 | | | 1863 | 1559 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.72 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1726 | 1863 | 1471 | | 1350 | | | 1863 | 1559 |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 8 | 401 | 61 | 382 | 383 | 0 | 0 | 235 | 1662 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 41 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 8 | 401 | 15 | 0 | 765 | 0 | 0 | 235 | 1621 |
| Confl. Peds. (#/hr) | 4 | | 4 | 20 | | 20 | 1 | | 1 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 10 | | | 7 | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 14.4 | 14.4 | 14.4 | | 34.6 | | | 34.6 | 34.6 |
| Effective Green, g (s) | | | | 14.4 | 14.4 | 14.4 | | 34.6 | | | 34.6 | 34.6 |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | 0.24 | | 0.58 | | | 0.58 | 0.58 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 414 | 447 | 353 | | 779 | | | 1074 | 899 |
| v/s Ratio Prot | | | | c0.22 | | | | | | | 0.13 | |
| v/s Ratio Perm | | | | 0.00 | | 0.01 | | 0.57 | | | | c1.04 |
| v/c Ratio | | | | 0.02 | 0.90 | 0.04 | | 0.98 | | | 0.22 | 1.80 |
| Uniform Delay, d1 | | | | 17.4 | 22.1 | 17.5 | | 12.4 | | | 6.2 | 12.7 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 20.2 | 0.0 | | 28.2 | | | 0.5 | 365.8 |
| Delay (s) | | | | 17.4 | 42.2 | 17.6 | | 40.6 | | | 6.6 | 378.5 |
| Level of Service | | | | B | D | B | | D | | | A | F |
| Approach Delay (s) | | 0.0 | | | 38.6 | | | 40.6 | | | 332.4 | |
| Approach LOS | | A | | | D | | | D | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 217.1 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.54 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 172.6% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Near-Term PM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|-------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 184 | 627 | 66 | 56 | 728 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frbp, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.89 | 0.85 |
| Flt Protected | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (prot) | | | 3500 | | 3170 | 1441 |
| Flt Permitted | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (perm) | | | 3500 | | 3170 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 |
| Adj. Flow (vph) | 0 | 200 | 682 | 72 | 61 | 774 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 882 | 0 | 520 | 387 |
| Confl. Peds. (#/hr) | 46 | | | | | |
| Confl. Bikes (#/hr) | 3 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1268 | | 1141 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.25 | | 0.16 | c0.27 |
| v/c Ratio | | | 0.70 | | 0.46 | 0.75 |
| Uniform Delay, d1 | | | 12.2 | | 11.0 | 12.6 |
| Progression Factor | | | 0.75 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.3 | | 1.3 | 9.4 |
| Delay (s) | | | 9.5 | | 12.3 | 22.0 |
| Level of Service | | | A | | B | C |
| Approach Delay (s) | | | 9.5 | | 16.5 | |
| Approach LOS | | | A | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 13.0 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.71 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 66.5% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 291 | 570 | 83 | 0 | 0 | 0 | 0 | 534 | 74 | 1 | 69 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | | | | 0.98 | | | 1.00 | |
| Flt Protected | | 0.98 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4917 | | | | | | 1832 | | | 1862 | |
| Flt Permitted | | 0.98 | | | | | | 1.00 | | | 0.84 | |
| Satd. Flow (perm) | | 1000 | | | | | | 1300 | | | 1300 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 |
| Adj. Flow (vph) | 316 | 613 | 90 | 0 | 0 | 0 | 0 | 580 | 80 | 1 | 75 | 0 |
| RTOR Reduction (vph) | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 994 | 0 | 0 | 0 | 0 | 0 | 649 | 0 | 0 | 76 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | 4 | | | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 500 | | | | | | 631 | | | 448 | |
| v/s Ratio Prot | | | | | | | | c0.35 | | | | |
| v/s Ratio Perm | | c0.99 | | | | | | | | | 0.06 | |
| v/c Ratio | | 1.99 | | | | | | 1.03 | | | 0.17 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 14.8 | | | 10.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.08 | |
| Incremental Delay, d2 | | 451.3 | | | | | | 43.3 | | | 0.8 | |
| Delay (s) | | 462.5 | | | | | | 58.0 | | | 1.5 | |
| Level of Service | | F | | | | | | E | | | A | |
| Approach Delay (s) | | 462.5 | | | 0.0 | | | 58.0 | | | 1.5 | |
| Approach LOS | | F | | | A | | | E | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 290.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.60 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 62.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Near-Term PM
Kaiser Center Transportation Study



| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 192 | 170 | 1168 | 831 | 149 | 823 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3316 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3316 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 209 | 185 | 1243 | 903 | 162 | 895 |
| RTOR Reduction (vph) | 0 | 152 | 135 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 209 | 33 | 2011 | 0 | 162 | 895 |
| Turn Type | Perm | | | Prot | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Actuated g/C Ratio | 0.18 | 0.18 | 0.44 | | 0.25 | 0.73 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 315 | 281 | 1470 | | 435 | 2595 |
| v/s Ratio Prot | c0.12 | | c0.61 | | c0.09 | 0.25 |
| v/s Ratio Perm | | 0.02 | | | | |
| v/c Ratio | 0.66 | 0.12 | 1.37 | | 0.37 | 0.34 |
| Uniform Delay, d1 | 34.5 | 31.1 | 25.0 | | 28.2 | 4.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.66 | 0.46 |
| Incremental Delay, d2 | 5.2 | 0.2 | 170.0 | | 1.9 | 0.3 |
| Delay (s) | 39.7 | 31.3 | 195.0 | | 20.4 | 2.3 |
| Level of Service | D | C | F | | C | A |
| Approach Delay (s) | 35.7 | | 195.0 | | | 5.1 |
| Approach LOS | D | | F | | | A |

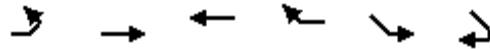
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 121.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.94 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 87.8% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

46: Lakeshore Drive & El Embarcadero (WB)

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 254 | 299 | 247 | 109 | 460 | 447 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3377 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3377 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 276 | 325 | 268 | 118 | 500 | 486 |
| RTOR Reduction (vph) | 0 | 0 | 81 | 0 | 0 | 308 |
| Lane Group Flow (vph) | 276 | 325 | 305 | 0 | 500 | 178 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 12.5 | 27.1 | 10.6 | | 20.2 | 20.2 |
| Effective Green, g (s) | 12.5 | 27.1 | 10.6 | | 20.2 | 20.2 |
| Actuated g/C Ratio | 0.23 | 0.49 | 0.19 | | 0.37 | 0.37 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 400 | 1734 | 647 | | 647 | 578 |
| v/s Ratio Prot | c0.16 | 0.09 | c0.09 | | c0.28 | |
| v/s Ratio Perm | | | | | | 0.11 |
| v/c Ratio | 0.69 | 0.19 | 0.47 | | 0.77 | 0.31 |
| Uniform Delay, d1 | 19.6 | 7.9 | 19.9 | | 15.5 | 12.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.1 | 0.1 | 0.5 | | 5.7 | 0.3 |
| Delay (s) | 24.7 | 8.0 | 20.4 | | 21.2 | 12.9 |
| Level of Service | C | A | C | | C | B |
| Approach Delay (s) | | 15.6 | 20.4 | | 17.1 | |
| Approach LOS | | B | C | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 17.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 55.3 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 59.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Near-Term PM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | 3TW | | | TT | T | T | TT | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 672 | 490 | 1038 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4962 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4962 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 329 | 1480 | 154 | 0 | 614 | 730 | 533 | 1128 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 52 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1952 | 0 | 0 | 614 | 678 | 533 | 1128 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1654 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.39 | | | 0.17 | | c0.30 | 0.32 | |
| v/s Ratio Perm | | | | | | | c0.43 | | | | |
| v/c Ratio | | | | 1.18 | | | 0.89 | 2.20 | 0.92 | 0.56 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.3 | 36.2 | 29.1 | 12.4 | |
| Progression Factor | | | | 1.00 | | | 1.47 | 1.55 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 87.6 | | | 1.9 | 542.2 | 19.6 | 0.4 | |
| Delay (s) | | | | 117.6 | | | 54.0 | 598.3 | 48.7 | 12.8 | |
| Level of Service | | | | F | | | D | F | D | B | |
| Approach Delay (s) | 0.0 | | | 117.6 | | | 349.6 | | | 24.3 | |
| Approach LOS | A | | | F | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 149.2 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.31 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 88.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|-------|------|--------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 414 | 1167 | 609 | 169 | 346 | 550 | 71 | 329 | 24 | 243 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.98 | 0.85 | | 0.90 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3135 | 1441 | | 3198 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3135 | 1441 | | 3198 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 450 | 1241 | 662 | 184 | 376 | 598 | 77 | 358 | 26 | 264 |
| RTOR Reduction (vph) | 0 | 0 | 16 | 0 | 6 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 405 | 1485 | 631 | 0 | 1045 | 0 | 0 | 0 | 384 | 264 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 975 | 448 | | 1315 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.25 | c0.47 | 0.44 | | c0.33 | | | | c0.22 | 0.07 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.81 | 1.52 | 1.41 | | 1.01dr | | | | 1.63 | 0.13 |
| Uniform Delay, d1 | 28.5 | 31.0 | 31.0 | | 23.2 | | | | 39.0 | 8.2 |
| Progression Factor | 0.65 | 0.66 | 0.64 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.3 | 235.9 | 185.2 | | 5.0 | | | | 300.8 | 0.1 |
| Delay (s) | 19.8 | 256.4 | 205.1 | | 28.2 | | | | 339.8 | 8.3 |
| Level of Service | B | F | F | | C | | | | F | A |
| Approach Delay (s) | | 205.5 | | | 28.2 | | | | | 204.7 |
| Approach LOS | | F | | | C | | | | | F |

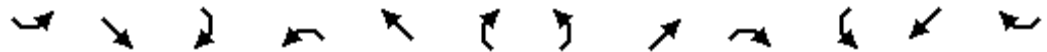
Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 161.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.19 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 95.0% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Near-Term PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1650 | 234 | 329 | 1013 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4860 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4860 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.98 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1719 | 254 | 336 | 1078 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 6 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1719 | 244 | 0 | 1408 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2543 | 792 | | 1782 | | | | |
| v/s Ratio Prot | | | | | c0.34 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.15 | | 0.29 | | | | |
| v/c Ratio | | | | | 0.68 | 0.31 | | 0.79 | | | | |
| Uniform Delay, d1 | | | | | 11.3 | 8.9 | | 16.9 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.18 | | | | |
| Incremental Delay, d2 | | | | | 1.5 | 1.0 | | 1.9 | | | | |
| Delay (s) | | | | | 12.8 | 9.9 | | 21.9 | | | | |
| Level of Service | | | | | B | A | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 12.4 | | | 21.9 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |

Intersection Summary

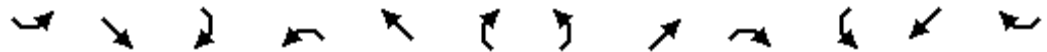
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 16.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 64.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

50: Santa Clara Avenue & Harrison Street

Near-Term PM
Kaiser Center Transportation Study




















| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 646 | 1371 | 0 | 0 | 0 | 0 | 0 | 715 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4778 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4778 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 702 | 1413 | 0 | 0 | 0 | 0 | 0 | 777 | 71 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 38 | 26 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 474 | 1577 | 0 | 0 | 0 | 0 | 0 | 837 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2309 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.24 | |
| v/s Ratio Perm | | | | 0.31 | 0.33 | | | | | | | |
| v/c Ratio | | | | 0.64 | 0.68 | | | | | | 0.62 | |
| Uniform Delay, d1 | | | | 11.6 | 12.0 | | | | | | 15.0 | |
| Progression Factor | | | | 1.43 | 1.37 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 3.2 | 1.2 | | | | | | 2.2 | |
| Delay (s) | | | | 19.8 | 17.6 | | | | | | 17.2 | |
| Level of Service | | | | B | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 18.1 | | | 0.0 | | | 17.2 | |
| Approach LOS | | A | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 17.9 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.66 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 64.8% | | | ICU Level of Service | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

51: Oakland Avenue & Monte Vista Avenue

Near-Term PM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 230 | 492 | 11 | 18 | 242 | 20 | 16 | 24 | 30 | 68 | 50 | 45 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 250 | 523 | 12 | 20 | 263 | 22 | 17 | 26 | 33 | 74 | 54 | 49 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 250 | 535 | 304 | 76 | 177 | | | | | | | |
| Volume Left (vph) | 250 | 0 | 20 | 17 | 74 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 22 | 33 | 49 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.18 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.3 | 5.8 | 5.8 | 6.7 | 6.5 | | | | | | | |
| Degree Utilization, x | 0.44 | 0.86 | 0.49 | 0.14 | 0.32 | | | | | | | |
| Capacity (veh/h) | 555 | 612 | 581 | 490 | 517 | | | | | | | |
| Control Delay (s) | 13.0 | 33.6 | 14.4 | 10.8 | 12.5 | | | | | | | |
| Approach Delay (s) | 27.0 | | 14.4 | 10.8 | 12.5 | | | | | | | |
| Approach LOS | D | | B | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 21.3 | | | | | | | | | |
| HCM Level of Service | | | C | | | | | | | | | |
| Intersection Capacity Utilization | | | 67.3% | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 9.7 Worst Case Level Of Service: D[30.8]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 1121 0 0 0 506 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 1121 0 0 0 506 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 1121 0 0 0 506 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.95 1.00 1.00 1.00 0.93 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1180 0 0 0 544 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1180 0 0 0 544 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 6.2 xxxxx xxxxx xxxxx

FollowUpTim:xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 3.3 xxxxx xxxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 393 xxxxx xxxxx xxxxx

Potent Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 660 xxxxx xxxxx xxxxx

Move Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 660 xxxxx xxxxx xxxxx

Volume/Cap: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 0.82 xxxxx xxxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 8.8 xxxxx xxxxx xxxxx

Control Del:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 30.8 xxxxx xxxxx xxxxx

LOS by Move: * * * * * * * * * * D * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 30.8 xxxxxx

ApproachLOS: * * * * D *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: I-580 EB On-Ramp & Oakland Avenue

Near-Term + I AM
Kaiser Center Transportation Study
























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 468 | 165 | 1006 | 447 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1730 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1730 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 482 | 179 | 1093 | 486 | 30 |
| RTOR Reduction (vph) | 79 | 55 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 249 | 278 | 1093 | 516 | 0 |
| Confl. Peds. (#/hr) | | | | | 2 |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 12.9 | 12.9 | 39.6 | 16.6 | |
| Effective Green, g (s) | 12.9 | 12.9 | 39.6 | 16.6 | |
| Actuated g/C Ratio | 0.22 | 0.22 | 0.66 | 0.28 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 361 | 372 | 2336 | 438 | |
| v/s Ratio Prot | | | c0.31 | c0.33 | |
| v/s Ratio Perm | 0.15 | 0.16 | | | |
| v/c Ratio | 0.69 | 0.75 | 0.47 | 1.18 | |
| Uniform Delay, d1 | 21.7 | 22.0 | 5.0 | 21.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 4.3 | 7.0 | 0.7 | 101.6 | |
| Delay (s) | 26.0 | 29.0 | 5.7 | 123.3 | |
| Level of Service | C | C | A | F | |
| Approach Delay (s) | | 27.5 | 43.4 | | |
| Approach LOS | | C | D | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 38.8 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | 0.75 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 53.4% | | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term + I AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |  |  | | |  |  |  | |  |  |  |
| Volume (vph) | 38 | 110 | 85 | 20 | 45 | 15 | 150 | 134 | 14 | 243 | 334 | 26 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.93 | | | 1.00 | 1.00 | 0.91 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1478 | | | 1770 | 1863 | 1443 | | 3433 | 3497 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1478 | | | 1770 | 1863 | 1443 | | 3433 | 3497 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 41 | 120 | 92 | 22 | 49 | 16 | 163 | 141 | 15 | 264 | 363 | 28 |
| RTOR Reduction (vph) | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 117 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 41 | 120 | 103 | 0 | 0 | 65 | 163 | 24 | 0 | 279 | 386 | 0 |
| Confl. Peds. (#/hr) | 21 | | 21 | | | | | 27 | | 9 | | 8 |
| Confl. Bikes (#/hr) | | | 8 | | | | | 24 | | | | 1 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 5.2 | 12.9 | 12.9 | | | 7.4 | 15.1 | 15.1 | | 12.6 | 44.4 | |
| Effective Green, g (s) | 5.2 | 12.9 | 12.9 | | | 7.4 | 15.1 | 15.1 | | 12.6 | 44.4 | |
| Actuated g/C Ratio | 0.06 | 0.14 | 0.14 | | | 0.08 | 0.17 | 0.17 | | 0.14 | 0.49 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 102 | 507 | 212 | | | 146 | 313 | 242 | | 481 | 1725 | |
| v/s Ratio Prot | 0.02 | 0.03 | | | | 0.04 | c0.09 | | | c0.08 | c0.11 | |
| v/s Ratio Perm | | | c0.07 | | | | | 0.02 | | | | |
| v/c Ratio | 0.40 | 0.24 | 0.49 | | | 0.45 | 0.52 | 0.10 | | 0.58 | 0.22 | |
| Uniform Delay, d1 | 40.9 | 34.2 | 35.5 | | | 39.3 | 34.2 | 31.7 | | 36.2 | 13.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.6 | 0.2 | 1.7 | | | 2.2 | 1.6 | 0.2 | | 1.8 | 0.3 | |
| Delay (s) | 43.5 | 34.4 | 37.2 | | | 41.5 | 35.7 | 31.9 | | 38.0 | 13.3 | |
| Level of Service | D | C | D | | | D | D | C | | D | B | |
| Approach Delay (s) | | 36.9 | | | | | 35.3 | | | | 23.6 | |
| Approach LOS | | D | | | | | D | | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 28.6 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.70 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | Sum of lost time (s) | | | | 16.0 | | |
| Intersection Capacity Utilization | | | 69.2% | | | ICU Level of Service | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 96 | 1015 | 95 | 94 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.98 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3456 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3456 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 104 | 1103 | 103 | 102 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 |
| Lane Group Flow (vph) | 104 | 1303 | 0 | 0 |
| Confl. Peds. (#/hr) | 18 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 9.3 | 41.1 | | |
| Effective Green, g (s) | 9.3 | 41.1 | | |
| Actuated g/C Ratio | 0.10 | 0.46 | | |
| Clearance Time (s) | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 183 | 1578 | | |
| v/s Ratio Prot | 0.06 | 0.38 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.57 | 0.83 | | |
| Uniform Delay, d1 | 38.4 | 21.3 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 4.0 | 5.1 | | |
| Delay (s) | 42.4 | 26.4 | | |
| Level of Service | D | C | | |
| Approach Delay (s) | | 27.6 | | |
| Approach LOS | | C | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 56 | 172 | 77 | 33 | 288 | 289 | 49 | 459 | 37 | 94 | 547 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1746 | 3330 | | | 3517 | 1543 | 1760 | 3484 | | 1766 | 3495 | |
| Flt Permitted | 0.55 | 1.00 | | | 0.90 | 1.00 | 0.35 | 1.00 | | 0.43 | 1.00 | |
| Satd. Flow (perm) | 1007 | 3330 | | | 3168 | 1543 | 649 | 3484 | | 797 | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 61 | 185 | 84 | 36 | 303 | 314 | 53 | 473 | 40 | 102 | 595 | 47 |
| RTOR Reduction (vph) | 0 | 48 | 0 | 0 | 0 | 147 | 0 | 7 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 61 | 221 | 0 | 0 | 339 | 167 | 53 | 506 | 0 | 102 | 635 | 0 |
| Confl. Peds. (#/hr) | 25 | | 25 | 18 | | 13 | 19 | | 13 | 6 | | 6 |
| Confl. Bikes (#/hr) | | 16 | 16 | 59 | | 5 | | 5 | 59 | | | 6 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 426 | 1410 | | | 1342 | 654 | 290 | 1558 | | 356 | 1562 | |
| v/s Ratio Prot | | 0.07 | | | | | | 0.15 | | | c0.18 | |
| v/s Ratio Perm | 0.06 | | | | 0.11 | c0.11 | 0.08 | | | 0.13 | | |
| v/c Ratio | 0.14 | 0.16 | | | 0.25 | 0.26 | 0.18 | 0.32 | | 0.29 | 0.41 | |
| Uniform Delay, d1 | 15.0 | 15.1 | | | 15.8 | 15.8 | 14.2 | 15.2 | | 14.9 | 15.9 | |
| Progression Factor | 1.05 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.2 | | | 0.5 | 0.9 | 1.4 | 0.6 | | 2.0 | 0.8 | |
| Delay (s) | 16.5 | 15.4 | | | 16.3 | 16.8 | 15.5 | 15.8 | | 16.9 | 16.7 | |
| Level of Service | B | B | | | B | B | B | B | | B | B | |
| Approach Delay (s) | | 15.6 | | | 16.5 | | | 15.7 | | | 16.7 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

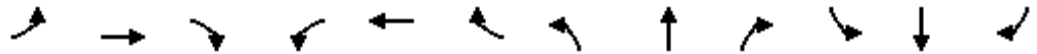
| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 16.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.33 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 93.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|-----------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Volume (vph) | 343 | 365 | 134 | 43 | 253 | 107 | 83 | 362 | 22 | 46 | 341 | 133 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1561 | 1765 | 1863 | 1546 | 1761 | 3498 | | 1764 | 3367 | |
| Flt Permitted | 0.48 | 1.00 | 1.00 | 0.53 | 1.00 | 1.00 | 0.28 | 1.00 | | 0.39 | 1.00 | |
| Satd. Flow (perm) | 893 | 1863 | 1561 | 981 | 1863 | 1546 | 512 | 3498 | | 716 | 3367 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 373 | 397 | 146 | 47 | 275 | 116 | 86 | 393 | 24 | 50 | 371 | 145 |
| RTOR Reduction (vph) | 0 | 0 | 58 | 0 | 0 | 59 | 0 | 7 | 0 | 0 | 64 | 0 |
| Lane Group Flow (vph) | 373 | 397 | 88 | 47 | 275 | 57 | 86 | 410 | 0 | 50 | 452 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | Permpm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 59.4 | 51.4 | 51.4 | 45.6 | 42.1 | 42.1 | 16.6 | 16.6 | | 16.6 | 16.6 | |
| Effective Green, g (s) | 59.4 | 51.4 | 51.4 | 45.6 | 42.1 | 42.1 | 16.6 | 16.6 | | 16.6 | 16.6 | |
| Actuated g/C Ratio | 0.70 | 0.60 | 0.60 | 0.54 | 0.50 | 0.50 | 0.20 | 0.20 | | 0.20 | 0.20 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 756 | 1127 | 944 | 559 | 923 | 766 | 100 | 683 | | 140 | 658 | |
| v/s Ratio Prot | c0.07 | 0.21 | | 0.00 | 0.15 | | | 0.12 | | | 0.13 | |
| v/s Ratio Perm | c0.27 | | 0.06 | 0.04 | | 0.04 | c0.17 | | | 0.07 | | |
| v/c Ratio | 0.49 | 0.35 | 0.09 | 0.08 | 0.30 | 0.08 | 0.86 | 0.60 | | 0.36 | 0.69 | |
| Uniform Delay, d1 | 5.6 | 8.4 | 7.0 | 9.4 | 12.7 | 11.2 | 33.1 | 31.2 | | 29.6 | 31.8 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.65 | 0.67 | 0.33 | 0.91 | 0.89 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.9 | 0.2 | 0.0 | 0.8 | 0.2 | 46.1 | 0.9 | | 0.6 | 2.4 | |
| Delay (s) | 5.7 | 9.3 | 7.2 | 6.1 | 9.4 | 3.9 | 76.2 | 28.7 | | 30.2 | 34.2 | |
| Level of Service | A | A | A | A | A | A | E | C | | C | C | |
| Approach Delay (s) | | 7.5 | | | 7.6 | | | 36.9 | | | 33.8 | |
| Approach LOS | | A | | | A | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 19.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 73.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

6: 27th Street & I-980 On Ramp

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 155 | 834 | 0 | 0 | 149 | 297 | 5 | 263 | 25 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1608 | 3387 | | | 3539 | 2787 | | 5008 | | | | |
| Flt Permitted | 0.65 | 0.95 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 1099 | 3219 | | | 3539 | 2787 | | 5008 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 168 | 907 | 0 | 0 | 162 | 323 | 5 | 286 | 27 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 194 | 0 | 16 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 151 | 924 | 0 | 0 | 162 | 129 | 0 | 302 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 6 | | 6 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 4 | | | 3 |
| Turn Type | Perm | | | Perm | | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 440 | 1288 | | | 1416 | 1115 | | 2003 | | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | 0.14 | 0.29 | | | | 0.05 | | 0.06 | | | | |
| v/c Ratio | 0.34 | 0.72 | | | 0.11 | 0.12 | | 0.15 | | | | |
| Uniform Delay, d1 | 8.3 | 10.1 | | | 7.5 | 7.5 | | 7.7 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 2.1 | 3.5 | | | 0.2 | 0.2 | | 0.2 | | | | |
| Delay (s) | 10.5 | 13.6 | | | 7.7 | 7.8 | | 7.8 | | | | |
| Level of Service | B | B | | | A | A | | A | | | | |
| Approach Delay (s) | | 13.1 | | | 7.7 | | | 7.8 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.8 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.43 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 56.8% | | | ICU Level of Service | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 280 | 27 | 11 | 158 | 0 | 0 | 0 | 0 | 692 | 1033 | 351 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1558 | | 3526 | | | | | 1610 | 3370 | 1583 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1558 | | 3296 | | | | | 1610 | 3370 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 0 | 304 | 29 | 12 | 172 | 0 | 0 | 0 | 0 | 752 | 1111 | 382 |
| RTOR Reduction (vph) | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 185 |
| Lane Group Flow (vph) | 0 | 304 | 10 | 0 | 184 | 0 | 0 | 0 | 0 | 602 | 1261 | 197 |
| Confl. Peds. (#/hr) | 2 | | 2 | 10 | | 10 | 6 | | 6 | | | |
| Confl. Bikes (#/hr) | | | 3 | | | 4 | | | 1 | | | |
| Turn Type | | Perm | | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | | 8 | | | | | | 6 | |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 545 | | 1154 | | | | | 832 | 1741 | 818 |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.06 | | | | | 0.37 | 0.37 | 0.12 |
| v/c Ratio | | 0.25 | 0.02 | | 0.16 | | | | | 0.72 | 0.72 | 0.24 |
| Uniform Delay, d1 | | 13.9 | 12.8 | | 13.4 | | | | | 11.2 | 11.2 | 8.0 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.5 | 0.1 | | 0.3 | | | | | 5.4 | 2.7 | 0.7 |
| Delay (s) | | 14.3 | 12.8 | | 13.7 | | | | | 16.6 | 13.9 | 8.7 |
| Level of Service | | B | B | | B | | | | | B | B | A |
| Approach Delay (s) | | 14.2 | | | 13.7 | | 0.0 | | | | 13.7 | |
| Approach LOS | | B | | | B | | A | | | | B | |

Intersection Summary

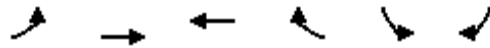
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 69.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 195 | 584 | 670 | 126 | 808 | 197 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.98 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3438 | | 3432 | 1414 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3438 | | 3432 | 1414 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 212 | 635 | 728 | 137 | 878 | 214 |
| RTOR Reduction (vph) | 0 | 0 | 18 | 0 | 2 | 134 |
| Lane Group Flow (vph) | 212 | 635 | 847 | 0 | 897 | 59 |
| Confl. Peds. (#/hr) | 14 | | | 11 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 10 | | 1 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 5 | 2 | 6 | | 4 | |
| Permitted Phases | | | | | | 4 |
| Actuated Green, G (s) | 12.8 | 47.6 | 30.8 | | 24.4 | 24.4 |
| Effective Green, g (s) | 12.8 | 47.6 | 30.8 | | 24.4 | 24.4 |
| Actuated g/C Ratio | 0.16 | 0.60 | 0.38 | | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 283 | 2106 | 1324 | | 1047 | 431 |
| v/s Ratio Prot | c0.12 | 0.18 | c0.25 | | c0.26 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 0.75 | 0.30 | 0.64 | | 0.86 | 0.14 |
| Uniform Delay, d1 | 32.1 | 8.0 | 20.1 | | 26.2 | 20.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 9.1 | 0.4 | 2.4 | | 6.8 | 0.1 |
| Delay (s) | 41.2 | 8.4 | 22.5 | | 32.9 | 20.2 |
| Level of Service | D | A | C | | C | C |
| Approach Delay (s) | | 16.6 | 22.5 | | 30.7 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 23.9 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.74 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 68.7% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|------|------|-------|-------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 108 | 835 | 357 | 68 | 424 | 67 | 201 | 258 | 31 | 100 | 354 | 77 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1766 | 3427 | 1553 | 1768 | 3347 | | 1768 | 3471 | | 1757 | 3430 | |
| Flt Permitted | 0.32 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.41 | 1.00 | | 0.57 | 1.00 | |
| Satd. Flow (perm) | 592 | 3427 | 1553 | 300 | 3347 | | 759 | 3471 | | 1046 | 3430 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 117 | 870 | 388 | 74 | 461 | 73 | 218 | 272 | 34 | 109 | 385 | 84 |
| RTOR Reduction (vph) | 0 | 0 | 275 | 0 | 14 | 0 | 0 | 8 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 117 | 870 | 113 | 74 | 520 | 0 | 218 | 298 | 0 | 109 | 449 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | 4 | | | | 4 | 5 | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | 24.8 | 24.8 | 24.8 | 24.8 | 24.8 | | 49.7 | 49.7 | | 35.9 | 35.9 | |
| Effective Green, g (s) | 24.8 | 24.8 | 24.8 | 24.8 | 24.8 | | 49.7 | 49.7 | | 35.9 | 35.9 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | | 0.58 | 0.58 | | 0.42 | 0.42 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 173 | 1000 | 453 | 88 | 977 | | 554 | 2030 | | 442 | 1449 | |
| v/s Ratio Prot | c0.25 | | | | 0.16 | | c0.04 | 0.09 | | | 0.13 | |
| v/s Ratio Perm | 0.20 | | 0.07 | 0.25 | | | c0.19 | | | 0.10 | | |
| v/c Ratio | 0.68 | 0.87 | 0.25 | 0.84 | 0.53 | | 0.39 | 0.15 | | 0.25 | 0.31 | |
| Uniform Delay, d1 | 26.6 | 28.6 | 23.0 | 28.2 | 25.2 | | 8.7 | 8.0 | | 15.8 | 16.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.14 | 1.17 | |
| Incremental Delay, d2 | 19.2 | 10.3 | 1.3 | 59.2 | 2.1 | | 0.2 | 0.2 | | 1.3 | 0.5 | |
| Delay (s) | 45.8 | 38.8 | 24.3 | 87.4 | 27.3 | | 8.8 | 8.2 | | 19.4 | 19.6 | |
| Level of Service | D | D | C | F | C | | A | A | | B | B | |
| Approach Delay (s) | 35.3 | | | | 34.6 | | 8.4 | | | 19.6 | | |
| Approach LOS | D | | | | C | | A | | | B | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 27.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 75.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | ↰ | ↶↷ | | | ↶↷ | | ↰ | ↶↷ | ↰ | ↰ | ↶↷ | |
| Volume (vph) | 87 | 710 | 78 | 94 | 484 | 72 | 107 | 420 | 90 | 77 | 378 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 0.99 | | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1753 | 3360 | | | 3324 | | 1763 | 3539 | 1529 | 1761 | 3434 | |
| Flt Permitted | 0.26 | 1.00 | | | 0.61 | | 0.44 | 1.00 | 1.00 | 0.47 | 1.00 | |
| Satd. Flow (perm) | 478 | 3360 | | | 2053 | | 820 | 3539 | 1529 | 864 | 3434 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 95 | 772 | 85 | 102 | 526 | 78 | 116 | 457 | 98 | 84 | 411 | 85 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 13 | 0 | 0 | 0 | 47 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 95 | 845 | 0 | 0 | 693 | 0 | 116 | 457 | 51 | 84 | 477 | 0 |
| Confl. Peds. (#/hr) | 34 | | 34 | 37 | | 37 | 8 | | 8 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 11 | | | 8 | | | 35 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | 2 | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 30.5 | 30.5 | | | 30.5 | | 41.5 | 41.5 | 41.5 | 41.5 | 41.5 | |
| Effective Green, g (s) | 30.5 | 30.5 | | | 30.5 | | 41.5 | 41.5 | 41.5 | 41.5 | 41.5 | |
| Actuated g/C Ratio | 0.38 | 0.38 | | | 0.38 | | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 182 | 1281 | | | 783 | | 425 | 1836 | 793 | 448 | 1781 | |
| v/s Ratio Prot | | 0.25 | | | | | | 0.13 | | | 0.14 | |
| v/s Ratio Perm | 0.20 | | | | c0.34 | | c0.14 | | 0.03 | 0.10 | | |
| v/c Ratio | 0.52 | 0.66 | | | 0.89 | | 0.27 | 0.25 | 0.06 | 0.19 | 0.27 | |
| Uniform Delay, d1 | 19.1 | 20.5 | | | 23.1 | | 10.8 | 10.6 | 9.6 | 10.3 | 10.8 | |
| Progression Factor | 1.00 | 1.00 | | | 1.21 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.2 | 0.9 | | | 11.3 | | 1.6 | 0.3 | 0.2 | 0.9 | 0.4 | |
| Delay (s) | 20.4 | 21.4 | | | 39.2 | | 12.4 | 11.0 | 9.7 | 11.2 | 11.1 | |
| Level of Service | C | C | | | D | | B | B | A | B | B | |
| Approach Delay (s) | | 21.3 | | | 39.2 | | | 11.0 | | | 11.1 | |
| Approach LOS | | C | | | D | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 21.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 84.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|-------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 0 | 386 | 386 | 119 | 439 | 0 | 0 | 0 | 0 | 10 | 158 | 19 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frbp, ped/bikes | | 0.97 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Frt | | 0.92 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 3077 | | 1770 | 3427 | | | | | | 3416 | |
| Flt Permitted | | 1.00 | | 0.18 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 3077 | | 339 | 3427 | | | | | | 3416 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 415 | 420 | 129 | 477 | 0 | 0 | 0 | 0 | 11 | 172 | 21 |
| RTOR Reduction (vph) | 0 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 632 | 0 | 129 | 477 | 0 | 0 | 0 | 0 | 0 | 193 | 0 |
| Confl. Peds. (#/hr) | 26 | | 26 | 28 | | 28 | 21 | | 21 | 101 | | 101 |
| Confl. Bikes (#/hr) | | | 4 | | | 4 | | | 3 | | | 6 |
| Turn Type | Perm | | pm+pt | | | | | | Perm | | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | | | | 4 | | |
| Actuated Green, G (s) | | 31.6 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | | 31.6 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | | 0.40 | | 0.54 | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1215 | | 297 | 1842 | | | | | | 1238 | |
| v/s Ratio Prot | | c0.21 | | c0.03 | 0.14 | | | | | | | |
| v/s Ratio Perm | | | | 0.20 | | | | | | | 0.06 | |
| v/c Ratio | | 0.52 | | 0.43 | 0.26 | | | | | | 0.16 | |
| Uniform Delay, d1 | | 18.4 | | 11.3 | 9.9 | | | | | | 17.2 | |
| Progression Factor | | 2.61 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | | 1.4 | | 0.4 | 0.3 | | | | | | 0.3 | |
| Delay (s) | | 49.6 | | 11.7 | 10.3 | | | | | | 17.5 | |
| Level of Service | | D | | B | B | | | | | | B | |
| Approach Delay (s) | | 49.6 | | | 10.6 | | | 0.0 | | | 17.5 | |
| Approach LOS | | D | | | B | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 31.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 68.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|--------|------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↔↔↔ | ↗ | | ↔↔↔ | |
| Volume (vph) | 62 | 148 | 77 | 535 | 547 | 119 | 121 | 776 | 341 | 33 | 773 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 1.00 | 0.94 | | 1.00 | 0.90 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 5041 | 1419 | | 4973 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.85 | |
| Satd. Flow (perm) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 3370 | 1419 | | 4250 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 67 | 161 | 84 | 582 | 595 | 129 | 132 | 843 | 371 | 36 | 831 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 20 | 0 | 0 | 72 | 0 | 0 | 237 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 67 | 161 | 64 | 582 | 595 | 57 | 0 | 975 | 134 | 0 | 951 | 0 |
| Confl. Peds. (#/hr) | 38 | | 38 | 34 | | 34 | 60 | | 60 | 28 | | 28 |
| Confl. Bikes (#/hr) | | | 12 | | | 18 | | | 39 | | | 9 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 5.5 | 33.0 | 33.0 | 16.0 | 44.5 | 44.5 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 5.5 | 33.0 | 33.0 | 16.0 | 44.5 | 44.5 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.06 | 0.33 | 0.33 | 0.16 | 0.44 | 0.44 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 189 | 1168 | 488 | 549 | 1575 | 661 | | 1213 | 511 | | 1530 | |
| v/s Ratio Prot | 0.02 | 0.05 | | c0.17 | c0.17 | | | | | | | |
| v/s Ratio Perm | | | 0.04 | | | 0.04 | | c0.29 | 0.09 | | 0.22 | |
| v/c Ratio | 0.35 | 0.14 | 0.13 | 1.06 | 0.38 | 0.09 | | 0.98dl | 0.26 | | 0.62 | |
| Uniform Delay, d1 | 45.5 | 23.5 | 23.5 | 42.0 | 18.5 | 16.0 | | 28.8 | 22.6 | | 26.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.2 | 0.6 | 55.3 | 0.7 | 0.3 | | 5.7 | 1.2 | | 1.9 | |
| Delay (s) | 46.0 | 23.8 | 24.0 | 97.3 | 19.2 | 16.3 | | 34.5 | 23.8 | | 28.3 | |
| Level of Service | D | C | C | F | B | B | | C | C | | C | |
| Approach Delay (s) | | 28.6 | | | 53.7 | | | 31.6 | | | 28.3 | |
| Approach LOS | | C | | | D | | | C | | | C | |

Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 37.9 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 93.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Near-Term + I AM
Kaiser Center Transportation Study

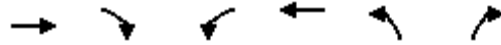


| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|-------|----------------------|------|------|
| Lane Configurations | WT | | WT | TTT | TTT | |
| Volume (vph) | 94 | 44 | 106 | 947 | 1088 | 530 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frbp, ped/bikes | 0.98 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.95 | | 1.00 | 1.00 | 0.95 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3253 | | 1768 | 3725 | 6091 | |
| Flt Permitted | 0.97 | | 0.10 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3253 | | 183 | 3725 | 6091 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.93 | 0.92 |
| Adj. Flow (vph) | 102 | 48 | 115 | 986 | 1170 | 576 |
| RTOR Reduction (vph) | 43 | 0 | 0 | 0 | 54 | 0 |
| Lane Group Flow (vph) | 107 | 0 | 115 | 986 | 1692 | 0 |
| Confl. Peds. (#/hr) | 36 | 36 | 109 | | | |
| Confl. Bikes (#/hr) | | 14 | | | | |
| Turn Type | pm+pt | | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 8.0 | | 58.5 | 52.3 | 52.3 | |
| Effective Green, g (s) | 8.0 | | 58.5 | 52.3 | 52.3 | |
| Actuated g/C Ratio | 0.10 | | 0.73 | 0.65 | 0.65 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 325 | | 257 | 2435 | 3982 | |
| v/s Ratio Prot | c0.03 | | c0.03 | 0.26 | 0.28 | |
| v/s Ratio Perm | | | c0.29 | | | |
| v/c Ratio | 0.33 | | 0.45 | 0.40 | 0.42 | |
| Uniform Delay, d1 | 33.5 | | 3.7 | 6.5 | 6.6 | |
| Progression Factor | 1.00 | | 1.23 | 1.50 | 1.00 | |
| Incremental Delay, d2 | 0.6 | | 1.1 | 0.5 | 0.3 | |
| Delay (s) | 34.1 | | 5.6 | 10.3 | 7.0 | |
| Level of Service | C | | A | B | A | |
| Approach Delay (s) | 34.1 | | | 9.8 | 7.0 | |
| Approach LOS | C | | | A | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 9.4 | | HCM Level of Service | A | |
| HCM Volume to Capacity ratio | | 0.43 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | 13.0 | |
| Intersection Capacity Utilization | | 60.8% | | ICU Level of Service | B | |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

Near-Term + I AM
Kaiser Center Transportation Study

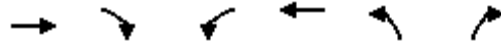


| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | EBT | | | WBT | NBL | NBR |
| Volume (veh/h) | 132 | 30 | 102 | 534 | 1 | 11 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 143 | 33 | 111 | 580 | 1 | 12 |
| Pedestrians | 7 | | | 7 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 178 | | 971 | 169 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 178 | | 971 | 169 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 92 | | 100 | 99 |
| cM capacity (veh/h) | | | 1395 | | 256 | 869 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 176 | 691 | 13 | | | |
| Volume Left | 0 | 111 | 1 | | | |
| Volume Right | 33 | 0 | 12 | | | |
| cSH | 1700 | 1395 | 724 | | | |
| Volume to Capacity | 0.10 | 0.08 | 0.02 | | | |
| Queue Length 95th (ft) | 0 | 6 | 1 | | | |
| Control Delay (s) | 0.0 | 2.0 | 10.1 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 2.0 | 10.1 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.8 | | | |
| Intersection Capacity Utilization | | 58.3% | | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

15: 21st Street & Garage Entrance East

Near-Term + I AM
Kaiser Center Transportation Study

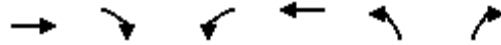






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ➡ | | | ➡ | ➡ | ➡ |
| Volume (veh/h) | 140 | 190 | 294 | 242 | 2 | 20 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 152 | 207 | 320 | 263 | 2 | 22 |
| Pedestrians | 24 | | | 24 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 2 | | | 2 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 361 | | 1184 | 281 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 361 | | 1184 | 281 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 73 | | 99 | 97 |
| cM capacity (veh/h) | | | 1196 | | 150 | 741 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 359 | 583 | 24 | | | |
| Volume Left | 0 | 320 | 2 | | | |
| Volume Right | 207 | 0 | 22 | | | |
| cSH | 1700 | 1196 | 546 | | | |
| Volume to Capacity | 0.21 | 0.27 | 0.04 | | | |
| Queue Length 95th (ft) | 0 | 27 | 3 | | | |
| Control Delay (s) | 0.0 | 6.3 | 11.9 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 6.3 | 11.9 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.1 | | | |
| Intersection Capacity Utilization | | 67.0% | | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

16: 21st Street & Garage Entrance West

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 180 | 88 | 91 | 396 | 30 | 30 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 1.00 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 196 | 88 | 99 | 430 | 33 | 33 |
| Pedestrians | 16 | | | 16 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 286 | | 886 | 258 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 286 | | 886 | 258 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 92 | | 89 | 96 |
| cM capacity (veh/h) | | | 1274 | | 286 | 769 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 284 | 529 | 16 | 16 | 16 | 16 |
| Volume Left | 0 | 99 | 16 | 16 | 0 | 0 |
| Volume Right | 88 | 0 | 0 | 0 | 16 | 16 |
| cSH | 1700 | 1274 | 286 | 286 | 769 | 769 |
| Volume to Capacity | 0.17 | 0.08 | 0.06 | 0.06 | 0.02 | 0.02 |
| Queue Length 95th (ft) | 0 | 6 | 5 | 5 | 2 | 2 |
| Control Delay (s) | 0.0 | 2.2 | 18.3 | 18.3 | 9.8 | 9.8 |
| Lane LOS | | A | C | C | A | A |
| Approach Delay (s) | 0.0 | 2.2 | 14.1 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | | | 58.2% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis

17: 21st Street & Webster Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 283 | 56 | 50 | 56 | 0 | 0 | 0 | 0 | 228 | 400 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.96 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 0.98 | |
| Satd. Flow (prot) | | 1863 | 1342 | | 1744 | | | | | | 4736 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.58 | | | | | | 0.98 | |
| Satd. Flow (perm) | | 1863 | 1342 | | 1041 | | | | | | 4736 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 308 | 61 | 54 | 61 | 0 | 0 | 0 | 0 | 248 | 435 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 308 | 15 | 0 | 115 | 0 | 0 | 0 | 0 | 0 | 713 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | 2 | |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 19.8 | 19.8 | | 19.8 | | | | | | 52.2 | |
| Effective Green, g (s) | | 19.8 | 19.8 | | 19.8 | | | | | | 52.2 | |
| Actuated g/C Ratio | | 0.25 | 0.25 | | 0.25 | | | | | | 0.65 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 461 | 332 | | 258 | | | | | | 3090 | |
| v/s Ratio Prot | | c0.17 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.11 | | | | | | 0.15 | |
| v/c Ratio | | 0.67 | 0.05 | | 0.45 | | | | | | 0.23 | |
| Uniform Delay, d1 | | 27.1 | 22.9 | | 25.5 | | | | | | 5.7 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.74 | |
| Incremental Delay, d2 | | 3.7 | 0.1 | | 1.2 | | | | | | 0.2 | |
| Delay (s) | | 30.8 | 23.0 | | 26.7 | | | | | | 4.4 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 29.5 | | | 26.7 | | | 0.0 | | | 4.4 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.2 | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | | 0.35 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | | 59.2% | | | ICU Level of Service | | B | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰↱ | ↱ | | | |
| Volume (vph) | 7 | 213 | 4 | 0 | 40 | 38 | 10 | 204 | 133 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 1.00 | 0.87 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 0.93 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1850 | | | 1635 | | | 3514 | 1376 | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1843 | | | 1635 | | | 3514 | 1376 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 8 | 232 | 4 | 0 | 43 | 41 | 11 | 222 | 145 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 14 | 0 | 0 | 0 | 121 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 243 | 0 | 0 | 70 | 0 | 0 | 233 | 24 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 29.6 | | | 29.6 | | | 7.4 | 7.4 | | | |
| Effective Green, g (s) | | 29.6 | | | 29.6 | | | 7.4 | 7.4 | | | |
| Actuated g/C Ratio | | 0.66 | | | 0.66 | | | 0.16 | 0.16 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1212 | | | 1075 | | | 578 | 226 | | | |
| v/s Ratio Prot | | | | | 0.04 | | | | | | | |
| v/s Ratio Perm | | c0.13 | | | | | | 0.07 | 0.02 | | | |
| v/c Ratio | | 0.20 | | | 0.07 | | | 0.40 | 0.11 | | | |
| Uniform Delay, d1 | | 3.0 | | | 2.8 | | | 16.8 | 16.0 | | | |
| Progression Factor | | 0.53 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.4 | | | 0.1 | | | 0.2 | 0.1 | | | |
| Delay (s) | | 2.0 | | | 2.9 | | | 17.0 | 16.1 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 2.0 | | | 2.9 | | | 16.6 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 9.9 | | | | | | HCM Level of Service | A | | | |
| HCM Volume to Capacity ratio | | 0.24 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 36.8% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 11 | 121 | 17 | 25 | 0 | 35 | 0 | 320 | 38 | 76 | 354 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | | 1.00 | | | 0.99 | |
| Frt | 1.00 | 0.98 | | | 0.92 | | | 0.98 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1751 | 1824 | | | 1651 | | | 3455 | | | 3487 | |
| Flt Permitted | 0.71 | 1.00 | | | 0.89 | | | 1.00 | | | 0.82 | |
| Satd. Flow (perm) | 1317 | 1824 | | | 1493 | | | 3455 | | | 2878 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 12 | 132 | 18 | 27 | 0 | 38 | 0 | 348 | 41 | 83 | 385 | 0 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 22 | 0 | 0 | 20 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 12 | 140 | 0 | 0 | 43 | 0 | 0 | 369 | 0 | 0 | 468 | 0 |
| Confl. Peds. (#/hr) | 16 | | 16 | 17 | | 17 | 43 | | 43 | 44 | | 44 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | 16 |
| Turn Type | Perm | | | Perm | | | | Perm | | | | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | 4 | | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 556 | 770 | | | 630 | | | 1305 | | | 1087 | |
| v/s Ratio Prot | c0.08 | | | | | | | 0.11 | | | | |
| v/s Ratio Perm | 0.01 | | | | 0.03 | | | | | | c0.16 | |
| v/c Ratio | 0.02 | 0.18 | | | 0.07 | | | 0.28 | | | 0.43 | |
| Uniform Delay, d1 | 7.6 | 8.1 | | | 7.7 | | | 9.8 | | | 10.4 | |
| Progression Factor | 1.00 | 1.00 | | | 1.26 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.5 | | | 0.2 | | | 0.5 | | | 1.2 | |
| Delay (s) | 7.7 | 8.7 | | | 10.0 | | | 10.3 | | | 11.6 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 8.6 | | | 10.0 | | | 10.3 | | | 11.6 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.30 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 67.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | ↕ | ↕↕ | |
| Volume (vph) | 19 | 90 | 20 | 12 | 198 | 101 | 34 | 458 | 37 | 158 | 163 | 58 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.95 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3414 | | | 3324 | | | 3483 | | 1769 | 3383 | |
| Flt Permitted | | 0.87 | | | 0.94 | | | 0.92 | | 0.38 | 1.00 | |
| Satd. Flow (perm) | | 2980 | | | 3130 | | | 3226 | | 698 | 3383 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 21 | 98 | 22 | 13 | 211 | 110 | 37 | 467 | 40 | 172 | 177 | 63 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 92 | 0 | 0 | 8 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 0 | 123 | 0 | 0 | 242 | 0 | 0 | 537 | 0 | 172 | 220 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 9.9 | | | 9.9 | | | 30.0 | | 41.1 | 41.1 | |
| Effective Green, g (s) | | 9.9 | | | 9.9 | | | 30.0 | | 41.1 | 41.1 | |
| Actuated g/C Ratio | | 0.16 | | | 0.16 | | | 0.50 | | 0.68 | 0.68 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 492 | | | 516 | | | 1613 | | 596 | 2317 | |
| v/s Ratio Prot | | | | | | | | | | c0.03 | 0.07 | |
| v/s Ratio Perm | | 0.04 | | | c0.08 | | | c0.17 | | 0.17 | | |
| v/c Ratio | | 0.25 | | | 0.47 | | | 0.33 | | 0.29 | 0.10 | |
| Uniform Delay, d1 | | 21.8 | | | 22.7 | | | 9.0 | | 3.6 | 3.2 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.6 | | | 0.6 | | 0.3 | 0.1 | |
| Delay (s) | | 22.1 | | | 23.3 | | | 9.6 | | 3.9 | 3.3 | |
| Level of Service | | C | | | C | | | A | | A | A | |
| Approach Delay (s) | | 22.1 | | | 23.3 | | | 9.6 | | | 3.5 | |
| Approach LOS | | C | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 12.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 58.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔↔ | |
| Volume (vph) | 8 | 177 | 61 | 48 | 157 | 112 | 60 | 478 | 78 | 63 | 414 | 26 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.98 | | | 0.96 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.96 | | | 0.95 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | | 3340 | | | 3153 | | | 3400 | | | 4981 | |
| Flt Permitted | | 0.94 | | | 0.88 | | | 0.86 | | | 0.80 | |
| Satd. Flow (perm) | | 3154 | | | 2783 | | | 2950 | | | 4002 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 9 | 192 | 66 | 52 | 171 | 122 | 65 | 514 | 85 | 68 | 450 | 28 |
| RTOR Reduction (vph) | 0 | 42 | 0 | 0 | 77 | 0 | 0 | 19 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 225 | 0 | 0 | 268 | 0 | 0 | 645 | 0 | 0 | 536 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 99 | | 99 | 72 | | 72 | 49 | | 49 |
| Confl. Bikes (#/hr) | | | 7 | | | 33 | | | 10 | | | 6 |
| Turn Type | Perm | | | Perm | | | Prot | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1156 | | | 1020 | | | 1478 | | | 1201 | |
| v/s Ratio Prot | | | | | | | | c0.05 | | | | |
| v/s Ratio Perm | | 0.07 | | | c0.10 | | | c0.16 | | | 0.13 | |
| v/c Ratio | | 0.19 | | | 0.26 | | | 0.44 | | | 0.45 | |
| Uniform Delay, d1 | | 13.0 | | | 13.3 | | | 10.1 | | | 17.0 | |
| Progression Factor | | 0.89 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 0.6 | | | 0.9 | | | 1.2 | |
| Delay (s) | | 11.8 | | | 13.9 | | | 11.1 | | | 18.2 | |
| Level of Service | | B | | | B | | | B | | | B | |
| Approach Delay (s) | | 11.8 | | | 13.9 | | | 11.1 | | | 18.2 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 77.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 29 | 313 | 0 | 0 | 257 | 88 | 32 | 242 | 96 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.99 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3515 | | | 3364 | 1337 | | 5023 | 1458 | | | |
| Flt Permitted | | 0.92 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3237 | | | 3364 | 1337 | | 5023 | 1458 | | | |
| Peak-hour factor, PHF | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 30 | 340 | 0 | 0 | 279 | 96 | 35 | 263 | 104 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 19 | 0 | 0 | 91 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 370 | 0 | 0 | 288 | 67 | 0 | 298 | 13 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | Perm | | | Perm | Perm | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 62.7 | | | 62.7 | 62.7 | | 10.3 | 10.3 | | | |
| Effective Green, g (s) | | 62.7 | | | 62.7 | 62.7 | | 10.3 | 10.3 | | | |
| Actuated g/C Ratio | | 0.78 | | | 0.78 | 0.78 | | 0.13 | 0.13 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2537 | | | 2637 | 1048 | | 647 | 188 | | | |
| v/s Ratio Prot | | | | | 0.09 | | | | | | | |
| v/s Ratio Perm | | c0.11 | | | | 0.05 | | 0.06 | 0.01 | | | |
| v/c Ratio | | 0.15 | | | 0.11 | 0.06 | | 0.46 | 0.07 | | | |
| Uniform Delay, d1 | | 2.1 | | | 2.0 | 2.0 | | 32.3 | 30.6 | | | |
| Progression Factor | | 1.00 | | | 1.89 | 4.21 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.5 | 0.2 | | | |
| Delay (s) | | 2.2 | | | 3.9 | 8.4 | | 32.8 | 30.8 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 2.2 | | | 5.0 | | | 32.3 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.7 | | | | | HCM Level of Service | | B | | | |
| HCM Volume to Capacity ratio | | 0.19 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | | Sum of lost time (s) | | 7.0 | | | |
| Intersection Capacity Utilization | | 56.0% | | | | | ICU Level of Service | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 23: 20th Street & Webster Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 264 | 150 | 159 | 256 | 0 | 0 | 0 | 0 | 67 | 340 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.90 | 1.00 | 1.00 | | | | | | 0.94 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 0.99 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1422 | 1610 | 3354 | | | | | | 4452 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.94 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1422 | 1610 | 3152 | | | | | | 4452 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 287 | 158 | 173 | 278 | 0 | 0 | 0 | 0 | 73 | 370 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 111 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 0 |
| Lane Group Flow (vph) | 0 | 287 | 47 | 145 | 306 | 0 | 0 | 0 | 0 | 0 | 497 | 0 |
| Confl. Peds. (#/hr) | 53 | | 53 | 86 | | 86 | 105 | | 105 | 331 | | 331 |
| Confl. Bikes (#/hr) | | | 16 | | | 2 | | | 1 | | | 14 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | | 4 |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Effective Green, g (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | 0.20 | 0.51 | | | | | | 0.39 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 929 | 373 | 322 | 1656 | | | | | | 1725 | |
| v/s Ratio Prot | | c0.08 | | c0.09 | 0.04 | | | | | | | |
| v/s Ratio Perm | | | 0.03 | | 0.06 | | | | | | 0.11 | |
| v/c Ratio | | 0.31 | 0.13 | 0.45 | 0.18 | | | | | | 0.29 | |
| Uniform Delay, d1 | | 23.7 | 22.5 | 28.1 | 10.5 | | | | | | 16.9 | |
| Progression Factor | | 1.07 | 1.68 | 1.48 | 0.47 | | | | | | 1.13 | |
| Incremental Delay, d2 | | 0.9 | 0.7 | 0.3 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 26.2 | 38.5 | 42.1 | 5.0 | | | | | | 19.2 | |
| Level of Service | | C | D | D | A | | | | | | B | |
| Approach Delay (s) | | 30.5 | | | 16.9 | | | 0.0 | | | 19.2 | |
| Approach LOS | | C | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 22.0 | | | HCM Level of Service | | | | | C | |
| HCM Volume to Capacity ratio | | | 0.33 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 12.0 | | |
| Intersection Capacity Utilization | | | 87.5% | | | ICU Level of Service | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|-------|------|------|-------|-------|-------|--------|--------|------|--------|--------|------|
| Lane Configurations | ↰ | ↰↰↰ | | | | ↱↱ | ↱↱ | ↰ | ↰ | | ↰ | ↰ |
| Volume (vph) | 72 | 122 | 171 | 61 | 56 | 318 | 400 | 337 | 59 | 0 | 22 | 27 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.94 |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.91 | | | | 1.00 | 0.97 | 0.85 | 0.85 | | 0.85 | 0.85 |
| Flt Protected | 0.95 | 0.98 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 1770 | 4696 | | | | 3491 | 3286 | 1441 | 1583 | | 1583 | 1490 |
| Flt Permitted | 0.95 | 0.98 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 1770 | 4696 | | | | 3491 | 3286 | 1441 | 1583 | | 1583 | 1490 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.94 | 0.94 | 0.96 | 0.92 | 0.96 | 0.96 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 76 | 133 | 186 | 65 | 60 | 331 | 435 | 351 | 61 | 0 | 23 | 28 |
| RTOR Reduction (vph) | 0 | 139 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 22 |
| Lane Group Flow (vph) | 76 | 180 | 0 | 0 | 0 | 456 | 547 | 239 | 23 | 0 | 23 | 6 |
| Confl. Peds. (#/hr) | 16 | | | | | | | | 102 | | | 32 |
| Confl. Bikes (#/hr) | | | | | | 6 | | | 10 | | | 2 |
| Turn Type | Prot | | | Split | Split | | custom | custom | | custom | custom | |
| Protected Phases | 5 | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | | |
| Permitted Phases | | 1 | | | | | | 6 | | | 9 | 2 |
| Actuated Green, G (s) | 6.8 | 20.4 | | | | 24.0 | 16.8 | 30.4 | 30.4 | | 2.8 | 16.8 |
| Effective Green, g (s) | 6.8 | 20.4 | | | | 24.0 | 16.8 | 30.4 | 30.4 | | 2.8 | 16.8 |
| Actuated g/C Ratio | 0.08 | 0.26 | | | | 0.30 | 0.21 | 0.38 | 0.38 | | 0.03 | 0.21 |
| Clearance Time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 150 | 1197 | | | | 1047 | 690 | 548 | 602 | | 55 | 313 |
| v/s Ratio Prot | c0.04 | 0.04 | | | | c0.13 | c0.17 | c0.17 | 0.01 | | | |
| v/s Ratio Perm | | | | | | | | | | | c0.01 | 0.00 |
| v/c Ratio | 0.51 | 0.15 | | | | 0.44 | 0.79 | 0.44 | 0.04 | | 0.42 | 0.02 |
| Uniform Delay, d1 | 35.0 | 23.1 | | | | 22.5 | 30.0 | 18.4 | 15.6 | | 37.8 | 25.1 |
| Progression Factor | 0.90 | 2.08 | | | | 1.00 | 1.28 | 1.55 | 3.02 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.6 | 0.3 | | | | 0.1 | 5.7 | 2.5 | 0.1 | | 1.9 | 0.0 |
| Delay (s) | 34.1 | 48.2 | | | | 22.7 | 44.1 | 31.1 | 47.3 | | 39.7 | 25.1 |
| Level of Service | C | D | | | | C | D | C | D | | D | C |
| Approach Delay (s) | | 45.5 | | | | 22.7 | 40.7 | | | 31.7 | | |
| Approach LOS | | D | | | | C | D | | | C | | |

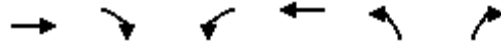
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 36.8 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 57.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

26: Harrison Street & Lakeside Drive

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | ↑↑↑ | | ↔ | ↑↑↑ | ↔ | ↔ |
| Volume (vph) | 391 | 29 | 451 | 587 | 143 | 776 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5032 | | 3433 | 5085 | 3179 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5032 | | 3433 | 5085 | 3179 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.97 |
| Adj. Flow (vph) | 425 | 32 | 470 | 638 | 155 | 800 |
| RTOR Reduction (vph) | 11 | 0 | 0 | 0 | 333 | 333 |
| Lane Group Flow (vph) | 446 | 0 | 470 | 638 | 222 | 67 |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 33.0 | | 20.6 | 58.6 | 13.4 | 13.4 |
| Effective Green, g (s) | 33.0 | | 20.6 | 58.6 | 13.4 | 13.4 |
| Actuated g/C Ratio | 0.41 | | 0.26 | 0.73 | 0.17 | 0.17 |
| Clearance Time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 2076 | | 884 | 3725 | 532 | 241 |
| v/s Ratio Prot | c0.09 | | c0.14 | 0.13 | c0.07 | |
| v/s Ratio Perm | | | | | | 0.05 |
| v/c Ratio | 0.22 | | 0.53 | 0.17 | 0.42 | 0.28 |
| Uniform Delay, d1 | 15.2 | | 25.6 | 3.3 | 29.8 | 29.1 |
| Progression Factor | 0.43 | | 0.77 | 1.06 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.2 | | 2.1 | 0.0 | 0.5 | 0.6 |
| Delay (s) | 6.7 | | 21.8 | 3.5 | 30.3 | 29.7 |
| Level of Service | A | | C | A | C | C |
| Approach Delay (s) | 6.7 | | | 11.3 | 30.1 | |
| Approach LOS | A | | | B | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 17.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.35 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 47.7% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 82 | 111 | 0 | 0 | 0 | 0 | 0 | 2982 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1770 | 3539 | | | | | | 6403 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1770 | 3539 | | | | | | 6403 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 88 | 121 | 0 | 0 | 0 | 0 | 0 | 3106 | 13 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 88 | 121 | 0 | 0 | 0 | 0 | 0 | 3119 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Effective Green, g (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Actuated g/C Ratio | | | | 0.12 | 0.12 | | | | | | 0.76 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 217 | 434 | | | | | | 4849 | |
| v/s Ratio Prot | | | | | 0.03 | | | | | | c0.49 | |
| v/s Ratio Perm | | | | c0.05 | | | | | | | | |
| v/c Ratio | | | | 0.41 | 0.28 | | | | | | 0.64 | |
| Uniform Delay, d1 | | | | 30.4 | 29.9 | | | | | | 4.3 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.95 | |
| Incremental Delay, d2 | | | | 5.5 | 1.6 | | | | | | 0.3 | |
| Delay (s) | | | | 35.9 | 31.5 | | | | | | 4.4 | |
| Level of Service | | | | D | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 33.4 | | | 0.0 | | | 4.4 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 6.2 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.61 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | | 9.0 | | |
| Intersection Capacity Utilization | | | 56.8% | | | ICU Level of Service | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|------|-------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 219 | 1172 | 528 | 75 | 486 | 107 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.98 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 4960 | | 3377 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 4960 | | 3377 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.95 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 238 | 1221 | 556 | 82 | 517 | 116 |
| RTOR Reduction (vph) | 50 | 0 | 30 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 188 | 1221 | 608 | 0 | 633 | 0 |
| Confl. Peds. (#/hr) | | | | 22 | | |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 33.6 | 33.6 | 15.1 | | 14.3 | |
| Effective Green, g (s) | 33.6 | 33.6 | 15.1 | | 14.3 | |
| Actuated g/C Ratio | 0.45 | 0.45 | 0.20 | | 0.19 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 793 | 2278 | 999 | | 644 | |
| v/s Ratio Prot | | c0.24 | c0.12 | | c0.19 | |
| v/s Ratio Perm | 0.11 | | | | | |
| v/c Ratio | 0.24 | 0.54 | 0.61 | | 0.98 | |
| Uniform Delay, d1 | 12.8 | 15.0 | 27.3 | | 30.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.9 | 1.1 | | 31.0 | |
| Delay (s) | 13.5 | 15.9 | 28.3 | | 61.2 | |
| Level of Service | B | B | C | | E | |
| Approach Delay (s) | | 15.5 | 28.3 | | 61.2 | |
| Approach LOS | | B | C | | E | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 29.1 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.65 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 63.9% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th St. & Castro Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 155 | 241 | 314 | 316 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.99 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.99 | 1.00 | | | | |
| Frt | | | | | 0.93 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3150 | 1423 | 1425 | 5925 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3150 | 1423 | 1425 | 5925 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 165 | 262 | 341 | 343 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 48 | 50 | 135 | 136 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 245 | 84 | 35 | 378 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 5 | | 5 | | | |
| Confl. Bikes (#/hr) | | | 6 | | | 2 | | | 5 | | | |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 37.6 | 37.6 | 12.4 | 12.4 | | | | |
| Effective Green, g (s) | | | | | 37.6 | 37.6 | 12.4 | 12.4 | | | | |
| Actuated g/C Ratio | | | | | 0.63 | 0.63 | 0.21 | 0.21 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1974 | 892 | 295 | 1225 | | | | |
| v/s Ratio Prot | | | | | c0.08 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.06 | 0.02 | 0.06 | | | | |
| v/c Ratio | | | | | 0.12 | 0.09 | 0.12 | 0.31 | | | | |
| Uniform Delay, d1 | | | | | 4.5 | 4.4 | 19.4 | 20.2 | | | | |
| Progression Factor | | | | | 4.13 | 7.37 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.1 | 0.2 | 0.2 | 0.1 | | | | |
| Delay (s) | | | | | 18.8 | 32.9 | 19.5 | 20.3 | | | | |
| Level of Service | | | | | B | C | B | C | | | | |
| Approach Delay (s) | | 0.0 | | | 23.2 | | | 20.1 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.3 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.17 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 28.7% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 177 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 1085 | 1218 | 34 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3433 | | | | | | | | 1522 | 4722 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3433 | | | | | | | | 1522 | 4722 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 190 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 1179 | 1324 | 37 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 345 | 63 | 0 |
| Lane Group Flow (vph) | 0 | 223 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 280 | 1852 | 0 |
| Confl. Peds. (#/hr) | 6 | | 6 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | 1 | | 1 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Effective Green, g (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Actuated g/C Ratio | | 0.52 | | | | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1774 | | | | | | | | 634 | 1968 | |
| v/s Ratio Prot | | c0.07 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.18 | 0.39 | |
| v/c Ratio | | 0.13 | | | | | | | | 0.44 | 0.94 | |
| Uniform Delay, d1 | | 15.0 | | | | | | | | 25.0 | 33.6 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | | | | | | | | 2.2 | 10.5 | |
| Delay (s) | | 15.1 | | | | | | | | 27.3 | 44.1 | |
| Level of Service | | B | | | | | | | | C | D | |
| Approach Delay (s) | | 15.1 | | | 0.0 | | | 0.0 | | | 39.9 | |
| Approach LOS | | B | | | A | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 37.9 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.49 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 57.2% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕ | ↗ | | | |
| Volume (vph) | 40 | 307 | 0 | 0 | 644 | 565 | 136 | 605 | 27 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | | 1.00 | 0.97 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3515 | | | 3539 | 1548 | | 3492 | 1531 | | | |
| Flt Permitted | | 0.79 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2782 | | | 3539 | 1548 | | 3492 | 1531 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 43 | 334 | 0 | 0 | 700 | 589 | 148 | 630 | 29 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 0 | 14 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 377 | 0 | 0 | 700 | 446 | 0 | 778 | 15 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 35 | | 35 | 6 | | 6 | 26 | | 26 | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 33 | | | 6 | | 10 | | | | 5 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 835 | | | 1062 | 464 | | 1862 | 817 | | | |
| v/s Ratio Prot | | | | | 0.20 | | | | | | | |
| v/s Ratio Perm | | 0.14 | | | | 0.29 | | 0.22 | 0.01 | | | |
| v/c Ratio | | 0.45 | | | 0.66 | 0.96 | | 0.42 | 0.02 | | | |
| Uniform Delay, d1 | | 17.0 | | | 18.3 | 20.6 | | 8.4 | 6.6 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 1.8 | | | 3.2 | 32.9 | | 0.7 | 0.0 | | | |
| Delay (s) | | 18.8 | | | 21.5 | 53.6 | | 9.1 | 6.6 | | | |
| Level of Service | | B | | | C | D | | A | A | | | |
| Approach Delay (s) | | 18.8 | | | 36.2 | | | 9.0 | | | 0.0 | |
| Approach LOS | | B | | | D | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 83.8% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 274 | 46 | 25 | 731 | 0 | 0 | 0 | 0 | 59 | 368 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.99 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3441 | | | 3531 | | | | | 1746 | 3505 | |
| Flt Permitted | | 1.00 | | | 0.94 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3441 | | | 3321 | | | | | 1746 | 3505 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 298 | 50 | 27 | 761 | 0 | 0 | 0 | 0 | 64 | 383 | 22 |
| RTOR Reduction (vph) | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 0 | 319 | 0 | 0 | 788 | 0 | 0 | 0 | 0 | 64 | 396 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 28 | | 28 | 18 | | | 18 | 16 | 16 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | | 3 | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1453 | | | 1402 | | | | | 737 | 1480 | |
| v/s Ratio Prot | | 0.09 | | | | | | | | | c0.11 | |
| v/s Ratio Perm | | | | | c0.24 | | | | | 0.04 | | |
| v/c Ratio | | 0.22 | | | 0.56 | | | | | 0.09 | 0.27 | |
| Uniform Delay, d1 | | 8.3 | | | 9.8 | | | | | 7.8 | 8.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 1.6 | | | | | 0.2 | 0.4 | |
| Delay (s) | | 8.6 | | | 11.5 | | | | | 8.0 | 8.9 | |
| Level of Service | | A | | | B | | | | | A | A | |
| Approach Delay (s) | | 8.6 | | | 11.5 | | | 0.0 | | | 8.8 | |
| Approach LOS | | A | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 57.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕ | |
| Volume (vph) | 45 | 166 | 12 | 8 | 400 | 99 | 66 | 425 | 27 | 29 | 75 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | 0.97 | | | 0.99 | | | 0.97 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3460 | | | 3387 | | | 3468 | | | 3346 | |
| Flt Permitted | | 0.83 | | | 0.95 | | | 0.90 | | | 0.82 | |
| Satd. Flow (perm) | | 2907 | | | 3224 | | | 3133 | | | 2778 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 49 | 180 | 13 | 9 | 435 | 108 | 72 | 462 | 29 | 32 | 82 | 30 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 40 | 0 | 0 | 10 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 0 | 236 | 0 | 0 | 512 | 0 | 0 | 553 | 0 | 0 | 124 | 0 |
| Confl. Peds. (#/hr) | 30 | | 30 | 55 | | 55 | 41 | | 41 | 40 | | 40 |
| Confl. Bikes (#/hr) | | | 7 | | | 19 | | | 6 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 23.1 | | | 23.1 | | | 14.4 | | | 14.4 | |
| Effective Green, g (s) | | 23.1 | | | 23.1 | | | 14.4 | | | 14.4 | |
| Actuated g/C Ratio | | 0.51 | | | 0.51 | | | 0.32 | | | 0.32 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1492 | | | 1655 | | | 1003 | | | 889 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | 0.16 | | | 0.18 | | | 0.04 | |
| v/c Ratio | | 0.16 | | | 0.31 | | | 0.55 | | | 0.14 | |
| Uniform Delay, d1 | | 5.8 | | | 6.3 | | | 12.6 | | | 10.9 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.5 | | | 0.7 | | | 0.1 | |
| Delay (s) | | 6.0 | | | 6.8 | | | 13.3 | | | 11.0 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 6.0 | | | 6.8 | | | 13.3 | | | 11.0 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.5 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 64.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

35: 12th St. & Madison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 0 | 0 | 415 | 1502 | 0 | 0 | 0 | 0 | 0 | 378 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.97 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6291 | | | | | | 4914 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6291 | | | | | | 4914 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 451 | 1548 | 0 | 0 | 0 | 0 | 0 | 386 | 83 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1911 | 0 | 0 | 0 | 0 | 0 | 466 | 0 |
| Confl. Peds. (#/hr) | 48 | | 48 | 30 | | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | 9 | | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2726 | | | | | | 2170 | |
| v/s Ratio Prot | | | | | | | | | | | c0.09 | |
| v/s Ratio Perm | | | | | 0.30 | | | | | | | |
| v/c Ratio | | | | | 0.70 | | | | | | 0.21 | |
| Uniform Delay, d1 | | | | | 13.8 | | | | | | 10.3 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 1.3 | | | | | | 0.2 | |
| Delay (s) | | | | | 7.9 | | | | | | 10.6 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 7.9 | | | 0.0 | | | 10.6 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.4 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.46 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 50.1% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th St. & Oak St.

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1684 | 78 | 324 | 797 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6341 | | | 6165 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6341 | | | 6165 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 85 | 348 | 866 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1812 | 0 | 0 | 1211 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | 1 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3160 | | | 2117 | | | | |
| v/s Ratio Prot | | | | | c0.29 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.20 | | | | |
| v/c Ratio | | | | | 0.57 | | | 0.57 | | | | |
| Uniform Delay, d1 | | | | | 10.6 | | | 16.1 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.8 | | | 1.1 | | | | |
| Delay (s) | | | | | 11.3 | | | 17.2 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 11.3 | | | 17.2 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.7 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.57 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 58.5% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 66 | 0 | 0 | 1073 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 72 | 0 | 0 | 1084 | 0 | 0 |
| Pedestrians | 12 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 1 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 283 | 12 | 12 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 283 | 12 | 12 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 677 | 1055 | 1589 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 72 | 271 | 271 | 271 | 271 | |
| Volume Left | 72 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 677 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.16 | 0.16 | 0.16 | 0.16 | |
| Queue Length 95th (ft) | 9 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 10.9 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 10.9 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 25.9% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 398 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 778 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6074 | | | | | | | | | 5074 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6074 | | | | | | | | | 5074 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 433 | 154 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 819 | 0 |
| RTOR Reduction (vph) | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 0 | 538 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 841 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2328 | | | | | | | | | 2199 | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.17 | |
| v/c Ratio | | 0.23 | | | | | | | | | 0.38 | |
| Uniform Delay, d1 | | 12.5 | | | | | | | | | 11.5 | |
| Progression Factor | | 0.77 | | | | | | | | | 1.16 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | | 0.5 | |
| Delay (s) | | 9.9 | | | | | | | | | 13.8 | |
| Level of Service | | A | | | | | | | | | B | |
| Approach Delay (s) | | 9.9 | | | 0.0 | | | 0.0 | | | 13.8 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 12.2 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.31 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | Sum of lost time (s) | | | 11.0 | | | | |
| Intersection Capacity Utilization | | 38.9% | | | ICU Level of Service | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTL | | | | | | 4TTL | | | | |
| Volume (vph) | 104 | 402 | 0 | 0 | 0 | 0 | 0 | 364 | 59 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6288 | | | | | | 6247 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6288 | | | | | | 6247 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 113 | 432 | 0 | 0 | 0 | 0 | 0 | 396 | 64 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 96 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 449 | 0 | 0 | 0 | 0 | 0 | 443 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | 56 | 21 | | 21 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 5 | | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 9.0 | | | | | | 44.0 | | | | |
| Effective Green, g (s) | | 9.0 | | | | | | 44.0 | | | | |
| Actuated g/C Ratio | | 0.15 | | | | | | 0.73 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 943 | | | | | | 4581 | | | | |
| v/s Ratio Prot | | | | | | | | c0.07 | | | | |
| v/s Ratio Perm | | 0.07 | | | | | | | | | | |
| v/c Ratio | | 0.48 | | | | | | 0.10 | | | | |
| Uniform Delay, d1 | | 23.3 | | | | | | 2.3 | | | | |
| Progression Factor | | 1.01 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.0 | | | | |
| Delay (s) | | 23.8 | | | | | | 2.3 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 23.8 | | | 0.0 | | | 2.3 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.0 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.16 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.9% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 135 | 571 | 0 | 0 | 0 | 0 | 0 | 1115 | 291 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.97 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6328 | | | | | | 4905 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6328 | | | | | | 4905 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 145 | 621 | 0 | 0 | 0 | 0 | 0 | 1212 | 316 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 73 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 756 | 0 | 0 | 0 | 0 | 0 | 1455 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 59 | | 59 | 12 | | 12 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 2 | | | 1 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2531 | | | | | | 1962 | | | | |
| v/s Ratio Prot | | | | | | | | c0.30 | | | | |
| v/s Ratio Perm | | 0.12 | | | | | | | | | | |
| v/c Ratio | | 0.30 | | | | | | 0.74 | | | | |
| Uniform Delay, d1 | | 9.2 | | | | | | 11.5 | | | | |
| Progression Factor | | 0.78 | | | | | | 0.75 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 1.9 | | | | |
| Delay (s) | | 7.5 | | | | | | 10.6 | | | | |
| Level of Service | | A | | | | | | B | | | | |
| Approach Delay (s) | | 7.5 | | | 0.0 | | | 10.6 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.5 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 50.8% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑↑ | | | | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 552 | 282 | 0 | 0 | 0 | 0 | 0 | 0 | 150 | 619 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.95 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6051 | | | | | | | | | 5026 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6051 | | | | | | | | | 5026 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 600 | 307 | 0 | 0 | 0 | 0 | 0 | 0 | 163 | 632 | 0 |
| RTOR Reduction (vph) | 0 | 95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 0 | 812 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 713 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 10 | | 10 | 8 | | 8 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 7 | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2420 | | | | | | | | | 2234 | |
| v/s Ratio Prot | | c0.13 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.14 | |
| v/c Ratio | | 0.34 | | | | | | | | | 0.32 | |
| Uniform Delay, d1 | | 9.4 | | | | | | | | | 8.1 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | | | | | | | 0.4 | |
| Delay (s) | | 9.7 | | | | | | | | | 8.5 | |
| Level of Service | | A | | | | | | | | | A | |
| Approach Delay (s) | | 9.7 | | | 0.0 | | | 0.0 | | | 8.5 | |
| Approach LOS | | A | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.1 | | | | HCM Level of Service | | | A | | |
| HCM Volume to Capacity ratio | | | 0.33 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | Sum of lost time (s) | | | 7.0 | | |
| Intersection Capacity Utilization | | | 38.8% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↱ | | ↕ | | | ↱ | ↱ |
| Volume (vph) | 0 | 0 | 0 | 24 | 348 | 53 | 226 | 282 | 0 | 0 | 167 | 1778 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frbp, ped/bikes | | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1736 | 1863 | 1503 | | 1821 | | | 1863 | 1558 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.77 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1736 | 1863 | 1503 | | 1436 | | | 1863 | 1558 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 26 | 362 | 58 | 246 | 307 | 0 | 0 | 182 | 1872 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 94 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 26 | 362 | 16 | 0 | 553 | 0 | 0 | 182 | 1778 |
| Confl. Peds. (#/hr) | 1 | | 1 | 23 | | 23 | 2 | | 2 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 12.2 | 12.2 | 12.2 | | 21.8 | | | 21.8 | 21.8 |
| Effective Green, g (s) | | | | 12.2 | 12.2 | 12.2 | | 21.8 | | | 21.8 | 21.8 |
| Actuated g/C Ratio | | | | 0.27 | 0.27 | 0.27 | | 0.48 | | | 0.48 | 0.48 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 471 | 505 | 407 | | 696 | | | 903 | 755 |
| v/s Ratio Prot | | | | c0.19 | | | | | | | 0.10 | |
| v/s Ratio Perm | | | | 0.01 | | 0.01 | | 0.39 | | | | c1.14 |
| v/c Ratio | | | | 0.06 | 0.72 | 0.04 | | 0.79 | | | 0.20 | 2.35 |
| Uniform Delay, d1 | | | | 12.1 | 14.8 | 12.1 | | 9.7 | | | 6.6 | 11.6 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 4.8 | 0.0 | | 9.1 | | | 0.5 | 613.6 |
| Delay (s) | | | | 12.2 | 19.7 | 12.1 | | 18.8 | | | 7.1 | 625.2 |
| Level of Service | | | | B | B | B | | B | | | A | F |
| Approach Delay (s) | | 0.0 | | | 18.2 | | | 18.8 | | | 570.5 | |
| Approach LOS | | A | | | B | | | B | | | F | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 389.9 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.77 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 170.0% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 145 | 505 | 141 | 56 | 878 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3497 | | 3190 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3497 | | 3190 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 158 | 526 | 153 | 61 | 954 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 684 | 0 | 691 | 477 |
| Confl. Peds. (#/hr) | 51 | 2 | | | | |
| Confl. Bikes (#/hr) | 2 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1267 | | 1148 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.20 | | 0.22 | 0.33 |
| v/c Ratio | | | 0.54 | | 0.60 | 0.92 |
| Uniform Delay, d1 | | | 11.4 | | 11.8 | 13.8 |
| Progression Factor | | | 0.81 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.5 | | 2.3 | 23.8 |
| Delay (s) | | | 9.7 | | 14.1 | 37.6 |
| Level of Service | | | A | | B | D |
| Approach Delay (s) | | | 9.7 | | 23.7 | |
| Approach LOS | | | A | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 18.5 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.72 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 68.4% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 356 | 651 | 179 | 0 | 0 | 0 | 0 | 271 | 80 | 4 | 138 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.97 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4857 | | | | | | 1800 | | | 1860 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.99 | |
| Satd. Flow (perm) | | 1850 | | | | | | 1500 | | | 1600 | |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 375 | 708 | 195 | 0 | 0 | 0 | 0 | 295 | 87 | 4 | 150 | 0 |
| RTOR Reduction (vph) | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1221 | 0 | 0 | 0 | 0 | 0 | 358 | 0 | 0 | 154 | 0 |
| Confl. Peds. (#/hr) | 14 | | 14 | 52 | | 52 | 1 | | 1 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 5 | | | 2 | | | | | | |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 925 | | | | | | 620 | | | 551 | |
| v/s Ratio Prot | | | | | | | | c0.20 | | | | |
| v/s Ratio Perm | | c0.66 | | | | | | | | | 0.10 | |
| v/c Ratio | | 1.32 | | | | | | 0.58 | | | 0.28 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 12.1 | | | 10.7 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.94 | |
| Incremental Delay, d2 | | 151.6 | | | | | | 3.9 | | | 1.0 | |
| Delay (s) | | 162.9 | | | | | | 16.0 | | | 11.1 | |
| Level of Service | | F | | | | | | B | | | B | |
| Approach Delay (s) | | 162.9 | | | 0.0 | | | 16.0 | | | 11.1 | |
| Approach LOS | | F | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 119.1 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.02 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 52.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 361 | 213 | 521 | 286 | 115 | 1223 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.95 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3351 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3351 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 392 | 232 | 566 | 311 | 125 | 1329 |
| RTOR Reduction (vph) | 0 | 171 | 75 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 392 | 61 | 802 | 0 | 125 | 1329 |
| Turn Type | Perm | | | Prot | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 23.5 | 23.5 | 40.6 | | 13.9 | 58.5 |
| Effective Green, g (s) | 23.5 | 23.5 | 40.6 | | 13.9 | 58.5 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.45 | | 0.15 | 0.65 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 462 | 413 | 1512 | | 273 | 2300 |
| v/s Ratio Prot | c0.22 | | 0.24 | | 0.07 | c0.38 |
| v/s Ratio Perm | | 0.04 | | | | |
| v/c Ratio | 0.85 | 0.15 | 0.53 | | 0.46 | 0.58 |
| Uniform Delay, d1 | 31.6 | 25.5 | 17.8 | | 34.6 | 8.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 13.5 | 0.2 | 1.3 | | 5.4 | 1.1 |
| Delay (s) | 45.1 | 25.7 | 19.2 | | 40.1 | 9.9 |
| Level of Service | D | C | B | | D | A |
| Approach Delay (s) | 37.9 | | 19.2 | | | 12.5 |
| Approach LOS | D | | B | | | B |

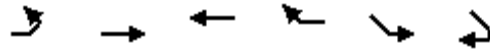
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 19.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 60.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

46: Lakeshore Drive & El Embarcadero (WB)

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | ↰ | ↱↱ | ↰↱ | | ↰ | ↰ |
| Volume (vph) | 350 | 233 | 416 | 206 | 187 | 199 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.94 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 372 | 243 | 452 | 224 | 203 | 216 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 167 |
| Lane Group Flow (vph) | 372 | 243 | 586 | 0 | 203 | 49 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.2 | 31.5 | 13.3 | | 11.7 | 11.7 |
| Effective Green, g (s) | 14.2 | 31.5 | 13.3 | | 11.7 | 11.7 |
| Actuated g/C Ratio | 0.28 | 0.62 | 0.26 | | 0.23 | 0.23 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 491 | 2177 | 874 | | 404 | 362 |
| v/s Ratio Prot | c0.21 | 0.07 | c0.17 | | c0.11 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.76 | 0.11 | 0.67 | | 0.50 | 0.14 |
| Uniform Delay, d1 | 16.9 | 4.1 | 17.0 | | 17.2 | 15.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 6.6 | 0.0 | 2.0 | | 1.0 | 0.2 |
| Delay (s) | 23.5 | 4.1 | 19.0 | | 18.2 | 15.9 |
| Level of Service | C | A | B | | B | B |
| Approach Delay (s) | | 15.8 | 19.0 | | 17.0 | |
| Approach LOS | | B | B | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 17.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 51.2 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 57.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|--------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | 3TW | | | 2T | 1T | 1T | 2T | |
| Volume (vph) | 0 | 0 | 671 | 706 | 221 | 0 | 424 | 213 | 282 | 1299 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4932 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4932 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 729 | 767 | 240 | 0 | 456 | 232 | 307 | 1412 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 182 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1714 | 0 | 0 | 456 | 50 | 307 | 1412 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1698 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.35 | | | 0.13 | | 0.17 | c0.40 | |
| v/s Ratio Perm | | | | | | | | 0.03 | | | |
| v/c Ratio | | | | 1.16dl | | | 0.78 | 0.19 | 0.47 | 0.70 | |
| Uniform Delay, d1 | | | | 34.8 | | | 42.4 | 38.2 | 25.6 | 16.2 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 24.2 | | | 10.0 | 1.6 | 2.4 | 2.0 | |
| Delay (s) | | | | 59.0 | | | 52.4 | 39.8 | 28.1 | 18.3 | |
| Level of Service | | | | E | | | D | D | C | B | |
| Approach Delay (s) | 0.0 | | | 59.0 | | | 48.1 | | | 20.0 | |
| Approach LOS | A | | | E | | | D | | | C | |

Intersection Summary

| | | | |
|---|-------|----------------------|-----|
| HCM Average Control Delay | 41.0 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.81 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 8.5 |
| Intersection Capacity Utilization | 80.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 261 | 490 | 217 | 198 | 341 | 178 | 21 | 345 | 47 | 460 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3101 | 1441 | | 3341 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3101 | 1441 | | 3341 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 284 | 533 | 236 | 215 | 363 | 193 | 23 | 375 | 51 | 500 |
| RTOR Reduction (vph) | 0 | 0 | 80 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 256 | 703 | 229 | 0 | 576 | 0 | 0 | 0 | 426 | 500 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 30.6 | 30.6 | 30.6 | | 34.1 | | | | 28.8 | 66.4 |
| Effective Green, g (s) | 30.6 | 30.6 | 30.6 | | 34.1 | | | | 28.8 | 66.4 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.32 | | | | 0.27 | 0.63 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 465 | 895 | 416 | | 1075 | | | | 481 | 2217 |
| v/s Ratio Prot | 0.16 | c0.23 | 0.16 | | c0.17 | | | | c0.24 | 0.14 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.55 | 0.79 | 0.55 | | 0.54 | | | | 0.89 | 0.23 |
| Uniform Delay, d1 | 31.9 | 34.7 | 31.9 | | 29.5 | | | | 37.0 | 8.6 |
| Progression Factor | 0.70 | 0.71 | 0.57 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.8 | 2.7 | 0.9 | | 1.9 | | | | 17.5 | 0.2 |
| Delay (s) | 23.2 | 27.3 | 18.9 | | 31.4 | | | | 54.5 | 8.9 |
| Level of Service | C | C | B | | C | | | | D | A |
| Approach Delay (s) | | 24.4 | | | 31.4 | | | | | 29.9 |
| Approach LOS | | C | | | C | | | | | C |

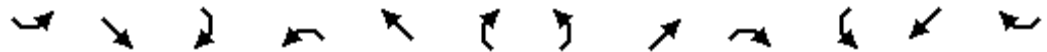
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 27.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.73 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 67.3% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Near-Term + I AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2615 | 126 | 466 | 409 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4789 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4789 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.93 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2724 | 137 | 501 | 431 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 68 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2724 | 69 | 0 | 932 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | 0.48 | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2415 | 752 | | 2035 | | | | |
| v/s Ratio Prot | | | | | c0.54 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.04 | | 0.19 | | | | |
| v/c Ratio | | | | | 1.13 | 0.09 | | 0.46 | | | | |
| Uniform Delay, d1 | | | | | 21.0 | 11.5 | | 16.4 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 63.5 | 0.2 | | 0.7 | | | | |
| Delay (s) | | | | | 84.5 | 11.8 | | 17.2 | | | | |
| Level of Service | | | | | F | B | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 81.0 | | | 17.2 | | | 0.0 | |
| Approach LOS | | A | | | F | | | B | | | A | |

Intersection Summary

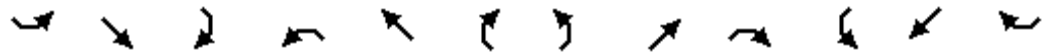
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 65.4 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.81 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 85.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

50: MacArthur Blvd (WB) & Harrison Street


















Near-Term + I AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1232 | 1734 | 0 | 0 | 0 | 0 | 0 | 1228 | 37 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4755 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4755 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1270 | 1885 | 0 | 0 | 0 | 0 | 0 | 1306 | 39 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 760 | 2391 | 0 | 0 | 0 | 0 | 0 | 1342 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2734 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.38 | |
| v/s Ratio Perm | | | | 0.50 | 0.50 | | | | | | | |
| v/c Ratio | | | | 0.87 | 0.87 | | | | | | 1.17 | |
| Uniform Delay, d1 | | | | 14.4 | 14.5 | | | | | | 27.0 | |
| Progression Factor | | | | 1.41 | 1.41 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 1.2 | 0.4 | | | | | | 87.1 | |
| Delay (s) | | | | 21.6 | 20.9 | | | | | | 114.1 | |
| Level of Service | | | | C | C | | | | | | F | |
| Approach Delay (s) | | 0.0 | | | 21.1 | | | 0.0 | | | 114.1 | |
| Approach LOS | | A | | | C | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 48.9 | | | HCM Level of Service | | | | | D | |
| HCM Volume to Capacity ratio | | | 0.98 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 85.7% | | | ICU Level of Service | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Near-Term + I AM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 90 | 233 | 7 | 11 | 496 | 16 | 11 | 7 | 10 | 22 | 17 | 16 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 98 | 248 | 8 | 12 | 539 | 17 | 12 | 8 | 11 | 24 | 18 | 17 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 98 | 255 | 568 | 30 | 60 | | | | | | | |
| Volume Left (vph) | 98 | 0 | 12 | 12 | 24 | | | | | | | |
| Volume Right (vph) | 0 | 8 | 17 | 11 | 17 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.8 | 5.3 | 4.7 | 6.1 | 6.0 | | | | | | | |
| Degree Utilization, x | 0.16 | 0.37 | 0.75 | 0.05 | 0.10 | | | | | | | |
| Capacity (veh/h) | 605 | 663 | 752 | 530 | 533 | | | | | | | |
| Control Delay (s) | 8.7 | 10.2 | 20.2 | 9.4 | 9.7 | | | | | | | |
| Approach Delay (s) | 9.8 | | 20.2 | 9.4 | 9.7 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 15.6 | | | | | | | | | |
| HCM Level of Service | | | C | | | | | | | | | |
| Intersection Capacity Utilization | | | 54.4% | ICU Level of Service | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 4.4 Worst Case Level Of Service: B[14.2]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 1 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 792 0 0 0 346 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 792 0 0 0 346 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 792 0 0 0 346 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.95 1.00 1.00 1.00 0.92 1.00 1.00 1.00

PHF Volume: 0 0 0 0 834 0 0 0 376 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 834 0 0 0 376 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 278 xxxxx xxxx xxxxx

Potent Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 766 xxxxx xxxx xxxxx

Move Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 766 xxxxx xxxx xxxxx

Volume/Cap: xxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 0.49 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 2.7 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx 14.2 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * B * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 14.2 xxxxxx

ApproachLOS: * * B *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: Oakland Avenue & I-580 Off-ramp

Near-Term + I PM
Kaiser Center Transportation Study
























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|-------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 738 | 349 | 1276 | 680 | 98 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1738 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1738 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 802 | 379 | 1387 | 739 | 107 |
| RTOR Reduction (vph) | 37 | 34 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 548 | 562 | 1387 | 846 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Effective Green, g (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.61 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 448 | 463 | 2153 | 356 | |
| v/s Ratio Prot | | | c0.39 | c0.53 | |
| v/s Ratio Perm | c0.33 | 0.32 | | | |
| v/c Ratio | 1.22 | 1.21 | 0.64 | 2.38 | |
| Uniform Delay, d1 | 22.0 | 22.0 | 7.6 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 118.7 | 114.3 | 1.5 | 628.0 | |
| Delay (s) | 140.7 | 136.3 | 9.1 | 651.2 | |
| Level of Service | F | F | A | F | |
| Approach Delay (s) | | 138.5 | 252.4 | | |
| Approach LOS | | F | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 213.0 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 1.25 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 84.7% | | ICU Level of Service | E |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |  |  | | |  |  |  | |  |  |  |
| Volume (vph) | 212 | 425 | 101 | 20 | 52 | 16 | 180 | 206 | 10 | 391 | 1093 | 103 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1522 | | 3433 | 3482 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1522 | | 3433 | 3482 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 226 | 452 | 107 | 21 | 57 | 17 | 196 | 224 | 11 | 425 | 1188 | 112 |
| RTOR Reduction (vph) | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 187 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 226 | 452 | 121 | 0 | 0 | 74 | 196 | 37 | 0 | 436 | 1292 | 0 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | 20 | | | | 9 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 14.5 | 27.2 | |
| Effective Green, g (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 14.5 | 27.2 | |
| Actuated g/C Ratio | 0.21 | 0.29 | 0.29 | | | 0.09 | 0.17 | 0.17 | | 0.16 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 372 | 1026 | 459 | | | 151 | 308 | 252 | | 553 | 1052 | |
| v/s Ratio Prot | c0.13 | 0.13 | | | | 0.04 | c0.11 | | | 0.13 | c0.37 | |
| v/s Ratio Perm | | | 0.08 | | | | | 0.02 | | | | |
| v/c Ratio | 0.61 | 0.44 | 0.26 | | | 0.49 | 0.64 | 0.15 | | 0.79 | 1.23 | |
| Uniform Delay, d1 | 32.2 | 26.0 | 24.6 | | | 39.3 | 35.0 | 32.1 | | 36.3 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.8 | 0.3 | 0.3 | | | 2.5 | 4.3 | 0.3 | | 7.3 | 111.3 | |
| Delay (s) | 35.0 | 26.3 | 24.9 | | | 41.8 | 39.3 | 32.4 | | 43.6 | 142.7 | |
| Level of Service | C | C | C | | | D | D | C | | D | F | |
| Approach Delay (s) | | 28.5 | | | | | 36.5 | | | | 117.8 | |
| Approach LOS | | C | | | | | D | | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 76.6 | | | | HCM Level of Service | | E | | | | |
| HCM Volume to Capacity ratio | | 0.92 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 90.0 | | | | Sum of lost time (s) | | 18.0 | | | | |
| Intersection Capacity Utilization | | 82.2% | | | | ICU Level of Service | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|-------|------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 222 | 489 | 47 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3431 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3431 | | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 239 | 526 | 51 | 84 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 |
| Lane Group Flow (vph) | 239 | 648 | 0 | 0 |
| Confl. Peds. (#/hr) | 26 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 11.0 | 22.7 | | |
| Effective Green, g (s) | 11.0 | 22.7 | | |
| Actuated g/C Ratio | 0.12 | 0.25 | | |
| Clearance Time (s) | 4.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 216 | 865 | | |
| v/s Ratio Prot | c0.14 | 0.19 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 1.11 | 0.75 | | |
| Uniform Delay, d1 | 39.5 | 31.0 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 92.7 | 5.9 | | |
| Delay (s) | 132.2 | 36.9 | | |
| Level of Service | F | D | | |
| Approach Delay (s) | | 62.2 | | |
| Approach LOS | | E | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 91 | 250 | 70 | 48 | 390 | 269 | 150 | 659 | 33 | 202 | 623 | 95 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1745 | 3387 | | | 3517 | 1536 | 1767 | 3510 | | 1767 | 3447 | |
| Flt Permitted | 0.46 | 1.00 | | | 0.87 | 1.00 | 0.28 | 1.00 | | 0.29 | 1.00 | |
| Satd. Flow (perm) | 845 | 3387 | | | 3076 | 1536 | 517 | 3510 | | 543 | 3447 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 99 | 272 | 76 | 52 | 406 | 292 | 163 | 716 | 36 | 220 | 677 | 103 |
| RTOR Reduction (vph) | 0 | 30 | 0 | 0 | 0 | 73 | 0 | 4 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 99 | 318 | 0 | 0 | 458 | 219 | 163 | 748 | 0 | 220 | 766 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 10 | | 10 | 6 | | 6 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 20 | | | 18 | | | 17 | | | 66 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 358 | 1434 | | | 1303 | 651 | 231 | 1569 | | 243 | 1541 | |
| v/s Ratio Prot | | 0.09 | | | | | | 0.21 | | | 0.22 | |
| v/s Ratio Perm | 0.12 | | | | 0.15 | 0.14 | 0.32 | | | 0.41 | | |
| v/c Ratio | 0.28 | 0.22 | | | 0.35 | 0.34 | 0.71 | 0.48 | | 0.91 | 0.50 | |
| Uniform Delay, d1 | 16.0 | 15.6 | | | 16.6 | 16.5 | 19.0 | 16.5 | | 21.8 | 16.7 | |
| Progression Factor | 0.85 | 0.84 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.6 | 0.3 | | | 0.7 | 1.4 | 16.6 | 1.0 | | 37.6 | 1.1 | |
| Delay (s) | 15.2 | 13.4 | | | 17.3 | 17.9 | 35.6 | 17.6 | | 59.5 | 17.9 | |
| Level of Service | B | B | | | B | B | D | B | | E | B | |
| Approach Delay (s) | | 13.8 | | | 17.5 | | | 20.8 | | | 27.0 | |
| Approach LOS | | B | | | B | | | C | | | C | |

Intersection Summary

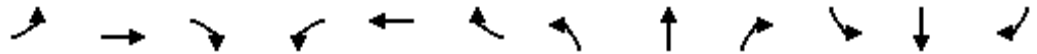
| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 21.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 107.0% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-----------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 210 | 405 | 136 | 64 | 588 | 114 | 186 | 491 | 46 | 133 | 461 | 350 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1554 | 1769 | 1863 | 1552 | 1763 | 3483 | | 1763 | 3257 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.35 | 1.00 | 1.00 | 0.20 | 1.00 | | 0.36 | 1.00 | |
| Satd. Flow (perm) | 226 | 1863 | 1554 | 659 | 1863 | 1552 | 371 | 3483 | | 675 | 3257 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 228 | 440 | 148 | 70 | 639 | 124 | 202 | 534 | 50 | 145 | 501 | 380 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 83 | 0 | 8 | 0 | 0 | 161 | 0 |
| Lane Group Flow (vph) | 228 | 440 | 58 | 70 | 639 | 41 | 202 | 576 | 0 | 145 | 720 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 17 | | | 28 |
| Turn Type | pm+pt | | | Permpm+pt | | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.40 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 298 | 725 | 605 | 333 | 622 | 519 | 144 | 1352 | | 262 | 1264 | |
| v/s Ratio Prot | c0.09 | 0.24 | | 0.01 | c0.34 | | | 0.17 | | | 0.22 | |
| v/s Ratio Perm | 0.30 | | 0.04 | 0.07 | | 0.03 | c0.54 | | | 0.21 | | |
| v/c Ratio | 0.77 | 0.61 | 0.10 | 0.21 | 1.03 | 0.08 | 1.40 | 0.43 | | 0.55 | 0.57 | |
| Uniform Delay, d1 | 17.6 | 20.7 | 16.5 | 16.5 | 28.3 | 19.4 | 26.0 | 19.1 | | 20.3 | 20.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.57 | 1.42 | 2.78 | 0.76 | 0.66 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.1 | 3.8 | 0.3 | 0.1 | 42.2 | 0.3 | 215.0 | 0.1 | | 1.4 | 0.4 | |
| Delay (s) | 27.7 | 24.5 | 16.8 | 26.0 | 82.3 | 54.2 | 234.7 | 12.7 | | 21.7 | 20.8 | |
| Level of Service | C | C | B | C | F | D | F | B | | C | C | |
| Approach Delay (s) | | 24.0 | | | 73.4 | | | 69.8 | | | 20.9 | |
| Approach LOS | | C | | | E | | | E | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 45.4 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 1.17 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 93.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

6: 27th Street & Northgate Avenue (NB)

Near-Term + 1 PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 246 | 655 | 0 | 0 | 257 | 973 | 21 | 839 | 75 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1609 | 3384 | | | 3539 | 2787 | | 5011 | | | | |
| Flt Permitted | 0.58 | 0.94 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 983 | 3181 | | | 3539 | 2787 | | 5011 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 265 | 712 | 0 | 0 | 279 | 1003 | 23 | 912 | 82 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 53 | 0 | 25 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 238 | 739 | 0 | 0 | 279 | 950 | 0 | 992 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 4 | | 4 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | 5 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | 4 | | | 8 | | | 2 | | | | | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 393 | 1272 | | | 1416 | 1115 | | 2004 | | | | |
| v/s Ratio Prot | | | | | 0.08 | | | | | | | |
| v/s Ratio Perm | 0.24 | 0.23 | | | | 0.34 | | 0.20 | | | | |
| v/c Ratio | 0.61 | 0.58 | | | 0.20 | 0.85 | | 0.49 | | | | |
| Uniform Delay, d1 | 9.5 | 9.4 | | | 7.8 | 10.9 | | 9.0 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 6.8 | 1.9 | | | 0.3 | 8.3 | | 0.9 | | | | |
| Delay (s) | 16.3 | 11.3 | | | 8.1 | 19.2 | | 9.9 | | | | |
| Level of Service | B | B | | | A | B | | A | | | | |
| Approach Delay (s) | | 12.5 | | | 16.8 | | | 9.9 | | | 0.0 | |
| Approach LOS | | B | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.67 | | |
| Actuated Cycle Length (s) | 40.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 80.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Near-Term + I PM
Kaiser Center Transportation Study

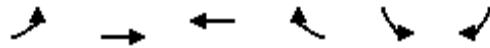


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 492 | 38 | 12 | 243 | 0 | 0 | 0 | 0 | 406 | 296 | 205 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1552 | | 3531 | | | | | 1605 | 3324 | 1558 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1552 | | 3285 | | | | | 1605 | 3324 | 1558 |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 518 | 41 | 13 | 264 | 0 | 0 | 0 | 0 | 441 | 322 | 223 |
| RTOR Reduction (vph) | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 |
| Lane Group Flow (vph) | 0 | 518 | 14 | 0 | 277 | 0 | 0 | 0 | 0 | 251 | 512 | 115 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 1 | | 1 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 5 | | | 9 | | | 1 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 543 | | 1150 | | | | | 829 | 1717 | 805 |
| v/s Ratio Prot | | c0.15 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.08 | | | | | c0.16 | 0.15 | 0.07 |
| v/c Ratio | | 0.42 | 0.03 | | 0.24 | | | | | 0.30 | 0.30 | 0.14 |
| Uniform Delay, d1 | | 14.8 | 12.8 | | 13.8 | | | | | 8.3 | 8.3 | 7.6 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 1.0 | 0.1 | | 0.5 | | | | | 0.9 | 0.4 | 0.4 |
| Delay (s) | | 15.9 | 12.9 | | 14.3 | | | | | 9.2 | 8.7 | 7.9 |
| Level of Service | | B | B | | B | | | | | A | A | A |
| Approach Delay (s) | | 15.7 | | | 14.3 | | | 0.0 | | | 8.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.7 | | HCM Level of Service | | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.35 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 50.0% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 274 | 570 | 624 | 456 | 196 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.94 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3273 | | 3417 | 1421 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3273 | | 3417 | 1421 |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 298 | 613 | 678 | 470 | 213 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 117 | 0 | 8 | 89 |
| Lane Group Flow (vph) | 298 | 613 | 1031 | 0 | 219 | 12 |
| Confl. Peds. (#/hr) | 14 | | | 18 | | |
| Confl. Bikes (#/hr) | | | | 7 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 18.9 | 62.5 | 39.6 | | 9.5 | 9.5 |
| Effective Green, g (s) | 18.9 | 62.5 | 39.6 | | 9.5 | 9.5 |
| Actuated g/C Ratio | 0.24 | 0.78 | 0.50 | | 0.12 | 0.12 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 418 | 2765 | 1620 | | 406 | 169 |
| v/s Ratio Prot | c0.17 | 0.17 | c0.31 | | c0.06 | |
| v/s Ratio Perm | | | | | | 0.01 |
| v/c Ratio | 0.71 | 0.22 | 0.64 | | 0.54 | 0.07 |
| Uniform Delay, d1 | 28.1 | 2.3 | 14.9 | | 33.2 | 31.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 4.7 | 0.2 | 1.9 | | 0.7 | 0.1 |
| Delay (s) | 32.8 | 2.5 | 16.8 | | 33.9 | 31.4 |
| Level of Service | C | A | B | | C | C |
| Approach Delay (s) | | 12.4 | 16.8 | | 33.1 | |
| Approach LOS | | B | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 17.4 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.64 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 64.5% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|-------|-------|------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 27 | 688 | 32 | 19 | 845 | 128 | 95 | 542 | 33 | 139 | 429 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1760 | 3343 | | 1769 | 3505 | | 1761 | 3406 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.37 | 1.00 | | 0.41 | 1.00 | |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 306 | 3343 | | 682 | 3505 | | 769 | 3406 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 29 | 748 | 35 | 21 | 918 | 139 | 103 | 589 | 36 | 151 | 452 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 29 | 748 | 10 | 21 | 1043 | 0 | 103 | 620 | 0 | 151 | 544 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | 5 | 2 | | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | 50.3 | 50.3 | | | 40.2 | 40.2 | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | 50.3 | 50.3 | | | 40.2 | 40.2 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.59 | 0.59 | | | 0.47 | 0.47 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 6.0 | | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 87 | 952 | 475 | 2074 | | | 364 | 1611 | |
| v/s Ratio Prot | | 0.22 | | | c0.31 | 0.01 | c0.18 | | | | 0.16 | |
| v/s Ratio Perm | 0.09 | | 0.01 | 0.07 | | 0.11 | | | | c0.20 | | |
| v/c Ratio | 0.33 | 0.77 | 0.02 | 0.24 | 1.10 | 0.22 | 0.30 | | | 0.41 | 0.34 | |
| Uniform Delay, d1 | 24.0 | 27.8 | 21.9 | 23.3 | 30.4 | 7.9 | 8.6 | | | 14.7 | 14.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.27 | 1.29 | |
| Incremental Delay, d2 | 9.7 | 5.7 | 0.1 | 6.5 | 59.0 | 0.1 | 0.4 | | | 3.1 | 0.5 | |
| Delay (s) | 33.7 | 33.6 | 22.0 | 29.8 | 89.4 | 8.0 | 9.0 | | | 21.7 | 18.7 | |
| Level of Service | C | C | C | C | F | A | A | | | C | B | |
| Approach Delay (s) | | 33.1 | | | 88.2 | | 8.8 | | | | 19.3 | |
| Approach LOS | | C | | | F | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 42.6 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 70.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 81 | 466 | 39 | 105 | 343 | 34 | 294 | 647 | 172 | 54 | 502 | 108 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3382 | | | 3350 | | 1765 | 3539 | 1551 | 1751 | 3415 | |
| Flt Permitted | 0.31 | 1.00 | | | 0.62 | | 0.37 | 1.00 | 1.00 | 0.36 | 1.00 | |
| Satd. Flow (perm) | 581 | 3382 | | | 2090 | | 693 | 3539 | 1551 | 672 | 3415 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 88 | 507 | 42 | 114 | 373 | 37 | 320 | 681 | 187 | 59 | 546 | 117 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 9 | 0 | 0 | 0 | 70 | 0 | 15 | 0 |
| Lane Group Flow (vph) | 88 | 539 | 0 | 0 | 515 | 0 | 320 | 681 | 117 | 59 | 648 | 0 |
| Confl. Peds. (#/hr) | 8 | | 8 | 2 | | 2 | 8 | | 8 | 32 | | 32 |
| Confl. Bikes (#/hr) | | | 6 | | | 6 | | | 4 | | | 28 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 22.4 | 22.4 | | | 22.4 | | 49.6 | 49.6 | 49.6 | 49.6 | 49.6 | |
| Effective Green, g (s) | 22.4 | 22.4 | | | 22.4 | | 49.6 | 49.6 | 49.6 | 49.6 | 49.6 | |
| Actuated g/C Ratio | 0.28 | 0.28 | | | 0.28 | | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 163 | 947 | | | 585 | | 430 | 2194 | 962 | 417 | 2117 | |
| v/s Ratio Prot | | 0.16 | | | | | | 0.19 | | | 0.19 | |
| v/s Ratio Perm | 0.15 | | | | c0.25 | | c0.46 | | 0.08 | 0.09 | | |
| v/c Ratio | 0.54 | 0.57 | | | 0.88 | | 0.74 | 0.31 | 0.12 | 0.14 | 0.31 | |
| Uniform Delay, d1 | 24.4 | 24.7 | | | 27.5 | | 10.7 | 7.2 | 6.2 | 6.3 | 7.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.06 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.7 | 0.5 | | | 14.0 | | 11.1 | 0.4 | 0.3 | 0.7 | 0.4 | |
| Delay (s) | 26.2 | 25.1 | | | 43.0 | | 21.8 | 7.5 | 6.5 | 7.0 | 7.5 | |
| Level of Service | C | C | | | D | | C | A | A | A | A | |
| Approach Delay (s) | | 25.3 | | | 43.0 | | | 11.2 | | | 7.5 | |
| Approach LOS | | C | | | D | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 18.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 81.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|-------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | ↔ | ↔↔ | | | | | | ↔↔ | |
| Volume (vph) | 6 | 666 | 205 | 117 | 373 | 2 | 0 | 0 | 0 | 80 | 249 | 71 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frbp, ped/bikes | | 0.95 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | 0.96 | | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3134 | | 1770 | 3424 | | | | | | 3385 | |
| Flt Permitted | | 0.95 | | 0.16 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 2984 | | 289 | 3424 | | | | | | 3385 | |
| Peak-hour factor, PHF | 0.92 | 0.99 | 0.92 | 0.93 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 7 | 673 | 223 | 126 | 405 | 2 | 0 | 0 | 0 | 87 | 265 | 77 |
| RTOR Reduction (vph) | 0 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 0 | 868 | 0 | 126 | 407 | 0 | 0 | 0 | 0 | 0 | 406 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 8 | | 8 | 36 | | 36 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 18 | | | 14 | | | 2 | | | 8 |
| Turn Type | Perm | | pm+pt | | | | | | Perm | | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | | | | 4 | | |
| Actuated Green, G (s) | | 31.7 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | | 31.7 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | | 0.40 | | 0.54 | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1182 | | 272 | 1840 | | | | | | 1227 | |
| v/s Ratio Prot | | | | c0.04 | 0.12 | | | | | | | |
| v/s Ratio Perm | | c0.29 | | 0.21 | | | | | | | 0.12 | |
| v/c Ratio | | 0.73 | | 0.46 | 0.22 | | | | | | 0.33 | |
| Uniform Delay, d1 | | 20.6 | | 11.8 | 9.7 | | | | | | 18.5 | |
| Progression Factor | | 1.66 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | | 4.0 | | 0.5 | 0.3 | | | | | | 0.7 | |
| Delay (s) | | 38.2 | | 12.3 | 10.0 | | | | | | 19.2 | |
| Level of Service | | D | | B | A | | | | | | B | |
| Approach Delay (s) | | 38.2 | | | 10.5 | | | 0.0 | | | 19.2 | |
| Approach LOS | | D | | | B | | | A | | | B | |























Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 25.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 69.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  | |  |  | |  |  |
| Volume (vph) | 133 | 629 | 129 | 350 | 846 | 42 | 11 | 1314 | 1058 | 2 | 620 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1484 | 3433 | 3539 | 1460 | | 5082 | 1466 | | 4986 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.93 | 1.00 | | 0.94 | |
| Satd. Flow (perm) | 3433 | 3539 | 1484 | 3433 | 3539 | 1460 | | 4735 | 1466 | | 4669 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 145 | 684 | 140 | 357 | 910 | 46 | 12 | 1428 | 1150 | 2 | 646 | 65 |
| RTOR Reduction (vph) | 0 | 0 | 46 | 0 | 0 | 27 | 0 | 0 | 251 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 145 | 684 | 94 | 357 | 910 | 19 | 0 | 1440 | 899 | 0 | 701 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 8.6 | 35.0 | 35.0 | 14.0 | 41.4 | 41.4 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 8.6 | 35.0 | 35.0 | 14.0 | 41.4 | 41.4 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.09 | 0.35 | 0.35 | 0.14 | 0.41 | 0.41 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 295 | 1239 | 519 | 481 | 1465 | 604 | | 1705 | 528 | | 1681 | |
| v/s Ratio Prot | 0.04 | 0.19 | | c0.10 | c0.26 | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | | 0.01 | | 0.30 | c0.61 | | 0.15 | |
| v/c Ratio | 0.49 | 0.55 | 0.18 | 0.74 | 0.62 | 0.03 | | 0.84 | 1.70 | | 0.42 | |
| Uniform Delay, d1 | 43.6 | 26.2 | 22.6 | 41.3 | 23.1 | 17.4 | | 29.4 | 32.0 | | 24.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.5 | 1.8 | 0.8 | 5.4 | 2.0 | 0.1 | | 5.3 | 324.3 | | 0.8 | |
| Delay (s) | 44.1 | 28.0 | 23.3 | 46.6 | 25.1 | 17.5 | | 34.8 | 356.3 | | 24.9 | |
| Level of Service | D | C | C | D | C | B | | C | F | | C | |
| Approach Delay (s) | | 29.7 | | | 30.7 | | | 177.5 | | | 24.9 | |
| Approach LOS | | C | | | C | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 97.9 | | | | HCM Level of Service | | | | F | |
| HCM Volume to Capacity ratio | | | 1.06 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | | Sum of lost time (s) | | | 10.0 | | |
| Intersection Capacity Utilization | | | 122.3% | | | | ICU Level of Service | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|-------|-------|-------|------|------|
| Lane Configurations | WT | | WT | TTT | TTT | WT |
| Volume (vph) | 534 | 121 | 102 | 1512 | 917 | 129 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.99 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 0.99 | 1.00 | 1.00 | |
| Frt | 0.97 | | 1.00 | 1.00 | 0.98 | |
| Flt Protected | 0.96 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3353 | | 1760 | 3725 | 6289 | |
| Flt Permitted | 0.96 | | 0.19 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3353 | | 355 | 3725 | 6289 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 |
| Adj. Flow (vph) | 580 | 132 | 111 | 1575 | 997 | 140 |
| RTOR Reduction (vph) | 32 | 0 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 680 | 0 | 111 | 1575 | 1113 | 0 |
| Confl. Peds. (#/hr) | 30 | 30 | 106 | | | |
| Confl. Bikes (#/hr) | | 2 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 22.5 | | 44.0 | 37.4 | 37.4 | |
| Effective Green, g (s) | 22.5 | | 44.0 | 37.4 | 37.4 | |
| Actuated g/C Ratio | 0.28 | | 0.55 | 0.47 | 0.47 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 943 | | 311 | 1741 | 2940 | |
| v/s Ratio Prot | c0.20 | | c0.03 | c0.42 | 0.18 | |
| v/s Ratio Perm | | | 0.17 | | | |
| v/c Ratio | 0.72 | | 0.36 | 0.90 | 0.38 | |
| Uniform Delay, d1 | 25.9 | | 8.9 | 19.7 | 13.8 | |
| Progression Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.7 | | 0.7 | 8.2 | 0.4 | |
| Delay (s) | 28.7 | | 9.6 | 27.9 | 14.2 | |
| Level of Service | C | | A | C | B | |
| Approach Delay (s) | 28.7 | | | 26.7 | 14.2 | |
| Approach LOS | C | | | C | B | |

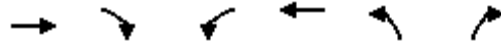
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 23.1 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 55.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

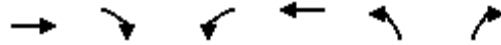
Near-Term + I PM
Kaiser Center Transportation Study






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 424 | 10 | 25 | 218 | 11 | 196 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 451 | 11 | 27 | 237 | 12 | 213 |
| Pedestrians | 18 | | | 18 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 462 | | 766 | 474 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 462 | | 766 | 474 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 98 | | 97 | 63 |
| cM capacity (veh/h) | | | 1099 | | 356 | 581 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 462 | 264 | 225 | | | |
| Volume Left | 0 | 27 | 12 | | | |
| Volume Right | 11 | 0 | 213 | | | |
| cSH | 1700 | 1099 | 562 | | | |
| Volume to Capacity | 0.27 | 0.02 | 0.40 | | | |
| Queue Length 95th (ft) | 0 | 2 | 48 | | | |
| Control Delay (s) | 0.0 | 1.1 | 15.6 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 1.1 | 15.6 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.0 | | | |
| Intersection Capacity Utilization | | 53.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

Near-Term + I PM
Kaiser Center Transportation Study

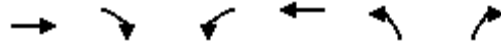






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 291 | 25 | 38 | 193 | 30 | 142 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 316 | 27 | 41 | 210 | 33 | 154 |
| Pedestrians | 27 | | | 27 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 343 | | 649 | 357 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 343 | | 649 | 357 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 97 | | 92 | 77 |
| cM capacity (veh/h) | | | 1216 | | 410 | 672 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 343 | 251 | 187 | | | |
| Volume Left | 0 | 41 | 33 | | | |
| Volume Right | 27 | 0 | 154 | | | |
| cSH | 1700 | 1216 | 604 | | | |
| Volume to Capacity | 0.20 | 0.03 | 0.31 | | | |
| Queue Length 95th (ft) | 0 | 3 | 33 | | | |
| Control Delay (s) | 0.0 | 1.6 | 13.6 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.6 | 13.6 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.8 | | | |
| Intersection Capacity Utilization | 52.1% | | | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

16: 21st Street & Garage Entrance West

Near-Term + 1 PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|----------------------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 382 | 18 | 25 | 150 | 80 | 146 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 394 | 20 | 27 | 160 | 87 | 159 |
| Pedestrians | 20 | | | 20 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.90 | | 0.90 | 0.90 |
| vC, conflicting volume | | | 413 | | 638 | 424 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 286 | | 536 | 297 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 98 | | 80 | 76 |
| cM capacity (veh/h) | | | 1142 | | 434 | 653 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 413 | 187 | 43 | 43 | 79 | 79 |
| Volume Left | 0 | 27 | 43 | 43 | 0 | 0 |
| Volume Right | 20 | 0 | 0 | 0 | 79 | 79 |
| cSH | 1700 | 1142 | 434 | 434 | 653 | 653 |
| Volume to Capacity | 0.24 | 0.02 | 0.10 | 0.10 | 0.12 | 0.12 |
| Queue Length 95th (ft) | 0 | 2 | 8 | 8 | 10 | 10 |
| Control Delay (s) | 0.0 | 1.4 | 14.2 | 14.2 | 11.3 | 11.3 |
| Lane LOS | | A | B | B | B | B |
| Approach Delay (s) | 0.0 | 1.4 | 12.3 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | 3.9 | | | | | |
| Intersection Capacity Utilization | 44.0% | | ICU Level of Service | | A | |
| Analysis Period (min) | 15 | | | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis

17: 21st Street & Webster Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 220 | 102 | 75 | 204 | 0 | 0 | 0 | 0 | 65 | 521 | 29 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.98 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.99 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1436 | | 1797 | | | | | | 4827 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.77 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1436 | | 1398 | | | | | | 4827 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 239 | 111 | 82 | 222 | 0 | 0 | 0 | 0 | 71 | 537 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 239 | 91 | 0 | 304 | 0 | 0 | 0 | 0 | 0 | 636 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | | 4 | | | | | | 2 | |
| Actuated Green, G (s) | | 22.9 | 22.9 | | 22.9 | | | | | | 49.1 | |
| Effective Green, g (s) | | 22.9 | 22.9 | | 22.9 | | | | | | 49.1 | |
| Actuated g/C Ratio | | 0.29 | 0.29 | | 0.29 | | | | | | 0.61 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 533 | 411 | | 400 | | | | | | 2963 | |
| v/s Ratio Prot | | 0.13 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | 0.22 | | | | | | 0.13 | |
| v/c Ratio | | 0.45 | 0.22 | | 0.76 | | | | | | 0.21 | |
| Uniform Delay, d1 | | 23.4 | 21.8 | | 26.0 | | | | | | 6.9 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 1.23 | |
| Incremental Delay, d2 | | 0.6 | 0.3 | | 8.3 | | | | | | 0.1 | |
| Delay (s) | | 24.0 | 22.0 | | 34.3 | | | | | | 8.6 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 23.4 | | | 34.3 | | | 0.0 | | | 8.6 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 18.6 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.39 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 54.5% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰↱ | ↱ | | | |
| Volume (vph) | 13 | 113 | 1 | 0 | 109 | 99 | 21 | 358 | 191 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 1.00 | 0.81 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1843 | | | 1682 | | | 3507 | 1285 | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1800 | | | 1682 | | | 3507 | 1285 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 14 | 123 | 1 | 0 | 118 | 108 | 23 | 385 | 208 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 163 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 138 | 0 | 0 | 183 | 0 | 0 | 408 | 45 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | | 40 | | | 1 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 27.2 | | | 27.2 | | | 9.8 | 9.8 | | | |
| Effective Green, g (s) | | 27.2 | | | 27.2 | | | 9.8 | 9.8 | | | |
| Actuated g/C Ratio | | 0.60 | | | 0.60 | | | 0.22 | 0.22 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1088 | | | 1017 | | | 764 | 280 | | | |
| v/s Ratio Prot | | | | | 0.11 | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | | | | 0.12 | 0.04 | | | |
| v/c Ratio | | 0.13 | | | 0.18 | | | 0.53 | 0.16 | | | |
| Uniform Delay, d1 | | 3.8 | | | 4.0 | | | 15.6 | 14.3 | | | |
| Progression Factor | | 0.38 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.4 | | | 0.4 | 0.1 | | | |
| Delay (s) | | 1.7 | | | 4.3 | | | 15.9 | 14.4 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 1.7 | | | 4.3 | | | 15.4 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.9 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.27 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 39.1% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 14 | 48 | 22 | 71 | 0 | 64 | 0 | 558 | 45 | 38 | 477 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.94 | | | 0.99 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.97 | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1747 | 1758 | | | 1662 | | | 3477 | | | 3519 | |
| Flt Permitted | 0.73 | 1.00 | | | 0.84 | | | 1.00 | | | 0.87 | |
| Satd. Flow (perm) | 1342 | 1758 | | | 1433 | | | 3477 | | | 3072 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 |
| Adj. Flow (vph) | 15 | 52 | 24 | 77 | 0 | 70 | 0 | 607 | 49 | 41 | 482 | 0 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 40 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 15 | 62 | 0 | 0 | 107 | 0 | 0 | 643 | 0 | 0 | 523 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 24 | | 24 | 40 | | 40 | 48 | | 48 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | 17 | | | 7 |
| Turn Type | Perm | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 567 | 742 | | | 605 | | | 1314 | | | 1161 | |
| v/s Ratio Prot | | 0.04 | | | | | | c0.18 | | | | |
| v/s Ratio Perm | 0.01 | | | | c0.07 | | | | | | 0.17 | |
| v/c Ratio | 0.03 | 0.08 | | | 0.18 | | | 0.49 | | | 0.45 | |
| Uniform Delay, d1 | 7.6 | 7.8 | | | 8.1 | | | 10.7 | | | 10.5 | |
| Progression Factor | 1.00 | 1.00 | | | 1.12 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.2 | | | 0.6 | | | 1.3 | | | 1.3 | |
| Delay (s) | 7.7 | 8.0 | | | 9.8 | | | 12.0 | | | 11.8 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 8.0 | | | 9.8 | | | 12.0 | | | 11.8 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.32 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 58.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|------|-------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | ↕ | ↕↕ | |
| Volume (vph) | 29 | 167 | 30 | 12 | 207 | 204 | 26 | 657 | 29 | 40 | 180 | 64 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.98 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.93 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3419 | | | 3219 | | | 3504 | | 1767 | 3370 | |
| Flt Permitted | | 0.80 | | | 0.94 | | | 0.94 | | 0.28 | 1.00 | |
| Satd. Flow (perm) | | 2754 | | | 3033 | | | 3295 | | 525 | 3370 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 32 | 182 | 33 | 13 | 225 | 222 | 28 | 714 | 32 | 41 | 196 | 70 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 181 | 0 | 0 | 4 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 0 | 222 | 0 | 0 | 279 | 0 | 0 | 770 | 0 | 41 | 243 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 3 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 11.0 | | | 11.0 | | | 32.8 | | 40.0 | 40.0 | |
| Effective Green, g (s) | | 11.0 | | | 11.0 | | | 32.8 | | 40.0 | 40.0 | |
| Actuated g/C Ratio | | 0.18 | | | 0.18 | | | 0.55 | | 0.67 | 0.67 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 505 | | | 556 | | | 1801 | | 406 | 2247 | |
| v/s Ratio Prot | | | | | | | | | | 0.00 | c0.07 | |
| v/s Ratio Perm | | 0.08 | | | c0.09 | | | c0.23 | | 0.06 | | |
| v/c Ratio | | 0.44 | | | 0.50 | | | 0.43 | | 0.10 | 0.11 | |
| Uniform Delay, d1 | | 21.8 | | | 22.0 | | | 8.0 | | 4.0 | 3.6 | |
| Progression Factor | | 1.00 | | | 0.68 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | 0.6 | | | 0.7 | | 0.1 | 0.1 | |
| Delay (s) | | 22.4 | | | 15.5 | | | 8.8 | | 4.1 | 3.7 | |
| Level of Service | | C | | | B | | | A | | A | A | |
| Approach Delay (s) | | 22.4 | | | 15.5 | | | 8.8 | | | 3.7 | |
| Approach LOS | | C | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 11.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.43 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 74.3% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕↕ | |
| Volume (vph) | 23 | 157 | 95 | 61 | 260 | 112 | 109 | 803 | 115 | 44 | 561 | 39 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.97 | | | 0.97 | | | 0.99 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | | 0.96 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Satd. Flow (prot) | | 3222 | | | 3230 | | | 3411 | | | 4989 | |
| Flt Permitted | | 0.90 | | | 0.87 | | | 0.72 | | | 0.81 | |
| Satd. Flow (perm) | | 2921 | | | 2821 | | | 2484 | | | 4036 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 25 | 171 | 103 | 66 | 283 | 122 | 118 | 873 | 121 | 48 | 610 | 42 |
| RTOR Reduction (vph) | 0 | 65 | 0 | 0 | 46 | 0 | 0 | 16 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 234 | 0 | 0 | 425 | 0 | 0 | 1097 | 0 | 0 | 688 | 0 |
| Confl. Peds. (#/hr) | 74 | | 74 | 120 | | 120 | 85 | | 85 | 65 | | 65 |
| Confl. Bikes (#/hr) | | | 30 | | | 13 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1071 | | | 1034 | | | 1309 | | | 1211 | |
| v/s Ratio Prot | | | | | | | | c0.10 | | | | |
| v/s Ratio Perm | | 0.08 | | | c0.15 | | | c0.31 | | | 0.17 | |
| v/c Ratio | | 0.22 | | | 0.41 | | | 0.84 | | | 0.57 | |
| Uniform Delay, d1 | | 13.1 | | | 14.2 | | | 13.5 | | | 17.7 | |
| Progression Factor | | 2.14 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 1.2 | | | 6.5 | | | 1.9 | |
| Delay (s) | | 28.5 | | | 15.4 | | | 20.0 | | | 19.7 | |
| Level of Service | | C | | | B | | | B | | | B | |
| Approach Delay (s) | | 28.5 | | | 15.4 | | | 20.0 | | | 19.7 | |
| Approach LOS | | C | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 20.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 89.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 38 | 338 | 0 | 0 | 421 | 113 | 65 | 401 | 257 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3511 | | | 3370 | 1319 | | 5005 | 1458 | | | |
| Flt Permitted | | 0.88 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3108 | | | 3370 | 1319 | | 5005 | 1458 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 41 | 367 | 0 | 0 | 458 | 120 | 71 | 436 | 276 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 29 | 0 | 0 | 223 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 408 | 0 | 0 | 469 | 79 | 0 | 507 | 53 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | 12 | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | Perm | | | Perm | Perm | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 58.2 | | | 58.2 | 58.2 | | 14.8 | 14.8 | | | |
| Effective Green, g (s) | | 58.2 | | | 58.2 | 58.2 | | 14.8 | 14.8 | | | |
| Actuated g/C Ratio | | 0.73 | | | 0.73 | 0.73 | | 0.18 | 0.18 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2261 | | | 2452 | 960 | | 926 | 270 | | | |
| v/s Ratio Prot | | | | | c0.14 | | | | | | | |
| v/s Ratio Perm | | 0.13 | | | | 0.06 | | 0.10 | 0.04 | | | |
| v/c Ratio | | 0.18 | | | 0.19 | 0.08 | | 0.55 | 0.20 | | | |
| Uniform Delay, d1 | | 3.4 | | | 3.5 | 3.2 | | 29.6 | 27.6 | | | |
| Progression Factor | | 1.00 | | | 0.72 | 0.30 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.2 | 0.2 | | 0.7 | 0.4 | | | |
| Delay (s) | | 3.6 | | | 2.6 | 1.1 | | 30.2 | 27.9 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 3.6 | | | 2.4 | | | 29.4 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.6 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.26 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | 7.0 | | | | |
| Intersection Capacity Utilization | | 57.3% | | | ICU Level of Service | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

23: 20th Street & Webster Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 415 | 178 | 147 | 414 | 0 | 0 | 0 | 0 | 82 | 522 | 119 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1439 | 1610 | 3377 | | | | | | 4521 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.94 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1439 | 1610 | 3195 | | | | | | 4521 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 451 | 193 | 160 | 450 | 0 | 0 | 0 | 0 | 89 | 567 | 129 |
| RTOR Reduction (vph) | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 0 | 451 | 150 | 144 | 466 | 0 | 0 | 0 | 0 | 0 | 749 | 0 |
| Confl. Peds. (#/hr) | 51 | | 51 | 114 | | 114 | 115 | | 115 | 333 | | 333 |
| Confl. Bikes (#/hr) | | | 8 | | | 3 | | | 17 | | | 6 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Effective Green, g (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Actuated g/C Ratio | | 0.35 | 0.35 | 0.12 | 0.52 | | | | | | 0.38 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1239 | 504 | 201 | 1700 | | | | | | 1695 | |
| v/s Ratio Prot | | c0.13 | | c0.09 | 0.03 | | | | | | | |
| v/s Ratio Perm | | | 0.10 | | 0.11 | | | | | | 0.17 | |
| v/c Ratio | | 0.36 | 0.30 | 0.72 | 0.27 | | | | | | 0.44 | |
| Uniform Delay, d1 | | 19.4 | 18.9 | 33.6 | 10.5 | | | | | | 18.7 | |
| Progression Factor | | 1.10 | 1.14 | 1.00 | 1.00 | | | | | | 1.38 | |
| Incremental Delay, d2 | | 0.8 | 1.5 | 9.7 | 0.0 | | | | | | 0.1 | |
| Delay (s) | | 22.1 | 22.9 | 43.3 | 10.6 | | | | | | 25.9 | |
| Level of Service | | C | C | D | B | | | | | | C | |
| Approach Delay (s) | | 22.3 | | | 18.3 | | | 0.0 | | | 25.9 | |
| Approach LOS | | C | | | B | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 22.5 | | | | HCM Level of Service | | C | | | | |
| HCM Volume to Capacity ratio | | 0.45 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | Sum of lost time (s) | | 12.0 | | | | |
| Intersection Capacity Utilization | | 93.3% | | | | ICU Level of Service | | F | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|-------|-------|------|-------|-------|-------|--------|--------|------|--------|--------|------|
| Lane Configurations | ↰ | ↰↰↰ | | | | ↱↱ | ↱↱ | ↰ | ↰ | | ↰ | ↰ |
| Volume (vph) | 7 | 389 | 103 | 97 | 26 | 828 | 188 | 268 | 51 | 0 | 128 | 55 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 0.48 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | | | 1.00 | 0.94 | 0.85 | 0.85 | | 0.85 | 0.85 |
| Flt Protected | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 841 | 4894 | | | | 3517 | 3186 | 1441 | 1583 | | 1583 | 1554 |
| Flt Permitted | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 841 | 4894 | | | | 3517 | 3186 | 1441 | 1583 | | 1583 | 1554 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 7 | 423 | 112 | 105 | 28 | 900 | 204 | 291 | 55 | 0 | 135 | 58 |
| RTOR Reduction (vph) | 0 | 72 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 44 |
| Lane Group Flow (vph) | 7 | 463 | 0 | 0 | 0 | 1033 | 341 | 154 | 23 | 0 | 135 | 14 |
| Confl. Peds. (#/hr) | 22 | | | | | | | | 74 | | | |
| Confl. Bikes (#/hr) | | | | | | 7 | | | 8 | | | 7 |
| Turn Type | Prot | | | Split | Split | | custom | custom | | custom | custom | |
| Protected Phases | 5 | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | | |
| Permitted Phases | | 1 | | | | | | 6 | | | 9 | 2 |
| Actuated Green, G (s) | 0.8 | 13.1 | | | | 16.0 | 17.2 | 29.5 | 29.5 | | 7.7 | 17.2 |
| Effective Green, g (s) | 0.8 | 13.1 | | | | 16.0 | 17.2 | 29.5 | 29.5 | | 7.7 | 17.2 |
| Actuated g/C Ratio | 0.01 | 0.19 | | | | 0.23 | 0.25 | 0.42 | 0.42 | | 0.11 | 0.25 |
| Clearance Time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 10 | 916 | | | | 804 | 783 | 607 | 667 | | 174 | 382 |
| v/s Ratio Prot | 0.01 | c0.09 | | | | c0.29 | c0.11 | 0.11 | 0.01 | | | |
| v/s Ratio Perm | | | | | | | | | | | c0.09 | 0.01 |
| v/c Ratio | 0.70 | 0.51 | | | | 1.28 | 0.44 | 0.25 | 0.03 | | 0.78 | 0.04 |
| Uniform Delay, d1 | 34.5 | 25.5 | | | | 27.0 | 22.3 | 13.1 | 11.9 | | 30.3 | 20.1 |
| Progression Factor | 1.00 | 1.00 | | | | 1.00 | 1.41 | 1.63 | 2.67 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 120.0 | 2.0 | | | | 137.6 | 0.1 | 1.0 | 0.1 | | 17.7 | 0.0 |
| Delay (s) | 154.5 | 27.5 | | | | 164.6 | 31.6 | 22.3 | 31.8 | | 48.0 | 20.1 |
| Level of Service | F | C | | | | F | C | C | C | | D | C |
| Approach Delay (s) | | 29.2 | | | | 164.6 | 29.0 | | | 39.6 | | |
| Approach LOS | | C | | | | F | C | | | D | | |

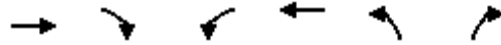
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 90.3 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 62.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

26: Harrison Street & Lakeside Drive

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | ↑↑↑ | | ↵↵ | ↑↑↑ | ↵↵ | ↵ |
| Volume (vph) | 1069 | 71 | 785 | 326 | 153 | 843 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5036 | | 3433 | 5085 | 3174 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5036 | | 3433 | 5085 | 3174 | 1441 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.99 | 0.92 | 0.92 | 0.93 |
| Adj. Flow (vph) | 1125 | 77 | 793 | 354 | 166 | 906 |
| RTOR Reduction (vph) | 11 | 0 | 0 | 0 | 317 | 317 |
| Lane Group Flow (vph) | 1191 | 0 | 793 | 354 | 302 | 136 |
| Confl. Bikes (#/hr) | | | | 16 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Effective Green, g (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Actuated g/C Ratio | 0.26 | | 0.27 | 0.59 | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 1295 | | 932 | 2978 | 952 | 432 |
| v/s Ratio Prot | c0.24 | | c0.23 | 0.07 | c0.10 | |
| v/s Ratio Perm | | | | | | 0.09 |
| v/c Ratio | 0.92 | | 0.85 | 0.12 | 0.32 | 0.31 |
| Uniform Delay, d1 | 25.3 | | 24.2 | 6.5 | 19.0 | 18.9 |
| Progression Factor | 0.99 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.4 | | 9.6 | 0.1 | 0.9 | 1.9 |
| Delay (s) | 26.3 | | 33.8 | 6.5 | 19.8 | 20.8 |
| Level of Service | C | | C | A | B | C |
| Approach Delay (s) | 26.3 | | | 25.4 | 20.3 | |
| Approach LOS | C | | | C | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.1 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 67.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Near-Term + 1 PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 148 | 158 | 0 | 0 | 0 | 0 | 0 | 1270 | 147 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1766 | 3539 | | | | | | 6292 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1766 | 3539 | | | | | | 6292 | |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 161 | 172 | 0 | 0 | 0 | 0 | 0 | 1309 | 160 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 158 | 172 | 0 | 0 | 0 | 0 | 0 | 1450 | 0 |
| Confl. Peds. (#/hr) | 15 | | 15 | 2 | | 2 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 23.6 | 23.6 | | | | | | 42.4 | |
| Effective Green, g (s) | | | | 23.6 | 23.6 | | | | | | 42.4 | |
| Actuated g/C Ratio | | | | 0.31 | 0.31 | | | | | | 0.57 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 556 | 1114 | | | | | | 3557 | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | c0.23 | |
| v/s Ratio Perm | | | | c0.09 | | | | | | | | |
| v/c Ratio | | | | 0.28 | 0.15 | | | | | | 0.41 | |
| Uniform Delay, d1 | | | | 19.3 | 18.5 | | | | | | 9.2 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.73 | |
| Incremental Delay, d2 | | | | 1.3 | 0.3 | | | | | | 0.1 | |
| Delay (s) | | | | 20.6 | 18.8 | | | | | | 6.8 | |
| Level of Service | | | | C | B | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 19.7 | | | 0.0 | | | 6.8 | |
| Approach LOS | | A | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.2 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 45.9% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 200 | 396 | 1220 | 77 | 346 | 41 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.99 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 5028 | | 3404 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 5028 | | 3404 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 217 | 426 | 1312 | 84 | 376 | 45 |
| RTOR Reduction (vph) | 2 | 0 | 9 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 215 | 426 | 1387 | 0 | 421 | 0 |
| Confl. Peds. (#/hr) | | | | 17 | | |
| Confl. Bikes (#/hr) | | | | 6 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 15.9 | 15.9 | 26.0 | | 21.1 | |
| Effective Green, g (s) | 15.9 | 15.9 | 26.0 | | 21.1 | |
| Actuated g/C Ratio | 0.21 | 0.21 | 0.35 | | 0.28 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 375 | 1078 | 1743 | | 958 | |
| v/s Ratio Prot | | 0.08 | c0.28 | | c0.12 | |
| v/s Ratio Perm | c0.12 | | | | | |
| v/c Ratio | 0.57 | 0.40 | 0.80 | | 0.44 | |
| Uniform Delay, d1 | 26.5 | 25.4 | 22.1 | | 22.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 6.2 | 1.1 | 2.6 | | 0.3 | |
| Delay (s) | 32.7 | 26.5 | 24.7 | | 22.4 | |
| Level of Service | C | C | C | | C | |
| Approach Delay (s) | | 28.6 | 24.7 | | 22.4 | |
| Approach LOS | | C | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 25.3 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.62 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 58.5% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th Street & Castro Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|-------|-------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 268 | 878 | 1024 | 528 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.98 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.98 | 0.99 | | | | |
| Frt | | | | | 0.91 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3043 | 1417 | 1403 | 5828 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3043 | 1417 | 1403 | 5828 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 291 | 954 | 1113 | 568 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 62 | 62 | 344 | 271 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 706 | 415 | 212 | 854 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 4 | | 4 | 14 | | 14 | | | |
| Confl. Bikes (#/hr) | | | | | | 1 | | | | | | 4 |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 42.7 | 42.7 | 22.3 | 22.3 | | | | |
| Effective Green, g (s) | | | | | 42.7 | 42.7 | 22.3 | 22.3 | | | | |
| Actuated g/C Ratio | | | | | 0.57 | 0.57 | 0.30 | 0.30 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1732 | 807 | 417 | 1733 | | | | |
| v/s Ratio Prot | | | | | 0.23 | | | | | | | |
| v/s Ratio Perm | | | | | | c0.29 | c0.15 | 0.15 | | | | |
| v/c Ratio | | | | | 0.41 | 0.51 | 0.51 | 0.49 | | | | |
| Uniform Delay, d1 | | | | | 9.1 | 9.8 | 21.8 | 21.7 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.7 | 2.3 | 1.0 | 0.2 | | | | |
| Delay (s) | | | | | 9.8 | 12.2 | 22.8 | 21.9 | | | | |
| Level of Service | | | | | A | B | C | C | | | | |
| Approach Delay (s) | | 0.0 | | | 10.7 | | | 22.2 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 17.3 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.51 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 73.4% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|----------------------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 250 | 72 | 0 | 0 | 0 | 0 | 0 | 0 | 561 | 908 | 55 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3407 | | | | | | | | 1522 | 4729 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3407 | | | | | | | | 1522 | 4729 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 272 | 78 | 0 | 0 | 0 | 0 | 0 | 0 | 610 | 987 | 60 |
| RTOR Reduction (vph) | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 231 | 42 | 0 |
| Lane Group Flow (vph) | 0 | 324 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 172 | 1212 | 0 |
| Confl. Peds. (#/hr) | 5 | | 5 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Effective Green, g (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Actuated g/C Ratio | | 0.47 | | | | | | | | 0.43 | 0.43 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1590 | | | | | | | | 649 | 2018 | |
| v/s Ratio Prot | | c0.10 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.11 | 0.26 | |
| v/c Ratio | | 0.20 | | | | | | | | 0.26 | 0.60 | |
| Uniform Delay, d1 | | 11.8 | | | | | | | | 13.9 | 16.6 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | 1.0 | 1.3 | |
| Delay (s) | | 12.1 | | | | | | | | 14.9 | 17.9 | |
| Level of Service | | B | | | | | | | | B | B | |
| Approach Delay (s) | | 12.1 | | | 0.0 | | | 0.0 | | | 17.2 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 16.3 | | | | | | | | HCM Level of Service | B | |
| HCM Volume to Capacity ratio | | 0.39 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | Sum of lost time (s) | 8.0 | |
| Intersection Capacity Utilization | | 45.1% | | | | | | | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔ | ↔ | | | |
| Volume (vph) | 63 | 918 | 0 | 0 | 425 | 261 | 205 | 634 | 42 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frbp, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.96 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3524 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Flt Permitted | | 0.89 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3130 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.99 | 0.96 | 0.96 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 68 | 998 | 0 | 0 | 443 | 272 | 223 | 689 | 46 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 118 | 0 | 0 | 4 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1066 | 0 | 0 | 443 | 154 | 0 | 912 | 42 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 52 | | 52 | 35 | | 35 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 5 | | | 21 | | | | | | 22 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 939 | | | 1062 | 438 | | 1852 | 811 | | | |
| v/s Ratio Prot | | | | | 0.13 | | | | | | | |
| v/s Ratio Perm | | 0.34 | | | | 0.11 | | 0.26 | 0.03 | | | |
| v/c Ratio | | 1.14 | | | 0.42 | 0.35 | | 0.49 | 0.05 | | | |
| Uniform Delay, d1 | | 21.0 | | | 16.8 | 16.4 | | 8.9 | 6.7 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 74.1 | | | 1.2 | 2.2 | | 0.9 | 0.1 | | | |
| Delay (s) | | 95.1 | | | 18.0 | 18.7 | | 9.8 | 6.8 | | | |
| Level of Service | | F | | | B | B | | A | A | | | |
| Approach Delay (s) | | 95.1 | | | 18.3 | | | 9.7 | | | 0.0 | |
| Approach LOS | | F | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 45.1 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 83.4% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↖ | ↑↑ | |
| Volume (vph) | 0 | 644 | 73 | 26 | 560 | 0 | 0 | 0 | 0 | 344 | 638 | 19 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3464 | | | 3531 | | | | | 1734 | 3520 | |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3464 | | | 3232 | | | | | 1734 | 3520 | |
| Peak-hour factor, PHF | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 700 | 79 | 28 | 609 | 0 | 0 | 0 | 0 | 366 | 665 | 21 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 760 | 0 | 0 | 637 | 0 | 0 | 0 | 0 | 366 | 681 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 25 | | 25 | 17 | | 17 | 24 | | 24 |
| Confl. Bikes (#/hr) | | | 16 | | | 17 | | | 2 | | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1463 | | | 1365 | | | | | 732 | 1486 | |
| v/s Ratio Prot | | c0.22 | | | | | | | | | 0.19 | |
| v/s Ratio Perm | | | | | 0.20 | | | | | c0.21 | | |
| v/c Ratio | | 0.52 | | | 0.47 | | | | | 0.50 | 0.46 | |
| Uniform Delay, d1 | | 9.6 | | | 9.4 | | | | | 9.5 | 9.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.3 | | | 1.1 | | | | | 2.4 | 1.0 | |
| Delay (s) | | 10.9 | | | 10.5 | | | | | 12.0 | 10.3 | |
| Level of Service | | B | | | B | | | | | B | B | |
| Approach Delay (s) | | 10.9 | | | 10.5 | | | 0.0 | | | 10.9 | |
| Approach LOS | | B | | | B | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 60.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 73 | 430 | 8 | 19 | 401 | 44 | 69 | 447 | 25 | 114 | 187 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 1.00 | | | 0.99 | | | 0.99 | | | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Satd. Flow (prot) | | 3484 | | | 3457 | | | 3474 | | | 3365 | |
| Flt Permitted | | 0.84 | | | 0.93 | | | 0.86 | | | 0.65 | |
| Satd. Flow (perm) | | 2949 | | | 3221 | | | 3005 | | | 2216 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 79 | 467 | 9 | 21 | 436 | 48 | 75 | 486 | 27 | 124 | 193 | 54 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 15 | 0 | 0 | 9 | 0 | 0 | 34 | 0 |
| Lane Group Flow (vph) | 0 | 553 | 0 | 0 | 490 | 0 | 0 | 579 | 0 | 0 | 337 | 0 |
| Confl. Peds. (#/hr) | 80 | | 80 | 58 | | 58 | 44 | | 44 | 41 | | 41 |
| Confl. Bikes (#/hr) | | | 14 | | | 10 | | | 7 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 22.8 | | | 22.8 | | | 14.7 | | | 14.7 | |
| Effective Green, g (s) | | 22.8 | | | 22.8 | | | 14.7 | | | 14.7 | |
| Actuated g/C Ratio | | 0.51 | | | 0.51 | | | 0.33 | | | 0.33 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1494 | | | 1632 | | | 982 | | | 724 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | c0.19 | | | 0.15 | | | c0.19 | | | 0.15 | |
| v/c Ratio | | 0.37 | | | 0.30 | | | 0.59 | | | 0.46 | |
| Uniform Delay, d1 | | 6.7 | | | 6.5 | | | 12.6 | | | 12.0 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | 0.5 | | | 0.9 | | | 0.5 | |
| Delay (s) | | 7.4 | | | 6.9 | | | 13.5 | | | 12.5 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 7.4 | | | 6.9 | | | 13.5 | | | 12.5 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.46 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 69.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

35: 12th Street & Madison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 249 | 941 | 0 | 0 | 0 | 0 | 0 | 735 | 46 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6270 | | | | | | 5027 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6270 | | | | | | 5027 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 271 | 970 | 0 | 0 | 0 | 0 | 0 | 799 | 50 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1194 | 0 | 0 | 0 | 0 | 0 | 837 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 47 | | 47 | 36 | | 36 | 29 | | 29 |
| Confl. Bikes (#/hr) | | | 3 | | | 13 | | | 9 | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2717 | | | | | | 2220 | |
| v/s Ratio Prot | | | | | | | | | | | c0.17 | |
| v/s Ratio Perm | | | | | 0.19 | | | | | | | |
| v/c Ratio | | | | | 0.44 | | | | | | 0.38 | |
| Uniform Delay, d1 | | | | | 11.9 | | | | | | 11.2 | |
| Progression Factor | | | | | 0.45 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.5 | | | | | | 0.5 | |
| Delay (s) | | | | | 5.8 | | | | | | 11.7 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 5.8 | | | 0.0 | | | 11.7 | |
| Approach LOS | | A | | | A | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 8.2 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 42.5% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th Street & Oak St.

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1015 | 60 | 178 | 986 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6330 | | | 6239 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6330 | | | 6239 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 65 | 193 | 1027 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 28 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1129 | 0 | 0 | 1192 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | 121 | 69 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | | | | 15 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3154 | | | 2142 | | | | |
| v/s Ratio Prot | | | | | 0.18 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.19 | | | | |
| v/c Ratio | | | | | 0.36 | | | 0.56 | | | | |
| Uniform Delay, d1 | | | | | 9.2 | | | 16.0 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.3 | | | 1.0 | | | | |
| Delay (s) | | | | | 9.5 | | | 17.0 | | | | |
| Level of Service | | | | | A | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 9.5 | | | 17.0 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.5 |
| Intersection Capacity Utilization | 46.5% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 68 | 0 | 0 | 1081 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.25 | 0.92 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 74 | 0 | 0 | 1175 | 0 | 0 |
| Pedestrians | 6 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 300 | 6 | 6 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 300 | 6 | 6 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 664 | 1069 | 1605 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 74 | 294 | 294 | 294 | 294 | |
| Volume Left | 74 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 664 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.17 | 0.17 | 0.17 | 0.17 | |
| Queue Length 95th (ft) | 9 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.1 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 26.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------------------------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 910 | 194 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 911 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.97 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6193 | | | | | | | | | 5067 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6193 | | | | | | | | | 5067 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 948 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 980 | 0 |
| RTOR Reduction (vph) | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 1130 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1025 | 0 |
| Confl. Peds. (#/hr) | 20 | | 20 | 30 | | 30 | 12 | | 12 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 5 | | | 7 | | | 3 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2374 | | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.18 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.20 | |
| v/c Ratio | | 0.48 | | | | | | | | | 0.47 | |
| Uniform Delay, d1 | | 14.0 | | | | | | | | | 12.1 | |
| Progression Factor | | 0.83 | | | | | | | | | 0.58 | |
| Incremental Delay, d2 | | 0.7 | | | | | | | | | 0.7 | |
| Delay (s) | | 12.2 | | | | | | | | | 7.7 | |
| Level of Service | | B | | | | | | | | | A | |
| Approach Delay (s) | | 12.2 | | | 0.0 | | | 0.0 | | | 7.7 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.1 | | | | | | | | | HCM Level of Service B |
| HCM Volume to Capacity ratio | | | 0.47 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 11.0 | Sum of lost time (s) |
| Intersection Capacity Utilization | | | 44.6% | | | | | | | | | ICU Level of Service A |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Near-Term + 1 PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTH | | | | | | 4TTH | | | | |
| Volume (vph) | 27 | 724 | 0 | 0 | 0 | 0 | 0 | 326 | 134 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6387 | | | | | | 6038 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6387 | | | | | | 6038 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 29 | 787 | 0 | 0 | 0 | 0 | 0 | 354 | 138 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 805 | 0 | 0 | 0 | 0 | 0 | 472 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | 17 | 53 | | 53 | 68 | | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | 1 | | | 6 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 13.3 | | | | | | 39.7 | | | | |
| Effective Green, g (s) | | 13.3 | | | | | | 39.7 | | | | |
| Actuated g/C Ratio | | 0.22 | | | | | | 0.66 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1416 | | | | | | 3995 | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.13 | | | | | | | | | | |
| v/c Ratio | | 0.57 | | | | | | 0.12 | | | | |
| Uniform Delay, d1 | | 20.8 | | | | | | 3.7 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 0.1 | | | | |
| Delay (s) | | 21.1 | | | | | | 3.8 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 21.1 | | | 0.0 | | | 3.8 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.6 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.23 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.9% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTL | | | | | | 4TTL | | | | |
| Volume (vph) | 178 | 1092 | 0 | 0 | 0 | 0 | 0 | 942 | 394 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6345 | | | | | | 4831 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6345 | | | | | | 4831 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.98 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 193 | 1114 | 0 | 0 | 0 | 0 | 0 | 1002 | 410 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1287 | 0 | 0 | 0 | 0 | 0 | 1399 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 50 | | 50 | 14 | | 14 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 16 | | | 1 | | | 2 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2538 | | | | | | 1932 | | | | |
| v/s Ratio Prot | | | | | | | | c0.29 | | | | |
| v/s Ratio Perm | | 0.20 | | | | | | | | | | |
| v/c Ratio | | 0.51 | | | | | | 0.72 | | | | |
| Uniform Delay, d1 | | 10.2 | | | | | | 11.4 | | | | |
| Progression Factor | | 0.96 | | | | | | 1.56 | | | | |
| Incremental Delay, d2 | | 0.5 | | | | | | 1.8 | | | | |
| Delay (s) | | 10.3 | | | | | | 19.6 | | | | |
| Level of Service | | B | | | | | | B | | | | |
| Approach Delay (s) | | 10.3 | | | 0.0 | | | 19.6 | | | 0.0 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 15.1 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.62 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 9.0 | | |
| Intersection Capacity Utilization | | 55.1% | | | | | | ICU Level of Service | | B | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 972 | 285 | 0 | 0 | 0 | 0 | 0 | 0 | 451 | 1491 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6153 | | | | | | | | | 5016 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6153 | | | | | | | | | 5016 | |
| Peak-hour factor, PHF | 0.25 | 0.99 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.95 | 0.25 |
| Adj. Flow (vph) | 0 | 982 | 310 | 0 | 0 | 0 | 0 | 0 | 0 | 490 | 1569 | 0 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 0 |
| Lane Group Flow (vph) | 0 | 1287 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2037 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 8 | | 8 | 2 | | 2 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 2 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2461 | | | | | | | | | 2229 | |
| v/s Ratio Prot | | c0.21 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.41 | |
| v/c Ratio | | 0.52 | | | | | | | | | 0.91 | |
| Uniform Delay, d1 | | 10.2 | | | | | | | | | 11.7 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.8 | | | | | | | | | 7.2 | |
| Delay (s) | | 11.0 | | | | | | | | | 18.9 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 11.0 | | | 0.0 | | | 0.0 | | | 18.9 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 15.9 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.73 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | | | | 7.0 | |
| Intersection Capacity Utilization | | 65.8% | | | | | | | | | C | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↰ | | ↕ | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 7 | 369 | 56 | 351 | 352 | 0 | 0 | 216 | 1638 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frbp, ped/bikes | | | | 1.00 | 1.00 | 0.93 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1726 | 1863 | 1471 | | 1817 | | | 1863 | 1559 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.72 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1726 | 1863 | 1471 | | 1350 | | | 1863 | 1559 |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 8 | 401 | 61 | 382 | 383 | 0 | 0 | 235 | 1671 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 41 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 8 | 401 | 15 | 0 | 765 | 0 | 0 | 235 | 1630 |
| Confl. Peds. (#/hr) | 4 | | 4 | 20 | | 20 | 1 | | 1 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 10 | | | 7 | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 14.4 | 14.4 | 14.4 | | 34.6 | | | 34.6 | 34.6 |
| Effective Green, g (s) | | | | 14.4 | 14.4 | 14.4 | | 34.6 | | | 34.6 | 34.6 |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | 0.24 | | 0.58 | | | 0.58 | 0.58 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 414 | 447 | 353 | | 779 | | | 1074 | 899 |
| v/s Ratio Prot | | | | c0.22 | | | | | | | 0.13 | |
| v/s Ratio Perm | | | | 0.00 | | 0.01 | | 0.57 | | | | c1.05 |
| v/c Ratio | | | | 0.02 | 0.90 | 0.04 | | 0.98 | | | 0.22 | 1.81 |
| Uniform Delay, d1 | | | | 17.4 | 22.1 | 17.5 | | 12.4 | | | 6.2 | 12.7 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 20.2 | 0.0 | | 28.2 | | | 0.5 | 370.3 |
| Delay (s) | | | | 17.4 | 42.2 | 17.6 | | 40.6 | | | 6.6 | 383.0 |
| Level of Service | | | | B | D | B | | D | | | A | F |
| Approach Delay (s) | | 0.0 | | | 38.6 | | | 40.6 | | | 336.6 | |
| Approach LOS | | A | | | D | | | D | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 219.9 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.54 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 173.2% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 184 | 627 | 66 | 56 | 730 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.89 | 0.85 |
| Flt Protected | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (prot) | | | 3500 | | 3169 | 1441 |
| Flt Permitted | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (perm) | | | 3500 | | 3169 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 |
| Adj. Flow (vph) | 0 | 200 | 682 | 72 | 61 | 777 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 882 | 0 | 522 | 388 |
| Confl. Peds. (#/hr) | 46 | | | | | |
| Confl. Bikes (#/hr) | 3 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1268 | | 1141 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.25 | | 0.16 | 0.27 |
| v/c Ratio | | | 0.70 | | 0.46 | 0.75 |
| Uniform Delay, d1 | | | 12.2 | | 11.0 | 12.6 |
| Progression Factor | | | 0.75 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.3 | | 1.3 | 9.5 |
| Delay (s) | | | 9.5 | | 12.4 | 22.1 |
| Level of Service | | | A | | B | C |
| Approach Delay (s) | | | 9.5 | | 16.5 | |
| Approach LOS | | | A | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 13.0 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.71 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 66.6% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 291 | 590 | 83 | 0 | 0 | 0 | 0 | 534 | 74 | 1 | 69 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | | | | 0.98 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4920 | | | | | | 1832 | | | 1862 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.84 | |
| Satd. Flow (perm) | | 1000 | | | | | | 1300 | | | 1300 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 |
| Adj. Flow (vph) | 316 | 634 | 90 | 0 | 0 | 0 | 0 | 580 | 80 | 1 | 75 | 0 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1016 | 0 | 0 | 0 | 0 | 0 | 649 | 0 | 0 | 76 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | 4 | | | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 500 | | | | | | 631 | | | 448 | |
| v/s Ratio Prot | | | | | | | | c0.35 | | | | |
| v/s Ratio Perm | | c1.02 | | | | | | | | | 0.06 | |
| v/c Ratio | | 2.03 | | | | | | 1.03 | | | 0.17 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 14.8 | | | 10.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.08 | |
| Incremental Delay, d2 | | 470.9 | | | | | | 43.3 | | | 0.8 | |
| Delay (s) | | 482.2 | | | | | | 58.0 | | | 1.5 | |
| Level of Service | | F | | | | | | E | | | A | |
| Approach Delay (s) | | 482.2 | | | 0.0 | | | 58.0 | | | 1.5 | |
| Approach LOS | | F | | | A | | | E | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 304.0 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.62 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 62.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|-------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 192 | 170 | 1199 | 862 | 149 | 847 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3314 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3314 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 209 | 185 | 1276 | 937 | 162 | 921 |
| RTOR Reduction (vph) | 0 | 152 | 136 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 209 | 33 | 2077 | 0 | 162 | 921 |
| Turn Type | Perm | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Actuated g/C Ratio | 0.18 | 0.18 | 0.44 | | 0.25 | 0.73 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 315 | 281 | 1469 | | 435 | 2595 |
| v/s Ratio Prot | c0.12 | | c0.63 | | 0.09 | c0.26 |
| v/s Ratio Perm | | 0.02 | | | | |
| v/c Ratio | 0.66 | 0.12 | 1.41 | | 0.37 | 0.35 |
| Uniform Delay, d1 | 34.5 | 31.1 | 25.0 | | 28.2 | 4.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.66 | 0.46 |
| Incremental Delay, d2 | 5.2 | 0.2 | 190.2 | | 1.9 | 0.3 |
| Delay (s) | 39.7 | 31.3 | 215.3 | | 20.3 | 2.3 |
| Level of Service | D | C | F | | C | A |
| Approach Delay (s) | 35.7 | | 215.3 | | | 5.0 |
| Approach LOS | D | | F | | | A |

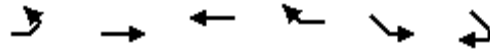
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 134.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.97 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 89.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

46: Lakeshore Drive & El Embarcadero (WB)

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 254 | 299 | 247 | 109 | 491 | 447 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3377 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3377 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 276 | 325 | 268 | 118 | 534 | 486 |
| RTOR Reduction (vph) | 0 | 0 | 81 | 0 | 0 | 304 |
| Lane Group Flow (vph) | 276 | 325 | 305 | 0 | 534 | 182 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 12.5 | 27.1 | 10.6 | | 21.1 | 21.1 |
| Effective Green, g (s) | 12.5 | 27.1 | 10.6 | | 21.1 | 21.1 |
| Actuated g/C Ratio | 0.22 | 0.48 | 0.19 | | 0.38 | 0.38 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 394 | 1707 | 637 | | 665 | 594 |
| v/s Ratio Prot | c0.16 | 0.09 | c0.09 | | c0.30 | |
| v/s Ratio Perm | | | | | | 0.12 |
| v/c Ratio | 0.70 | 0.19 | 0.48 | | 0.80 | 0.31 |
| Uniform Delay, d1 | 20.1 | 8.3 | 20.3 | | 15.7 | 12.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.5 | 0.1 | 0.6 | | 7.0 | 0.3 |
| Delay (s) | 25.7 | 8.4 | 20.9 | | 22.6 | 12.7 |
| Level of Service | C | A | C | | C | B |
| Approach Delay (s) | | 16.3 | 20.9 | | 17.9 | |
| Approach LOS | | B | C | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 18.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 56.2 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 61.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | 3TW | | | TT | T | T | TT | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 703 | 490 | 1062 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4962 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4962 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 329 | 1480 | 154 | 0 | 614 | 764 | 533 | 1154 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 52 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1952 | 0 | 0 | 614 | 712 | 533 | 1154 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1654 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.39 | | | 0.17 | | c0.30 | 0.33 | |
| v/s Ratio Perm | | | | | | | c0.45 | | | | |
| v/c Ratio | | | | 1.18 | | | 0.89 | 2.31 | 0.92 | 0.58 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.3 | 36.2 | 29.1 | 12.5 | |
| Progression Factor | | | | 1.00 | | | 1.48 | 1.55 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 87.6 | | | 1.9 | 591.8 | 19.6 | 0.4 | |
| Delay (s) | | | | 117.6 | | | 54.1 | 648.0 | 48.7 | 12.9 | |
| Level of Service | | | | F | | | D | F | D | B | |
| Approach Delay (s) | 0.0 | | | 117.6 | | | 383.3 | | | 24.2 | |
| Approach LOS | A | | | F | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 159.1 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.34 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 88.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|-------|------|--------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 414 | 1198 | 609 | 169 | 346 | 550 | 102 | 329 | 24 | 243 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.98 | 0.85 | | 0.90 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3138 | 1441 | | 3192 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3138 | 1441 | | 3192 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 450 | 1274 | 662 | 184 | 376 | 598 | 111 | 358 | 26 | 264 |
| RTOR Reduction (vph) | 0 | 0 | 16 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 405 | 1511 | 638 | 0 | 1076 | 0 | 0 | 0 | 384 | 264 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 976 | 448 | | 1312 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.25 | c0.48 | 0.44 | | c0.34 | | | | c0.22 | 0.07 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.81 | 1.55 | 1.42 | | 1.06dr | | | | 1.63 | 0.13 |
| Uniform Delay, d1 | 28.5 | 31.0 | 31.0 | | 23.5 | | | | 39.0 | 8.2 |
| Progression Factor | 0.65 | 0.66 | 0.65 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.3 | 247.1 | 192.2 | | 5.8 | | | | 300.8 | 0.1 |
| Delay (s) | 19.9 | 267.7 | 212.2 | | 29.4 | | | | 339.8 | 8.3 |
| Level of Service | B | F | F | | C | | | | F | A |
| Approach Delay (s) | | 214.5 | | | 29.4 | | | | | 204.7 |
| Approach LOS | | F | | | C | | | | | F |

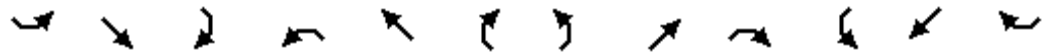
Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 166.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.21 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 96.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Near-Term + I PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1658 | 234 | 329 | 1045 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4861 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4861 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.98 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1727 | 254 | 336 | 1112 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 6 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1727 | 246 | 0 | 1442 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2543 | 792 | | 1782 | | | | |
| v/s Ratio Prot | | | | | c0.34 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.16 | | 0.30 | | | | |
| v/c Ratio | | | | | 0.68 | 0.31 | | 0.81 | | | | |
| Uniform Delay, d1 | | | | | 11.4 | 8.9 | | 17.1 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.19 | | | | |
| Incremental Delay, d2 | | | | | 1.5 | 1.0 | | 2.1 | | | | |
| Delay (s) | | | | | 12.8 | 9.9 | | 22.4 | | | | |
| Level of Service | | | | | B | A | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 12.5 | | | 22.4 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |

Intersection Summary

















| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 16.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.73 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 65.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

50: Santa Clara Avenue & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study


















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | |  |  | | | | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 654 | 1371 | 0 | 0 | 0 | 0 | 0 | 718 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4776 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4776 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 711 | 1413 | 0 | 0 | 0 | 0 | 0 | 780 | 71 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 37 | 28 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 475 | 1584 | 0 | 0 | 0 | 0 | 0 | 840 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2308 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.24 | |
| v/s Ratio Perm | | | | 0.31 | 0.33 | | | | | | | |
| v/c Ratio | | | | 0.65 | 0.69 | | | | | | 0.63 | |
| Uniform Delay, d1 | | | | 11.6 | 12.0 | | | | | | 15.0 | |
| Progression Factor | | | | 1.43 | 1.37 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 3.2 | 1.2 | | | | | | 2.2 | |
| Delay (s) | | | | 19.8 | 17.7 | | | | | | 17.2 | |
| Level of Service | | | | B | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 18.2 | | | 0.0 | | | 17.2 | |
| Approach LOS | | A | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 17.9 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.66 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 65.6% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

51: Oakland Avenue & Monte Vista Avenue

Near-Term + I PM

Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 230 | 524 | 11 | 18 | 245 | 20 | 16 | 24 | 30 | 68 | 50 | 45 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 250 | 557 | 12 | 20 | 266 | 22 | 17 | 26 | 33 | 74 | 54 | 49 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 250 | 569 | 308 | 76 | 177 | | | | | | | |
| Volume Left (vph) | 250 | 0 | 20 | 17 | 74 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 22 | 33 | 49 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.18 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.4 | 5.8 | 5.9 | 6.8 | 6.6 | | | | | | | |
| Degree Utilization, x | 0.44 | 0.92 | 0.50 | 0.14 | 0.32 | | | | | | | |
| Capacity (veh/h) | 554 | 603 | 593 | 488 | 518 | | | | | | | |
| Control Delay (s) | 13.1 | 42.4 | 14.7 | 10.9 | 12.7 | | | | | | | |
| Approach Delay (s) | 33.4 | | 14.7 | 10.9 | 12.7 | | | | | | | |
| Approach LOS | D | | B | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 25.4 | | | | | | | | | |
| HCM Level of Service | | | D | | | | | | | | | |
| Intersection Capacity Utilization | | | 69.2% | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 13.0 Worst Case Level Of Service: E[45.4]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 1270 0 0 0 517 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 1270 0 0 0 517 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 1270 0 0 0 517 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.93 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1380 0 0 0 556 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1380 0 0 0 556 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 460 xxxx xxxx xxxxx

Potent Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 605 xxxx xxxx xxxxx

Move Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 605 xxxx xxxx xxxxx

Volume/Cap: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 0.92 xxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 11.7 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 45.4 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * E * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 45.4 xxxxxx

ApproachLOS: * * * * E *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: I-580 EB On-Ramp & Oakland Avenue

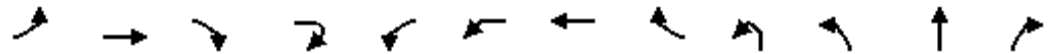
Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 468 | 165 | 1011 | 473 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1730 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1730 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 482 | 179 | 1099 | 514 | 30 |
| RTOR Reduction (vph) | 79 | 55 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 250 | 278 | 1099 | 544 | 0 |
| Confl. Peds. (#/hr) | | | | | 2 |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 12.9 | 12.9 | 39.6 | 16.6 | |
| Effective Green, g (s) | 12.9 | 12.9 | 39.6 | 16.6 | |
| Actuated g/C Ratio | 0.22 | 0.22 | 0.66 | 0.28 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 361 | 372 | 2336 | 438 | |
| v/s Ratio Prot | | | c0.31 | c0.34 | |
| v/s Ratio Perm | 0.15 | 0.16 | | | |
| v/c Ratio | 0.69 | 0.75 | 0.47 | 1.24 | |
| Uniform Delay, d1 | 21.7 | 22.0 | 5.0 | 21.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 4.6 | 7.0 | 0.7 | 127.0 | |
| Delay (s) | 26.3 | 29.0 | 5.7 | 148.7 | |
| Level of Service | C | C | A | F | |
| Approach Delay (s) | | 27.7 | 53.1 | | |
| Approach LOS | | C | D | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 45.8 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | 0.77 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 55.0% | | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis 3: 27th Street & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
|------------------------|------|------|-------|------|------|------|-------|------|------|-------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 40 | 110 | 93 | 20 | 45 | 15 | 150 | 134 | 14 | 253 | 363 | 26 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | | | 1.00 | 1.00 | 0.91 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1479 | | | 1770 | 1863 | 1444 | | 3433 | 5029 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1479 | | | 1770 | 1863 | 1444 | | 3433 | 5029 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 43 | 120 | 101 | 22 | 49 | 16 | 163 | 141 | 15 | 275 | 395 | 28 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 117 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 43 | 120 | 113 | 0 | 0 | 65 | 163 | 24 | 0 | 290 | 416 | 0 |
| Confl. Peds. (#/hr) | 21 | | 21 | | | | | 27 | | 9 | | 8 |
| Confl. Bikes (#/hr) | | | 8 | | | | | 24 | | | | 1 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 5.3 | 13.1 | 13.1 | | | 7.4 | 15.2 | 15.2 | | 12.8 | 44.2 | |
| Effective Green, g (s) | 5.3 | 13.1 | 13.1 | | | 7.4 | 15.2 | 15.2 | | 12.8 | 44.2 | |
| Actuated g/C Ratio | 0.06 | 0.15 | 0.15 | | | 0.08 | 0.17 | 0.17 | | 0.14 | 0.49 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 104 | 515 | 215 | | | 146 | 315 | 244 | | 488 | 2470 | |
| v/s Ratio Prot | 0.02 | 0.03 | | | | 0.04 | c0.09 | | | c0.08 | c0.08 | |
| v/s Ratio Perm | | | c0.08 | | | | | 0.02 | | | | |
| v/c Ratio | 0.41 | 0.23 | 0.52 | | | 0.45 | 0.52 | 0.10 | | 0.59 | 0.17 | |
| Uniform Delay, d1 | 40.9 | 34.0 | 35.6 | | | 39.3 | 34.1 | 31.6 | | 36.2 | 12.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.7 | 0.2 | 2.3 | | | 2.2 | 1.4 | 0.2 | | 1.9 | 0.1 | |
| Delay (s) | 43.5 | 34.2 | 37.9 | | | 41.5 | 35.5 | 31.8 | | 38.1 | 12.9 | |
| Level of Service | D | C | D | | | D | D | C | | D | B | |
| Approach Delay (s) | | 37.2 | | | | | 35.1 | | | | 23.1 | |
| Approach LOS | | D | | | | | D | | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 33.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.77 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 74.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 3: 27th Street & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|------|------|------|
| Lane Configurations | ↰ | ↑↑ | | |
| Volume (vph) | 96 | 1176 | 95 | 94 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.98 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3466 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3466 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 104 | 1278 | 103 | 102 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 |
| Lane Group Flow (vph) | 104 | 1479 | 0 | 0 |
| Confl. Peds. (#/hr) | 18 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 9.3 | 40.7 | | |
| Effective Green, g (s) | 9.3 | 40.7 | | |
| Actuated g/C Ratio | 0.10 | 0.45 | | |
| Clearance Time (s) | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 183 | 1567 | | |
| v/s Ratio Prot | 0.06 | 0.43 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.57 | 0.94 | | |
| Uniform Delay, d1 | 38.4 | 23.6 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 4.0 | 12.8 | | |
| Delay (s) | 42.4 | 36.3 | | |
| Level of Service | D | D | | |
| Approach Delay (s) | | 36.7 | | |
| Approach LOS | | D | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis 4: 27th Street & Broadway

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 56 | 180 | 98 | 33 | 294 | 289 | 54 | 462 | 37 | 94 | 584 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1746 | 3302 | | | 3517 | 1543 | 1760 | 3484 | | 1766 | 3498 | |
| Flt Permitted | 0.54 | 1.00 | | | 0.89 | 1.00 | 0.33 | 1.00 | | 0.43 | 1.00 | |
| Satd. Flow (perm) | 1001 | 3302 | | | 3157 | 1543 | 608 | 3484 | | 793 | 3498 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 61 | 194 | 107 | 36 | 309 | 314 | 59 | 476 | 40 | 102 | 635 | 47 |
| RTOR Reduction (vph) | 0 | 62 | 0 | 0 | 0 | 146 | 0 | 7 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 61 | 239 | 0 | 0 | 345 | 168 | 59 | 509 | 0 | 102 | 675 | 0 |
| Confl. Peds. (#/hr) | 25 | | 25 | 18 | | 13 | 19 | | 13 | 6 | | 6 |
| Confl. Bikes (#/hr) | | 16 | 16 | 59 | | 5 | | 5 | 59 | | | 6 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 424 | 1398 | | | 1337 | 654 | 272 | 1558 | | 355 | 1564 | |
| v/s Ratio Prot | | 0.07 | | | | | | 0.15 | | | c0.19 | |
| v/s Ratio Perm | 0.06 | | | | c0.11 | 0.11 | 0.10 | | | 0.13 | | |
| v/c Ratio | 0.14 | 0.17 | | | 0.26 | 0.26 | 0.22 | 0.33 | | 0.29 | 0.43 | |
| Uniform Delay, d1 | 15.0 | 15.2 | | | 15.9 | 15.8 | 14.4 | 15.2 | | 14.9 | 16.1 | |
| Progression Factor | 1.12 | 1.08 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.3 | | | 0.5 | 0.9 | 1.8 | 0.6 | | 2.0 | 0.9 | |
| Delay (s) | 17.6 | 16.7 | | | 16.3 | 16.8 | 16.2 | 15.8 | | 16.9 | 17.0 | |
| Level of Service | B | B | | | B | B | B | B | | B | B | |
| Approach Delay (s) | | 16.9 | | | 16.6 | | | 15.8 | | | 17.0 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 16.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.35 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 93.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|-----------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 343 | 392 | 145 | 43 | 263 | 107 | 87 | 364 | 22 | 48 | 356 | 133 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1561 | 1765 | 1863 | 1546 | 1761 | 3499 | | 1764 | 3372 | |
| Flt Permitted | 0.46 | 1.00 | 1.00 | 0.51 | 1.00 | 1.00 | 0.28 | 1.00 | | 0.39 | 1.00 | |
| Satd. Flow (perm) | 865 | 1863 | 1561 | 955 | 1863 | 1546 | 511 | 3499 | | 730 | 3372 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 373 | 426 | 158 | 47 | 286 | 116 | 91 | 396 | 24 | 52 | 387 | 145 |
| RTOR Reduction (vph) | 0 | 0 | 64 | 0 | 0 | 60 | 0 | 6 | 0 | 0 | 59 | 0 |
| Lane Group Flow (vph) | 373 | 426 | 94 | 47 | 286 | 56 | 91 | 414 | 0 | 52 | 473 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | Permpm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 58.4 | 50.4 | 50.4 | 44.4 | 40.9 | 40.9 | 17.6 | 17.6 | | 17.6 | 17.6 | |
| Effective Green, g (s) | 58.4 | 50.4 | 50.4 | 44.4 | 40.9 | 40.9 | 17.6 | 17.6 | | 17.6 | 17.6 | |
| Actuated g/C Ratio | 0.69 | 0.59 | 0.59 | 0.52 | 0.48 | 0.48 | 0.21 | 0.21 | | 0.21 | 0.21 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 733 | 1105 | 926 | 532 | 896 | 744 | 106 | 724 | | 151 | 698 | |
| v/s Ratio Prot | c0.08 | 0.23 | | 0.00 | 0.15 | | | 0.12 | | | 0.14 | |
| v/s Ratio Perm | c0.27 | | 0.06 | 0.04 | | 0.04 | c0.18 | | | 0.07 | | |
| v/c Ratio | 0.51 | 0.39 | 0.10 | 0.09 | 0.32 | 0.08 | 0.86 | 0.57 | | 0.34 | 0.68 | |
| Uniform Delay, d1 | 6.1 | 9.1 | 7.5 | 10.0 | 13.5 | 11.9 | 32.5 | 30.3 | | 28.8 | 31.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.65 | 0.67 | 0.33 | 0.92 | 0.90 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 1.0 | 0.2 | 0.0 | 0.9 | 0.2 | 43.2 | 0.7 | | 0.5 | 2.1 | |
| Delay (s) | 6.3 | 10.1 | 7.7 | 6.5 | 9.9 | 4.1 | 73.0 | 27.8 | | 29.3 | 33.2 | |
| Level of Service | A | B | A | A | A | A | E | C | | C | C | |
| Approach Delay (s) | | 8.2 | | | 8.1 | | | 35.9 | | | 32.8 | |
| Approach LOS | | A | | | A | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 19.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.59 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 74.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 6: 27th Street & I-980 On Ramp

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 155 | 872 | 0 | 0 | 149 | 312 | 5 | 269 | 25 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1608 | 3387 | | | 3539 | 2787 | | 5010 | | | | |
| Flt Permitted | 0.65 | 0.95 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 1099 | 3220 | | | 3539 | 2787 | | 5010 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 168 | 948 | 0 | 0 | 162 | 339 | 5 | 292 | 27 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 203 | 0 | 16 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 151 | 965 | 0 | 0 | 162 | 136 | 0 | 308 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 6 | | 6 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 4 | | | 3 |
| Turn Type | Perm | | | Perm | | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 440 | 1288 | | | 1416 | 1115 | | 2004 | | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | 0.14 | 0.30 | | | | 0.05 | | 0.06 | | | | |
| v/c Ratio | 0.34 | 0.75 | | | 0.11 | 0.12 | | 0.15 | | | | |
| Uniform Delay, d1 | 8.3 | 10.3 | | | 7.5 | 7.6 | | 7.7 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 2.1 | 4.0 | | | 0.2 | 0.2 | | 0.2 | | | | |
| Delay (s) | 10.5 | 14.3 | | | 7.7 | 7.8 | | 7.8 | | | | |
| Level of Service | B | B | | | A | A | | A | | | | |
| Approach Delay (s) | | 13.8 | | | 7.8 | | | 7.8 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.2 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.45 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 58.4% | | | ICU Level of Service | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 7: 27th Street & I-980 Off Ramp

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

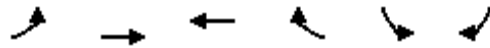


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↗ | | ↖↑ | | | | | ↘ | ↖↑ | ↗ |
| Volume (vph) | 0 | 280 | 27 | 11 | 158 | 0 | 0 | 0 | 0 | 730 | 1092 | 351 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1558 | | 3526 | | | | | 1610 | 3370 | 1583 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1558 | | 3296 | | | | | 1610 | 3370 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 0 | 304 | 29 | 12 | 172 | 0 | 0 | 0 | 0 | 793 | 1174 | 382 |
| RTOR Reduction (vph) | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 185 |
| Lane Group Flow (vph) | 0 | 304 | 10 | 0 | 184 | 0 | 0 | 0 | 0 | 634 | 1333 | 197 |
| Confl. Peds. (#/hr) | 2 | | 2 | 10 | | 10 | 6 | | 6 | | | |
| Confl. Bikes (#/hr) | | | 3 | | | 4 | | | 1 | | | |
| Turn Type | | | Perm | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 545 | | 1154 | | | | | 832 | 1741 | 818 |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.06 | | | | | 0.39 | 0.40 | 0.12 |
| v/c Ratio | | 0.25 | 0.02 | | 0.16 | | | | | 0.76 | 0.77 | 0.24 |
| Uniform Delay, d1 | | 13.9 | 12.8 | | 13.4 | | | | | 11.6 | 11.6 | 8.0 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.5 | 0.1 | | 0.3 | | | | | 6.5 | 3.3 | 0.7 |
| Delay (s) | | 14.3 | 12.8 | | 13.7 | | | | | 18.1 | 14.9 | 8.7 |
| Level of Service | | B | B | | B | | | | | B | B | A |
| Approach Delay (s) | | 14.2 | | | 13.7 | | | 0.0 | | | 14.7 | |
| Approach LOS | | B | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.6 | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | | 0.56 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | | 70.9% | | | ICU Level of Service | | C | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 195 | 602 | 672 | 132 | 857 | 197 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.98 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3435 | | 3432 | 1414 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3435 | | 3432 | 1414 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 212 | 654 | 730 | 143 | 932 | 214 |
| RTOR Reduction (vph) | 0 | 0 | 19 | 0 | 2 | 132 |
| Lane Group Flow (vph) | 212 | 654 | 854 | 0 | 951 | 61 |
| Confl. Peds. (#/hr) | 14 | | | 11 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 10 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 12.8 | 46.8 | 30.0 | | 25.2 | 25.2 |
| Effective Green, g (s) | 12.8 | 46.8 | 30.0 | | 25.2 | 25.2 |
| Actuated g/C Ratio | 0.16 | 0.58 | 0.38 | | 0.32 | 0.32 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 283 | 2070 | 1288 | | 1081 | 445 |
| v/s Ratio Prot | c0.12 | 0.18 | c0.25 | | c0.28 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 0.75 | 0.32 | 0.66 | | 0.88 | 0.14 |
| Uniform Delay, d1 | 32.1 | 8.5 | 20.8 | | 26.0 | 19.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 9.1 | 0.4 | 2.7 | | 8.1 | 0.1 |
| Delay (s) | 41.2 | 8.9 | 23.5 | | 34.1 | 19.7 |
| Level of Service | D | A | C | | C | B |
| Approach Delay (s) | | 16.8 | 23.5 | | 31.6 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 24.7 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.76 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 70.3% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 9: West Grand Avenue & Telegraph Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|------|------|-------|-------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 108 | 903 | 357 | 68 | 431 | 69 | 201 | 262 | 31 | 119 | 368 | 77 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1766 | 3427 | 1553 | 1768 | 3346 | | 1768 | 3472 | | 1757 | 3433 | |
| Flt Permitted | 0.31 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.40 | 1.00 | | 0.56 | 1.00 | |
| Satd. Flow (perm) | 584 | 3427 | 1553 | 297 | 3346 | | 739 | 3472 | | 1042 | 3433 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 117 | 941 | 388 | 74 | 468 | 75 | 218 | 276 | 34 | 129 | 400 | 84 |
| RTOR Reduction (vph) | 0 | 0 | 273 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 117 | 941 | 115 | 74 | 529 | 0 | 218 | 305 | 0 | 129 | 465 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | 4 | | | | 4 | 5 | | 2 | 6 | | | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | 6 | | | |
| Actuated Green, G (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 49.4 | 49.4 | | 35.6 | 35.6 | |
| Effective Green, g (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 49.4 | 49.4 | | 35.6 | 35.6 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | | 0.58 | 0.58 | | 0.42 | 0.42 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 172 | 1012 | 459 | 88 | 988 | | 542 | 2018 | | 436 | 1438 | |
| v/s Ratio Prot | c0.27 | | | | 0.16 | | c0.04 | 0.09 | | | 0.14 | |
| v/s Ratio Perm | 0.20 | | 0.07 | 0.25 | | | c0.19 | | | 0.12 | | |
| v/c Ratio | 0.68 | 0.93 | 0.25 | 0.84 | 0.54 | | 0.40 | 0.15 | | 0.30 | 0.32 | |
| Uniform Delay, d1 | 26.4 | 29.1 | 22.8 | 28.1 | 25.1 | | 8.8 | 8.2 | | 16.4 | 16.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.14 | 1.16 | |
| Incremental Delay, d2 | 19.6 | 15.7 | 1.3 | 59.2 | 2.1 | | 0.2 | 0.2 | | 1.7 | 0.6 | |
| Delay (s) | 46.0 | 44.8 | 24.1 | 87.3 | 27.1 | | 9.0 | 8.3 | | 20.3 | 19.8 | |
| Level of Service | D | D | C | F | C | | A | A | | C | B | |
| Approach Delay (s) | 39.4 | | | | 34.4 | | 8.6 | | | 19.9 | | |
| Approach LOS | D | | | | C | | A | | | B | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 29.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.56 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 77.3% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 92 | 779 | 90 | 94 | 487 | 72 | 113 | 436 | 97 | 96 | 397 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1753 | 3357 | | | 3325 | | 1764 | 3539 | 1529 | 1762 | 3438 | |
| Flt Permitted | 0.26 | 1.00 | | | 0.59 | | 0.43 | 1.00 | 1.00 | 0.45 | 1.00 | |
| Satd. Flow (perm) | 485 | 3357 | | | 1981 | | 793 | 3539 | 1529 | 840 | 3438 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 100 | 847 | 98 | 102 | 529 | 78 | 123 | 474 | 105 | 104 | 432 | 85 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 13 | 0 | 0 | 0 | 38 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 100 | 933 | 0 | 0 | 696 | 0 | 123 | 474 | 67 | 104 | 499 | 0 |
| Confl. Peds. (#/hr) | 34 | | 34 | 37 | | 37 | 8 | | 8 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 11 | | | 8 | | | 35 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | 2 | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 31.3 | 31.3 | | | 31.3 | | 40.7 | 40.7 | 40.7 | 40.7 | 40.7 | |
| Effective Green, g (s) | 31.3 | 31.3 | | | 31.3 | | 40.7 | 40.7 | 40.7 | 40.7 | 40.7 | |
| Actuated g/C Ratio | 0.39 | 0.39 | | | 0.39 | | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 190 | 1313 | | | 775 | | 403 | 1800 | 778 | 427 | 1749 | |
| v/s Ratio Prot | | 0.28 | | | | | | 0.13 | | | 0.15 | |
| v/s Ratio Perm | 0.21 | | | | c0.35 | | c0.16 | | 0.04 | 0.12 | | |
| v/c Ratio | 0.53 | 0.71 | | | 0.90 | | 0.31 | 0.26 | 0.09 | 0.24 | 0.29 | |
| Uniform Delay, d1 | 18.7 | 20.5 | | | 22.9 | | 11.4 | 11.1 | 10.1 | 11.0 | 11.3 | |
| Progression Factor | 1.00 | 1.00 | | | 1.23 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.2 | 1.5 | | | 12.8 | | 1.9 | 0.4 | 0.2 | 1.4 | 0.4 | |
| Delay (s) | 19.9 | 22.1 | | | 40.9 | | 13.4 | 11.5 | 10.3 | 12.4 | 11.7 | |
| Level of Service | B | C | | | D | | B | B | B | B | B | |
| Approach Delay (s) | | 21.9 | | | 40.9 | | | 11.7 | | | 11.8 | |
| Approach LOS | | C | | | D | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 21.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.56 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 86.8% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 11: Grand Avenue & Webster Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 0 | 414 | 453 | 119 | 441 | 0 | 0 | 0 | 0 | 12 | 159 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frbp, ped/bikes | | 0.97 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Frt | | 0.92 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 3062 | | 1770 | 3427 | | | | | | 3409 | |
| Flt Permitted | | 1.00 | | 0.14 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 3062 | | 264 | 3427 | | | | | | 3409 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 445 | 492 | 129 | 479 | 0 | 0 | 0 | 0 | 13 | 173 | 22 |
| RTOR Reduction (vph) | 0 | 197 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 740 | 0 | 129 | 479 | 0 | 0 | 0 | 0 | 0 | 197 | 0 |
| Confl. Peds. (#/hr) | 26 | | 26 | 28 | | 28 | 21 | | 21 | 101 | | 101 |
| Confl. Bikes (#/hr) | | | 4 | | | 4 | | | 3 | | | 6 |
| Turn Type | Perm | | pm+pt | | pm+pt | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 31.6 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Effective Green, g (s) | 31.6 | | 43.0 | | 43.0 | | | | 29.0 | | | |
| Actuated g/C Ratio | 0.40 | | 0.54 | | 0.54 | | | | 0.36 | | | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | 3.0 | | | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | 2.0 | | | |
| Lane Grp Cap (vph) | 1209 | | 262 | | 1842 | | | | 1236 | | | |
| v/s Ratio Prot | c0.24 | | c0.04 | | 0.14 | | | | | | | |
| v/s Ratio Perm | | | 0.23 | | | | | | 0.06 | | | |
| v/c Ratio | 0.61 | | 0.49 | | 0.26 | | | | 0.16 | | | |
| Uniform Delay, d1 | 19.3 | | 12.2 | | 9.9 | | | | 17.3 | | | |
| Progression Factor | 2.36 | | 1.00 | | 1.00 | | | | 1.00 | | | |
| Incremental Delay, d2 | 2.0 | | 0.5 | | 0.3 | | | | 0.3 | | | |
| Delay (s) | 47.6 | | 12.7 | | 10.3 | | | | 17.5 | | | |
| Level of Service | D | | B | | B | | | | B | | | |
| Approach Delay (s) | 47.6 | | | | 10.8 | | 0.0 | | | | 17.5 | |
| Approach LOS | D | | | | B | | A | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 31.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 71.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 12: Grand Avenue & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|--------|------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↔↔↔ | ↗ | | ↔↔↔ | |
| Volume (vph) | 64 | 150 | 78 | 634 | 547 | 119 | 121 | 812 | 343 | 33 | 890 | 105 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 1.00 | 0.94 | | 1.00 | 0.90 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 5045 | 1419 | | 4972 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.65 | 1.00 | | 0.85 | |
| Satd. Flow (perm) | 3433 | 3539 | 1479 | 3433 | 3539 | 1485 | | 3285 | 1419 | | 4239 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 70 | 163 | 85 | 689 | 595 | 129 | 132 | 883 | 373 | 36 | 957 | 114 |
| RTOR Reduction (vph) | 0 | 0 | 11 | 0 | 0 | 72 | 0 | 0 | 239 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 70 | 163 | 74 | 689 | 595 | 57 | 0 | 1015 | 134 | 0 | 1093 | 0 |
| Confl. Peds. (#/hr) | 38 | | 38 | 34 | | 34 | 60 | | 60 | 28 | | 28 |
| Confl. Bikes (#/hr) | | | 12 | | | 18 | | | 39 | | | 9 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 5.5 | 33.0 | 33.0 | 16.0 | 44.5 | 44.5 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 5.5 | 33.0 | 33.0 | 16.0 | 44.5 | 44.5 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.06 | 0.33 | 0.33 | 0.16 | 0.44 | 0.44 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 189 | 1168 | 488 | 549 | 1575 | 661 | | 1183 | 511 | | 1526 | |
| v/s Ratio Prot | 0.02 | 0.05 | | c0.20 | c0.17 | | | | | | | |
| v/s Ratio Perm | | | 0.05 | | | 0.04 | | c0.31 | 0.09 | | 0.26 | |
| v/c Ratio | 0.37 | 0.14 | 0.15 | 1.26 | 0.38 | 0.09 | | 1.28dl | 0.26 | | 0.72 | |
| Uniform Delay, d1 | 45.6 | 23.5 | 23.6 | 42.0 | 18.5 | 16.0 | | 29.6 | 22.6 | | 27.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.2 | 0.7 | 129.1 | 0.7 | 0.3 | | 8.2 | 1.3 | | 2.9 | |
| Delay (s) | 46.0 | 23.8 | 24.3 | 171.1 | 19.2 | 16.3 | | 37.8 | 23.9 | | 30.5 | |
| Level of Service | D | C | C | F | B | B | | D | C | | C | |
| Approach Delay (s) | | 28.8 | | | 93.0 | | | 34.0 | | | 30.5 | |
| Approach LOS | | C | | | F | | | C | | | C | |

Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 52.4 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 96.4% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 13: 21st Street & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study






| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|-------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 121 | 49 | 113 | 958 | 1139 | 696 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frbp, ped/bikes | 0.98 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.96 | | 1.00 | 1.00 | 0.94 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3274 | | 1769 | 3725 | 6041 | |
| Flt Permitted | 0.97 | | 0.08 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3274 | | 145 | 3725 | 6041 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.93 | 0.92 |
| Adj. Flow (vph) | 132 | 53 | 123 | 998 | 1225 | 757 |
| RTOR Reduction (vph) | 47 | 0 | 0 | 0 | 70 | 0 |
| Lane Group Flow (vph) | 138 | 0 | 123 | 998 | 1912 | 0 |
| Confl. Peds. (#/hr) | 36 | 36 | 109 | | | |
| Confl. Bikes (#/hr) | | 14 | | | | |
| Turn Type | pm+pt | | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 8.6 | | 57.9 | 51.5 | 51.5 | |
| Effective Green, g (s) | 8.6 | | 57.9 | 51.5 | 51.5 | |
| Actuated g/C Ratio | 0.11 | | 0.72 | 0.64 | 0.64 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 352 | | 235 | 2398 | 3889 | |
| v/s Ratio Prot | c0.04 | | c0.04 | 0.27 | 0.32 | |
| v/s Ratio Perm | | | c0.34 | | | |
| v/c Ratio | 0.39 | | 0.52 | 0.42 | 0.49 | |
| Uniform Delay, d1 | 33.3 | | 5.0 | 6.9 | 7.4 | |
| Progression Factor | 1.00 | | 1.07 | 1.50 | 1.00 | |
| Incremental Delay, d2 | 0.7 | | 1.9 | 0.5 | 0.4 | |
| Delay (s) | 34.0 | | 7.2 | 10.9 | 7.9 | |
| Level of Service | C | | A | B | A | |
| Approach Delay (s) | 34.0 | | | 10.5 | 7.9 | |
| Approach LOS | C | | | B | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 10.2 | | HCM Level of Service | B | |
| HCM Volume to Capacity ratio | | 0.50 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | 13.0 | |
| Intersection Capacity Utilization | | 65.0% | | ICU Level of Service | C | |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 14: 21st Street & Access Road

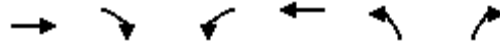
Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 156 | 30 | 113 | 695 | 1 | 19 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 170 | 33 | 123 | 755 | 1 | 21 |
| Pedestrians | 7 | | | 7 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 204 | | 1196 | 195 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 204 | | 1196 | 195 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 91 | | 99 | 98 |
| cM capacity (veh/h) | | | 1365 | | 186 | 840 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 202 | 878 | 22 | | | |
| Volume Left | 0 | 123 | 1 | | | |
| Volume Right | 33 | 0 | 21 | | | |
| cSH | 1700 | 1365 | 714 | | | |
| Volume to Capacity | 0.12 | 0.09 | 0.03 | | | |
| Queue Length 95th (ft) | 0 | 7 | 2 | | | |
| Control Delay (s) | 0.0 | 2.2 | 10.2 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 2.2 | 10.2 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.0 | | | |
| Intersection Capacity Utilization | | | 68.5% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

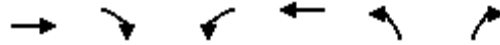
Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ➡ | | | ➡ | ➡ | ➡ |
| Volume (veh/h) | 150 | 256 | 412 | 286 | 2 | 34 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 163 | 278 | 448 | 311 | 2 | 37 |
| Pedestrians | 24 | | | 24 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 2 | | | 2 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 443 | | 1535 | 328 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 443 | | 1535 | 328 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 60 | | 97 | 95 |
| cM capacity (veh/h) | | | 1115 | | 75 | 698 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 441 | 759 | 39 | | | |
| Volume Left | 0 | 448 | 2 | | | |
| Volume Right | 278 | 0 | 37 | | | |
| cSH | 1700 | 1115 | 477 | | | |
| Volume to Capacity | 0.26 | 0.40 | 0.08 | | | |
| Queue Length 95th (ft) | 0 | 49 | 7 | | | |
| Control Delay (s) | 0.0 | 8.2 | 13.2 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 8.2 | 13.2 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.4 | | | |
| Intersection Capacity Utilization | | 80.9% | | ICU Level of Service | | D |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|-------|------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 246 | 149 | 131 | 400 | 34 | 42 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 1.00 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 267 | 149 | 142 | 435 | 37 | 46 |
| Pedestrians | 16 | | | 16 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.85 | | 0.85 | 0.85 |
| vC, conflicting volume | | | 418 | | 1079 | 360 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 220 | | 1002 | 151 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 87 | | 81 | 94 |
| cM capacity (veh/h) | | | 1138 | | 196 | 745 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 416 | 577 | 18 | 18 | 23 | 23 |
| Volume Left | 0 | 142 | 18 | 18 | 0 | 0 |
| Volume Right | 149 | 0 | 0 | 0 | 23 | 23 |
| cSH | 1700 | 1138 | 196 | 196 | 745 | 745 |
| Volume to Capacity | 0.24 | 0.13 | 0.09 | 0.09 | 0.03 | 0.03 |
| Queue Length 95th (ft) | 0 | 11 | 8 | 8 | 2 | 2 |
| Control Delay (s) | 0.0 | 3.2 | 25.3 | 25.3 | 10.0 | 10.0 |
| Lane LOS | | A | D | D | A | A |
| Approach Delay (s) | 0.0 | 3.2 | 16.8 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.0 | | | |
| Intersection Capacity Utilization | | 67.9% | | ICU Level of Service | | C |
| Analysis Period (min) | | 15 | | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 354 | 65 | 50 | 64 | 0 | 0 | 0 | 0 | 285 | 412 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.97 | | | | | | 0.95 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 0.98 | |
| Satd. Flow (prot) | | 1863 | 1342 | | 1766 | | | | | | 4705 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.57 | | | | | | 0.98 | |
| Satd. Flow (perm) | | 1863 | 1342 | | 1035 | | | | | | 4705 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 385 | 71 | 54 | 70 | 0 | 0 | 0 | 0 | 310 | 448 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 385 | 25 | 0 | 124 | 0 | 0 | 0 | 0 | 0 | 788 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 23.8 | 23.8 | | 23.8 | | | | | | 48.2 | |
| Effective Green, g (s) | | 23.8 | 23.8 | | 23.8 | | | | | | 48.2 | |
| Actuated g/C Ratio | | 0.30 | 0.30 | | 0.30 | | | | | | 0.60 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 554 | 399 | | 308 | | | | | | 2835 | |
| v/s Ratio Prot | | c0.21 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.02 | | 0.12 | | | | | | 0.17 | |
| v/c Ratio | | 0.69 | 0.06 | | 0.40 | | | | | | 0.28 | |
| Uniform Delay, d1 | | 24.9 | 20.1 | | 22.4 | | | | | | 7.6 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.82 | |
| Incremental Delay, d2 | | 3.8 | 0.1 | | 0.9 | | | | | | 0.2 | |
| Delay (s) | | 28.7 | 20.2 | | 23.3 | | | | | | 6.4 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 27.3 | | | 23.3 | | | 0.0 | | | 6.4 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.9 | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | | 0.42 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | | 66.0% | | | ICU Level of Service | | C | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔↔ | ↔ | | | |
| Volume (vph) | 7 | 253 | 4 | 0 | 43 | 43 | 10 | 213 | 173 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 1.00 | 0.87 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 0.93 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1852 | | | 1629 | | | 3515 | 1377 | | | |
| Flt Permitted | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1846 | | | 1629 | | | 3515 | 1377 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 8 | 275 | 4 | 0 | 47 | 47 | 11 | 232 | 188 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 16 | 0 | 0 | 0 | 156 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 286 | 0 | 0 | 78 | 0 | 0 | 243 | 32 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 29.4 | | | 29.4 | | | 7.6 | 7.6 | | | |
| Effective Green, g (s) | | 29.4 | | | 29.4 | | | 7.6 | 7.6 | | | |
| Actuated g/C Ratio | | 0.65 | | | 0.65 | | | 0.17 | 0.17 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1206 | | | 1064 | | | 594 | 233 | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | | c0.16 | | | | | | 0.07 | 0.02 | | | |
| v/c Ratio | | 0.24 | | | 0.07 | | | 0.41 | 0.14 | | | |
| Uniform Delay, d1 | | 3.2 | | | 2.8 | | | 16.7 | 15.9 | | | |
| Progression Factor | | 0.46 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.4 | | | 0.1 | | | 0.2 | 0.1 | | | |
| Delay (s) | | 1.9 | | | 3.0 | | | 16.9 | 16.0 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 1.9 | | | 3.0 | | | 16.5 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 9.8 | | | | | | HCM Level of Service | A | | | |
| HCM Volume to Capacity ratio | | 0.27 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 38.9% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|------|------|-------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 11 | 135 | 17 | 26 | 0 | 37 | 0 | 331 | 38 | 102 | 359 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | | 1.00 | | | 0.99 | |
| Frt | 1.00 | 0.98 | | | 0.92 | | | 0.98 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1751 | 1827 | | | 1650 | | | 3457 | | | 3475 | |
| Flt Permitted | 0.71 | 1.00 | | | 0.88 | | | 1.00 | | | 0.78 | |
| Satd. Flow (perm) | 1314 | 1827 | | | 1485 | | | 3457 | | | 2726 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 12 | 147 | 18 | 28 | 0 | 40 | 0 | 360 | 41 | 111 | 390 | 0 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 23 | 0 | 0 | 19 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 12 | 155 | 0 | 0 | 45 | 0 | 0 | 382 | 0 | 0 | 501 | 0 |
| Confl. Peds. (#/hr) | 16 | | 16 | 17 | | 17 | 43 | | 43 | 44 | | 44 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | 16 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Permitted Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 555 | 771 | | | 627 | | | 1306 | | | 1030 | |
| v/s Ratio Prot | c0.08 | | | | | | 0.11 | | | | | |
| v/s Ratio Perm | 0.01 | | | | 0.03 | | | | c0.18 | | | |
| v/c Ratio | 0.02 | 0.20 | | | 0.07 | | | 0.29 | | | 0.49 | |
| Uniform Delay, d1 | 7.6 | 8.2 | | | 7.7 | | | 9.8 | | | 10.7 | |
| Progression Factor | 1.00 | 1.00 | | | 1.23 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.6 | | | 0.2 | | | 0.6 | | | 1.6 | |
| Delay (s) | 7.7 | 8.8 | | | 9.7 | | | 10.4 | | | 12.3 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | 8.7 | | | | 9.7 | | 10.4 | | 12.3 | | | |
| Approach LOS | A | | | | A | | B | | B | | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.34 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 68.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 20: 20th Street & Telegraph Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | ↕ | ↕↕ | |
| Volume (vph) | 19 | 101 | 20 | 12 | 199 | 105 | 34 | 458 | 47 | 163 | 163 | 58 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.95 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3424 | | | 3320 | | | 3472 | | 1769 | 3383 | |
| Flt Permitted | | 0.87 | | | 0.94 | | | 0.92 | | 0.37 | 1.00 | |
| Satd. Flow (perm) | | 3003 | | | 3125 | | | 3218 | | 688 | 3383 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 21 | 110 | 22 | 13 | 212 | 114 | 37 | 467 | 51 | 177 | 177 | 63 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 95 | 0 | 0 | 10 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 0 | 135 | 0 | 0 | 244 | 0 | 0 | 546 | 0 | 177 | 220 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 9.9 | | | 9.9 | | | 30.0 | | 41.1 | 41.1 | |
| Effective Green, g (s) | | 9.9 | | | 9.9 | | | 30.0 | | 41.1 | 41.1 | |
| Actuated g/C Ratio | | 0.16 | | | 0.16 | | | 0.50 | | 0.68 | 0.68 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 495 | | | 516 | | | 1609 | | 590 | 2317 | |
| v/s Ratio Prot | | | | | | | | | | c0.03 | 0.07 | |
| v/s Ratio Perm | | 0.04 | | | c0.08 | | | c0.17 | | 0.17 | | |
| v/c Ratio | | 0.27 | | | 0.47 | | | 0.34 | | 0.30 | 0.10 | |
| Uniform Delay, d1 | | 21.9 | | | 22.7 | | | 9.0 | | 3.7 | 3.2 | |
| Progression Factor | | 1.00 | | | 1.01 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.7 | | | 0.6 | | 0.3 | 0.1 | |
| Delay (s) | | 22.2 | | | 23.7 | | | 9.6 | | 4.0 | 3.3 | |
| Level of Service | | C | | | C | | | A | | A | A | |
| Approach Delay (s) | | 22.2 | | | 23.7 | | | 9.6 | | | 3.6 | |
| Approach LOS | | C | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 12.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.37 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 59.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 21: 20th Street & Broadway

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕↕ | |
| Volume (vph) | 8 | 202 | 61 | 48 | 162 | 114 | 60 | 487 | 86 | 67 | 415 | 26 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.98 | | | 0.96 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.97 | | | 0.95 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | | 3359 | | | 3157 | | | 3393 | | | 4980 | |
| Flt Permitted | | 0.94 | | | 0.87 | | | 0.86 | | | 0.79 | |
| Satd. Flow (perm) | | 3174 | | | 2775 | | | 2948 | | | 3945 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 9 | 220 | 66 | 52 | 176 | 124 | 65 | 524 | 93 | 73 | 451 | 28 |
| RTOR Reduction (vph) | 0 | 42 | 0 | 0 | 79 | 0 | 0 | 21 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 253 | 0 | 0 | 273 | 0 | 0 | 661 | 0 | 0 | 542 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 99 | | 99 | 72 | | 72 | 49 | | 49 |
| Confl. Bikes (#/hr) | | | 7 | | | 33 | | | 10 | | | 6 |
| Turn Type | Perm | | | Perm | | | Prot | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1164 | | | 1018 | | | 1477 | | | 1184 | |
| v/s Ratio Prot | | | | | | | | c0.05 | | | | |
| v/s Ratio Perm | | 0.08 | | | c0.10 | | | c0.16 | | | 0.14 | |
| v/c Ratio | | 0.22 | | | 0.27 | | | 0.45 | | | 0.46 | |
| Uniform Delay, d1 | | 13.1 | | | 13.3 | | | 10.2 | | | 17.0 | |
| Progression Factor | | 0.91 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 0.6 | | | 1.0 | | | 1.3 | |
| Delay (s) | | 12.3 | | | 14.0 | | | 11.2 | | | 18.3 | |
| Level of Service | | B | | | B | | | B | | | B | |
| Approach Delay (s) | | 12.3 | | | 14.0 | | | 11.2 | | | 18.3 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.37 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 77.8% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 29 | 350 | 0 | 0 | 261 | 90 | 35 | 289 | 113 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.99 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3517 | | | 3365 | 1337 | | 5028 | 1460 | | | |
| Flt Permitted | | 0.92 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3248 | | | 3365 | 1337 | | 5028 | 1460 | | | |
| Peak-hour factor, PHF | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 30 | 380 | 0 | 0 | 284 | 98 | 38 | 314 | 123 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 20 | 0 | 0 | 106 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 410 | 0 | 0 | 293 | 68 | 0 | 352 | 17 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 61.8 | | | 61.8 | 61.8 | | 11.2 | 11.2 | | | |
| Effective Green, g (s) | | 61.8 | | | 61.8 | 61.8 | | 11.2 | 11.2 | | | |
| Actuated g/C Ratio | | 0.77 | | | 0.77 | 0.77 | | 0.14 | 0.14 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2509 | | | 2599 | 1033 | | 704 | 204 | | | |
| v/s Ratio Prot | | | | | 0.09 | | | | | | | |
| v/s Ratio Perm | | c0.13 | | | | 0.05 | | 0.07 | 0.01 | | | |
| v/c Ratio | | 0.16 | | | 0.11 | 0.07 | | 0.50 | 0.08 | | | |
| Uniform Delay, d1 | | 2.4 | | | 2.3 | 2.2 | | 31.8 | 29.9 | | | |
| Progression Factor | | 1.00 | | | 1.87 | 4.06 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.6 | 0.2 | | | |
| Delay (s) | | 2.5 | | | 4.3 | 9.0 | | 32.4 | 30.1 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 2.5 | | | 5.4 | | | 31.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.22 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 56.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 23: 20th Street & Webster Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 301 | 167 | 194 | 259 | 0 | 0 | 0 | 0 | 67 | 361 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.90 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 0.99 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 0.99 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1422 | 1610 | 3334 | | | | | | 4475 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.89 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1422 | 1610 | 2995 | | | | | | 4475 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 327 | 176 | 211 | 282 | 0 | 0 | 0 | 0 | 73 | 392 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | 0 |
| Lane Group Flow (vph) | 0 | 327 | 82 | 160 | 333 | 0 | 0 | 0 | 0 | 0 | 522 | 0 |
| Confl. Peds. (#/hr) | 53 | | 53 | 86 | | 86 | 105 | | 105 | 331 | | 331 |
| Confl. Bikes (#/hr) | | | 16 | | | 2 | | | 1 | | | 14 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Effective Green, g (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | 0.20 | 0.51 | | | | | | 0.39 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 929 | 373 | 322 | 1603 | | | | | | 1734 | |
| v/s Ratio Prot | | c0.09 | | c0.10 | 0.04 | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | 0.06 | | | | | | 0.12 | |
| v/c Ratio | | 0.35 | 0.22 | 0.50 | 0.21 | | | | | | 0.30 | |
| Uniform Delay, d1 | | 24.0 | 23.1 | 28.4 | 10.6 | | | | | | 17.0 | |
| Progression Factor | | 1.05 | 1.34 | 1.50 | 0.46 | | | | | | 1.13 | |
| Incremental Delay, d2 | | 1.0 | 1.4 | 0.4 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 26.1 | 32.3 | 43.0 | 4.9 | | | | | | 19.1 | |
| Level of Service | | C | C | D | A | | | | | | B | |
| Approach Delay (s) | | 28.3 | | | 17.3 | | | 0.0 | | | 19.1 | |
| Approach LOS | | C | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.5 | | | HCM Level of Service | | | | | C | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 12.0 | | |
| Intersection Capacity Utilization | | | 87.5% | | | ICU Level of Service | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 24: 20th Street & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|-------|------|------|-------|-------|-------|--------|--------|------|--------|--------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 103 | 128 | 171 | 61 | 76 | 318 | 415 | 371 | 59 | 0 | 26 | 33 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | 1.00 | 1.00 |
| Frbp, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.94 |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.91 | | | | 1.00 | 0.97 | 0.85 | 0.85 | | 0.85 | 0.85 |
| Flt Protected | 0.95 | 0.98 | | | | 0.98 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 1770 | 4701 | | | | 3486 | 3276 | 1441 | 1583 | | 1583 | 1490 |
| Flt Permitted | 0.95 | 0.98 | | | | 0.98 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 1770 | 4701 | | | | 3486 | 3276 | 1441 | 1583 | | 1583 | 1490 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.94 | 0.94 | 0.96 | 0.92 | 0.96 | 0.96 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 108 | 139 | 186 | 65 | 81 | 331 | 451 | 386 | 61 | 0 | 27 | 35 |
| RTOR Reduction (vph) | 0 | 139 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 28 |
| Lane Group Flow (vph) | 108 | 186 | 0 | 0 | 0 | 477 | 582 | 255 | 23 | 0 | 27 | 7 |
| Confl. Peds. (#/hr) | 16 | | | | | | | | 102 | | | 32 |
| Confl. Bikes (#/hr) | | | | | | 6 | | | 10 | | | 2 |
| Turn Type | Prot | | | Split | Split | | custom | custom | | custom | custom | |
| Protected Phases | 5 | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | | |
| Permitted Phases | | 1 | | | | | | 6 | | | 9 | 2 |
| Actuated Green, G (s) | 7.3 | 20.3 | | | | 24.0 | 16.8 | 29.8 | 29.8 | | 2.9 | 16.8 |
| Effective Green, g (s) | 7.3 | 20.3 | | | | 24.0 | 16.8 | 29.8 | 29.8 | | 2.9 | 16.8 |
| Actuated g/C Ratio | 0.09 | 0.25 | | | | 0.30 | 0.21 | 0.37 | 0.37 | | 0.04 | 0.21 |
| Clearance Time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 162 | 1193 | | | | 1046 | 688 | 537 | 590 | | 57 | 313 |
| v/s Ratio Prot | c0.06 | 0.04 | | | | c0.14 | c0.18 | c0.18 | 0.01 | | | |
| v/s Ratio Perm | | | | | | | | | | | c0.02 | 0.00 |
| v/c Ratio | 0.67 | 0.16 | | | | 0.46 | 0.85 | 0.47 | 0.04 | | 0.47 | 0.02 |
| Uniform Delay, d1 | 35.2 | 23.2 | | | | 22.7 | 30.4 | 19.1 | 16.0 | | 37.8 | 25.1 |
| Progression Factor | 0.90 | 2.09 | | | | 1.00 | 1.28 | 1.55 | 3.09 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 9.6 | 0.3 | | | | 0.1 | 8.9 | 2.9 | 0.1 | | 2.3 | 0.0 |
| Delay (s) | 41.1 | 48.7 | | | | 22.8 | 47.8 | 32.6 | 49.5 | | 40.1 | 25.1 |
| Level of Service | D | D | | | | C | D | C | D | | D | C |
| Approach Delay (s) | | 46.8 | | | | 22.8 | 43.6 | | | 31.6 | | |
| Approach LOS | | D | | | | C | D | | | C | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 38.6 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 58.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 26: Harrison Street & Lakeside Drive

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖↗ | ↑↑↑ | ↖↗ | ↖ |
| Volume (vph) | 398 | 29 | 457 | 636 | 143 | 788 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5033 | | 3433 | 5085 | 3178 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5033 | | 3433 | 5085 | 3178 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.97 |
| Adj. Flow (vph) | 433 | 32 | 476 | 691 | 155 | 812 |
| RTOR Reduction (vph) | 11 | 0 | 0 | 0 | 338 | 338 |
| Lane Group Flow (vph) | 454 | 0 | 476 | 691 | 223 | 68 |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 33.0 | | 20.6 | 58.6 | 13.4 | 13.4 |
| Effective Green, g (s) | 33.0 | | 20.6 | 58.6 | 13.4 | 13.4 |
| Actuated g/C Ratio | 0.41 | | 0.26 | 0.73 | 0.17 | 0.17 |
| Clearance Time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 2076 | | 884 | 3725 | 532 | 241 |
| v/s Ratio Prot | c0.09 | | c0.14 | 0.14 | c0.07 | |
| v/s Ratio Perm | | | | | | 0.05 |
| v/c Ratio | 0.22 | | 0.54 | 0.19 | 0.42 | 0.28 |
| Uniform Delay, d1 | 15.2 | | 25.6 | 3.3 | 29.8 | 29.1 |
| Progression Factor | 0.45 | | 0.74 | 0.88 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.2 | | 2.1 | 0.1 | 0.5 | 0.6 |
| Delay (s) | 7.0 | | 21.1 | 3.0 | 30.4 | 29.7 |
| Level of Service | A | | C | A | C | C |
| Approach Delay (s) | 7.0 | | | 10.4 | 30.1 | |
| Approach LOS | A | | | B | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 17.1 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.36 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | 13.0 |
| Intersection Capacity Utilization | | 48.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 28: 18th Street & Brush Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 82 | 113 | 0 | 0 | 0 | 0 | 0 | 2984 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1770 | 3539 | | | | | | 6403 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1770 | 3539 | | | | | | 6403 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 88 | 123 | 0 | 0 | 0 | 0 | 0 | 3108 | 13 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 88 | 123 | 0 | 0 | 0 | 0 | 0 | 3121 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Effective Green, g (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Actuated g/C Ratio | | | | 0.12 | 0.12 | | | | | | 0.76 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 217 | 434 | | | | | | 4849 | |
| v/s Ratio Prot | | | | | 0.03 | | | | | | c0.49 | |
| v/s Ratio Perm | | | | c0.05 | | | | | | | | |
| v/c Ratio | | | | 0.41 | 0.28 | | | | | | 0.64 | |
| Uniform Delay, d1 | | | | 30.4 | 29.9 | | | | | | 4.3 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.95 | |
| Incremental Delay, d2 | | | | 5.5 | 1.6 | | | | | | 0.3 | |
| Delay (s) | | | | 35.9 | 31.5 | | | | | | 4.4 | |
| Level of Service | | | | D | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 33.4 | | | 0.0 | | | 4.4 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 6.2 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.61 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 56.8% | | | ICU Level of Service | | | B | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|------|-------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 219 | 1178 | 528 | 80 | 486 | 107 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.98 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 4953 | | 3377 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 4953 | | 3377 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.95 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 238 | 1227 | 556 | 87 | 517 | 116 |
| RTOR Reduction (vph) | 50 | 0 | 30 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 188 | 1227 | 613 | 0 | 633 | 0 |
| Confl. Peds. (#/hr) | | | | 22 | | |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 33.7 | 33.7 | 15.2 | | 14.1 | |
| Effective Green, g (s) | 33.7 | 33.7 | 15.2 | | 14.1 | |
| Actuated g/C Ratio | 0.45 | 0.45 | 0.20 | | 0.19 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 795 | 2285 | 1004 | | 635 | |
| v/s Ratio Prot | | c0.24 | c0.12 | | c0.19 | |
| v/s Ratio Perm | 0.11 | | | | | |
| v/c Ratio | 0.24 | 0.54 | 0.61 | | 1.00 | |
| Uniform Delay, d1 | 12.7 | 15.0 | 27.2 | | 30.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.9 | 1.1 | | 34.7 | |
| Delay (s) | 13.4 | 15.9 | 28.3 | | 65.1 | |
| Level of Service | B | B | C | | E | |
| Approach Delay (s) | | 15.5 | 28.3 | | 65.1 | |
| Approach LOS | | B | C | | E | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 30.0 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.66 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 64.1% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th St. & Castro Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 156 | 241 | 314 | 316 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.99 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.99 | 1.00 | | | | |
| Frt | | | | | 0.93 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3151 | 1423 | 1425 | 5925 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3151 | 1423 | 1425 | 5925 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 166 | 262 | 341 | 343 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 48 | 50 | 135 | 136 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 246 | 84 | 35 | 378 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 5 | | 5 | | | |
| Confl. Bikes (#/hr) | | | 6 | | | 2 | | | 5 | | | |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 37.6 | 37.6 | 12.4 | 12.4 | | | | |
| Effective Green, g (s) | | | | | 37.6 | 37.6 | 12.4 | 12.4 | | | | |
| Actuated g/C Ratio | | | | | 0.63 | 0.63 | 0.21 | 0.21 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1975 | 892 | 295 | 1225 | | | | |
| v/s Ratio Prot | | | | | c0.08 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.06 | 0.02 | 0.06 | | | | |
| v/c Ratio | | | | | 0.12 | 0.09 | 0.12 | 0.31 | | | | |
| Uniform Delay, d1 | | | | | 4.5 | 4.4 | 19.4 | 20.2 | | | | |
| Progression Factor | | | | | 4.12 | 7.37 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.1 | 0.2 | 0.2 | 0.1 | | | | |
| Delay (s) | | | | | 18.8 | 32.9 | 19.5 | 20.3 | | | | |
| Level of Service | | | | | B | C | B | C | | | | |
| Approach Delay (s) | | 0.0 | | | 23.2 | | | 20.1 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.3 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.17 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 28.7% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 31: 11th Street & Brush Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 182 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 1085 | 1218 | 34 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3435 | | | | | | | | 1522 | 4722 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3435 | | | | | | | | 1522 | 4722 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 196 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 1179 | 1324 | 37 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 345 | 63 | 0 |
| Lane Group Flow (vph) | 0 | 229 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 280 | 1852 | 0 |
| Confl. Peds. (#/hr) | 6 | | 6 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | 1 | | 1 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Effective Green, g (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Actuated g/C Ratio | | 0.52 | | | | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1775 | | | | | | | | 634 | 1968 | |
| v/s Ratio Prot | | c0.07 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.18 | 0.39 | |
| v/c Ratio | | 0.13 | | | | | | | | 0.44 | 0.94 | |
| Uniform Delay, d1 | | 15.0 | | | | | | | | 25.0 | 33.6 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | 2.2 | 10.5 | |
| Delay (s) | | 15.2 | | | | | | | | 27.3 | 44.1 | |
| Level of Service | | B | | | | | | | | C | D | |
| Approach Delay (s) | | 15.2 | | | 0.0 | | | 0.0 | | | 39.9 | |
| Approach LOS | | B | | | A | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 37.8 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.49 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 57.2% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 32: 14th Street & Lakeside Dr.

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕ | ↗ | | | |
| Volume (vph) | 40 | 307 | 0 | 0 | 644 | 565 | 136 | 622 | 27 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | | 1.00 | 0.97 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3515 | | | 3539 | 1548 | | 3493 | 1531 | | | |
| Flt Permitted | | 0.79 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2782 | | | 3539 | 1548 | | 3493 | 1531 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 43 | 334 | 0 | 0 | 700 | 589 | 148 | 648 | 29 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 137 | 0 | 0 | 14 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 377 | 0 | 0 | 700 | 452 | 0 | 796 | 15 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 35 | | 35 | 6 | | 6 | 26 | | 26 | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 33 | | | 6 | | 10 | | | | 5 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 835 | | | 1062 | 464 | | 1863 | 817 | | | |
| v/s Ratio Prot | | | | | 0.20 | | | | | | | |
| v/s Ratio Perm | | 0.14 | | | | 0.29 | | 0.23 | 0.01 | | | |
| v/c Ratio | | 0.45 | | | 0.66 | 0.97 | | 0.43 | 0.02 | | | |
| Uniform Delay, d1 | | 17.0 | | | 18.3 | 20.8 | | 8.5 | 6.6 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 1.8 | | | 3.2 | 35.7 | | 0.7 | 0.0 | | | |
| Delay (s) | | 18.8 | | | 21.5 | 56.5 | | 9.2 | 6.6 | | | |
| Level of Service | | B | | | C | E | | A | A | | | |
| Approach Delay (s) | | 18.8 | | | 37.5 | | | 9.1 | | | 0.0 | |
| Approach LOS | | B | | | D | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 25.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 84.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 33: 14th Street & Madison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 274 | 46 | 25 | 731 | 0 | 0 | 0 | 0 | 59 | 374 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.99 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3441 | | | 3531 | | | | | 1746 | 3506 | |
| Flt Permitted | | 1.00 | | | 0.94 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3441 | | | 3321 | | | | | 1746 | 3506 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 298 | 50 | 27 | 761 | 0 | 0 | 0 | 0 | 64 | 390 | 22 |
| RTOR Reduction (vph) | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 0 | 319 | 0 | 0 | 788 | 0 | 0 | 0 | 0 | 64 | 403 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 28 | | 28 | 18 | | 18 | 16 | | 16 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 3 | | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1453 | | | 1402 | | | | | 737 | 1480 | |
| v/s Ratio Prot | | 0.09 | | | | | | | | | c0.11 | |
| v/s Ratio Perm | | | | | c0.24 | | | | | 0.04 | | |
| v/c Ratio | | 0.22 | | | 0.56 | | | | | 0.09 | 0.27 | |
| Uniform Delay, d1 | | 8.3 | | | 9.8 | | | | | 7.8 | 8.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 1.6 | | | | | 0.2 | 0.5 | |
| Delay (s) | | 8.6 | | | 11.5 | | | | | 8.0 | 8.9 | |
| Level of Service | | A | | | B | | | | | A | A | |
| Approach Delay (s) | | 8.6 | | | 11.5 | | | 0.0 | | | 8.8 | |
| Approach LOS | | A | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.1 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.42 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | Sum of lost time (s) | | | | 7.0 | | |
| Intersection Capacity Utilization | | | 57.6% | | | ICU Level of Service | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 34: 14th Street & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 45 | 166 | 12 | 8 | 400 | 99 | 66 | 437 | 27 | 29 | 76 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | 0.97 | | | 0.99 | | | 0.97 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3460 | | | 3387 | | | 3470 | | | 3348 | |
| Flt Permitted | | 0.83 | | | 0.95 | | | 0.90 | | | 0.82 | |
| Satd. Flow (perm) | | 2906 | | | 3224 | | | 3137 | | | 2776 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 49 | 180 | 13 | 9 | 435 | 108 | 72 | 475 | 29 | 32 | 83 | 30 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 41 | 0 | 0 | 9 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 0 | 236 | 0 | 0 | 511 | 0 | 0 | 567 | 0 | 0 | 125 | 0 |
| Confl. Peds. (#/hr) | 30 | | 30 | 55 | | 55 | 41 | | 41 | 40 | | 40 |
| Confl. Bikes (#/hr) | | | 7 | | | 19 | | | 6 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 23.0 | | | 23.0 | | | 14.5 | | | 14.5 | |
| Effective Green, g (s) | | 23.0 | | | 23.0 | | | 14.5 | | | 14.5 | |
| Actuated g/C Ratio | | 0.51 | | | 0.51 | | | 0.32 | | | 0.32 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1485 | | | 1648 | | | 1011 | | | 894 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | 0.16 | | | 0.18 | | | 0.04 | |
| v/c Ratio | | 0.16 | | | 0.31 | | | 0.56 | | | 0.14 | |
| Uniform Delay, d1 | | 5.9 | | | 6.4 | | | 12.6 | | | 10.8 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.5 | | | 0.7 | | | 0.1 | |
| Delay (s) | | 6.1 | | | 6.9 | | | 13.3 | | | 10.9 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 6.1 | | | 6.9 | | | 13.3 | | | 10.9 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.6 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 64.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 415 | 1502 | 0 | 0 | 0 | 0 | 0 | 384 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.97 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6291 | | | | | | 4916 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6291 | | | | | | 4916 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 451 | 1548 | 0 | 0 | 0 | 0 | 0 | 392 | 83 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1911 | 0 | 0 | 0 | 0 | 0 | 472 | 0 |
| Confl. Peds. (#/hr) | 48 | | 48 | 30 | | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | 9 | | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2726 | | | | | | 2171 | |
| v/s Ratio Prot | | | | | | | | | | | c0.10 | |
| v/s Ratio Perm | | | | | 0.30 | | | | | | | |
| v/c Ratio | | | | | 0.70 | | | | | | 0.22 | |
| Uniform Delay, d1 | | | | | 13.8 | | | | | | 10.3 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 1.3 | | | | | | 0.2 | |
| Delay (s) | | | | | 7.9 | | | | | | 10.6 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 7.9 | | | 0.0 | | | 10.6 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.4 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.46 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 50.1% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th St. & Oak St.

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1684 | 78 | 326 | 814 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6341 | | | 6167 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6341 | | | 6167 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 85 | 351 | 885 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1812 | 0 | 0 | 1233 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | 1 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3160 | | | 2117 | | | | |
| v/s Ratio Prot | | | | | c0.29 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.20 | | | | |
| v/c Ratio | | | | | 0.57 | | | 0.58 | | | | |
| Uniform Delay, d1 | | | | | 10.6 | | | 16.2 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.8 | | | 1.2 | | | | |
| Delay (s) | | | | | 11.3 | | | 17.3 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 11.3 | | | 17.3 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.58 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.5 |
| Intersection Capacity Utilization | 58.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 37: 11th Street & Oak Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 66 | 0 | 0 | 1092 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 72 | 0 | 0 | 1103 | 0 | 0 |
| Pedestrians | 12 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 1 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 288 | 12 | 12 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 288 | 12 | 12 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 672 | 1055 | 1589 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 72 | 276 | 276 | 276 | 276 | |
| Volume Left | 72 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 672 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.16 | 0.16 | 0.16 | 0.16 | |
| Queue Length 95th (ft) | 9 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.0 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 26.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 398 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 784 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6074 | | | | | | | | | 5074 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6074 | | | | | | | | | 5074 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 433 | 154 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 825 | 0 |
| RTOR Reduction (vph) | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 0 | 539 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 847 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2328 | | | | | | | | | 2199 | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.17 | |
| v/c Ratio | | 0.23 | | | | | | | | | 0.39 | |
| Uniform Delay, d1 | | 12.5 | | | | | | | | | 11.6 | |
| Progression Factor | | 0.76 | | | | | | | | | 1.15 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | | 0.5 | |
| Delay (s) | | 9.8 | | | | | | | | | 13.8 | |
| Level of Service | | A | | | | | | | | | B | |
| Approach Delay (s) | | 9.8 | | | 0.0 | | | 0.0 | | | 13.8 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.1 | | | | HCM Level of Service | | | | B | |
| HCM Volume to Capacity ratio | | | 0.31 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | Sum of lost time (s) | | | 11.0 | | |
| Intersection Capacity Utilization | | | 39.0% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4111 | | | | | | 1111 | | | | |
| Volume (vph) | 120 | 402 | 0 | 0 | 0 | 0 | 0 | 411 | 59 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6274 | | | | | | 6263 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6274 | | | | | | 6263 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 130 | 432 | 0 | 0 | 0 | 0 | 0 | 447 | 64 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 110 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 452 | 0 | 0 | 0 | 0 | 0 | 494 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | 56 | 21 | | 21 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 5 | | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 9.2 | | | | | | 43.8 | | | | |
| Effective Green, g (s) | | 9.2 | | | | | | 43.8 | | | | |
| Actuated g/C Ratio | | 0.15 | | | | | | 0.73 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 962 | | | | | | 4572 | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.07 | | | | | | | | | | |
| v/c Ratio | | 0.47 | | | | | | 0.11 | | | | |
| Uniform Delay, d1 | | 23.2 | | | | | | 2.4 | | | | |
| Progression Factor | | 1.03 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.0 | | | | |
| Delay (s) | | 23.9 | | | | | | 2.4 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 23.9 | | | 0.0 | | | 2.4 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.7 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.17 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 40.1% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 40: 7th St. & Oak St.

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4TTH | | | | | | 4TTH | | | | |
| Volume (vph) | 135 | 575 | 0 | 0 | 0 | 0 | 0 | 1145 | 291 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.97 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6328 | | | | | | 4909 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6328 | | | | | | 4909 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 145 | 625 | 0 | 0 | 0 | 0 | 0 | 1245 | 316 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 72 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 762 | 0 | 0 | 0 | 0 | 0 | 1489 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 59 | | 59 | 12 | | 12 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 2 | | | 1 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2531 | | | | | | 1964 | | | | |
| v/s Ratio Prot | | | | | | | | c0.30 | | | | |
| v/s Ratio Perm | | 0.12 | | | | | | | | | | |
| v/c Ratio | | 0.30 | | | | | | 0.76 | | | | |
| Uniform Delay, d1 | | 9.2 | | | | | | 11.6 | | | | |
| Progression Factor | | 0.79 | | | | | | 0.74 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 2.0 | | | | |
| Delay (s) | | 7.6 | | | | | | 10.7 | | | | |
| Level of Service | | A | | | | | | B | | | | |
| Approach Delay (s) | | 7.6 | | | 0.0 | | | 10.7 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 51.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 41: 7th St. & Madison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑↑ | | | | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 553 | 283 | 0 | 0 | 0 | 0 | 0 | 0 | 153 | 622 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.95 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6050 | | | | | | | | | 5025 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6050 | | | | | | | | | 5025 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 601 | 308 | 0 | 0 | 0 | 0 | 0 | 0 | 166 | 635 | 0 |
| RTOR Reduction (vph) | 0 | 94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 0 | 815 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 719 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 10 | | 10 | 8 | | 8 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 7 | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2420 | | | | | | | | | 2233 | |
| v/s Ratio Prot | | c0.13 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.14 | |
| v/c Ratio | | 0.34 | | | | | | | | | 0.32 | |
| Uniform Delay, d1 | | 9.4 | | | | | | | | | 8.1 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | | | | | | | 0.4 | |
| Delay (s) | | 9.7 | | | | | | | | | 8.5 | |
| Level of Service | | A | | | | | | | | | A | |
| Approach Delay (s) | | 9.7 | | | 0.0 | | | 0.0 | | | 8.5 | |
| Approach LOS | | A | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.2 | | | | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.33 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | | | | 7.0 | | |
| Intersection Capacity Utilization | | | 39.0% | | | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 42: I-880 NB On-ramp & Jackson Street

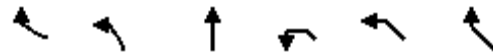
Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↱ | | ↕ | | | ↱ | ↱ |
| Volume (vph) | 0 | 0 | 0 | 24 | 349 | 53 | 226 | 282 | 0 | 0 | 167 | 1779 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1736 | 1863 | 1503 | | 1821 | | | 1863 | 1558 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.77 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1736 | 1863 | 1503 | | 1436 | | | 1863 | 1558 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 26 | 364 | 58 | 246 | 307 | 0 | 0 | 182 | 1873 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 94 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 26 | 364 | 16 | 0 | 553 | 0 | 0 | 182 | 1779 |
| Confl. Peds. (#/hr) | 1 | | 1 | 23 | | 23 | 2 | | 2 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 12.2 | 12.2 | 12.2 | | 21.8 | | | 21.8 | 21.8 |
| Effective Green, g (s) | | | | 12.2 | 12.2 | 12.2 | | 21.8 | | | 21.8 | 21.8 |
| Actuated g/C Ratio | | | | 0.27 | 0.27 | 0.27 | | 0.48 | | | 0.48 | 0.48 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 471 | 505 | 407 | | 696 | | | 903 | 755 |
| v/s Ratio Prot | | | | c0.20 | | | | | | | 0.10 | |
| v/s Ratio Perm | | | | 0.01 | | 0.01 | | 0.39 | | | | c1.14 |
| v/c Ratio | | | | 0.06 | 0.72 | 0.04 | | 0.79 | | | 0.20 | 2.36 |
| Uniform Delay, d1 | | | | 12.1 | 14.9 | 12.1 | | 9.7 | | | 6.6 | 11.6 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 5.0 | 0.0 | | 9.1 | | | 0.5 | 614.5 |
| Delay (s) | | | | 12.2 | 19.9 | 12.1 | | 18.8 | | | 7.1 | 626.1 |
| Level of Service | | | | B | B | B | | B | | | A | F |
| Approach Delay (s) | | 0.0 | | | 18.4 | | | 18.8 | | | 571.3 | |
| Approach LOS | | A | | | B | | | B | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 390.3 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.77 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 170.2% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 43: 6th St. & Oak St.

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|---|--------|------|-------|------|----------------------|-------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 145 | 505 | 141 | 57 | 908 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (prot) | | | 3497 | | 3188 | 1441 |
| Flt Permitted | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (perm) | | | 3497 | | 3188 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 158 | 526 | 153 | 62 | 987 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 684 | 0 | 709 | 493 |
| Confl. Peds. (#/hr) | 51 | 2 | | | | |
| Confl. Bikes (#/hr) | 2 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1267 | | 1148 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.20 | | 0.22 | c0.34 |
| v/c Ratio | | | 0.54 | | 0.87dr | 0.95 |
| Uniform Delay, d1 | | | 11.4 | | 11.9 | 14.0 |
| Progression Factor | | | 0.81 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.5 | | 2.5 | 28.8 |
| Delay (s) | | | 9.7 | | 14.3 | 42.9 |
| Level of Service | | | A | | B | D |
| Approach Delay (s) | | | 9.7 | | 26.0 | |
| Approach LOS | | | A | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 20.1 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.73 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 69.7% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 44: 5th St. & Oak St.

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↕↕↕ | | | | | | ↕ | | | ↕ | |
| Volume (vph) | 356 | 655 | 179 | 0 | 0 | 0 | 0 | 271 | 80 | 4 | 138 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.97 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4858 | | | | | | 1800 | | | 1860 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.99 | |
| Satd. Flow (perm) | | 1850 | | | | | | 1500 | | | 1600 | |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 375 | 712 | 195 | 0 | 0 | 0 | 0 | 295 | 87 | 4 | 150 | 0 |
| RTOR Reduction (vph) | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1226 | 0 | 0 | 0 | 0 | 0 | 358 | 0 | 0 | 154 | 0 |
| Confl. Peds. (#/hr) | 14 | | 14 | 52 | | 52 | 1 | | 1 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 5 | | | 2 | | | | | | |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 925 | | | | | | 620 | | | 551 | |
| v/s Ratio Prot | | | | | | | | c0.20 | | | | |
| v/s Ratio Perm | | c0.66 | | | | | | | | | 0.10 | |
| v/c Ratio | | 1.32 | | | | | | 0.58 | | | 0.28 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 12.1 | | | 10.7 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.93 | |
| Incremental Delay, d2 | | 153.7 | | | | | | 3.9 | | | 1.0 | |
| Delay (s) | | 165.0 | | | | | | 16.0 | | | 11.0 | |
| Level of Service | | F | | | | | | B | | | B | |
| Approach Delay (s) | | 165.0 | | | 0.0 | | | 16.0 | | | 11.0 | |
| Approach LOS | | F | | | A | | | B | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 120.6 | | | | | | HCM Level of Service | | | F | |
| HCM Volume to Capacity ratio | | 1.02 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 52.2% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 45: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



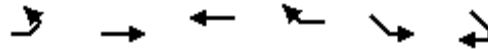
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 361 | 213 | 523 | 288 | 115 | 1322 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.95 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3351 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3351 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 392 | 232 | 568 | 313 | 125 | 1437 |
| RTOR Reduction (vph) | 0 | 171 | 76 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 392 | 61 | 805 | 0 | 125 | 1437 |
| Turn Type | Perm | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 23.5 | 23.5 | 40.6 | | 13.9 | 58.5 |
| Effective Green, g (s) | 23.5 | 23.5 | 40.6 | | 13.9 | 58.5 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.45 | | 0.15 | 0.65 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 462 | 413 | 1512 | | 273 | 2300 |
| v/s Ratio Prot | c0.22 | | 0.24 | | 0.07 | c0.41 |
| v/s Ratio Perm | | 0.04 | | | | |
| v/c Ratio | 0.85 | 0.15 | 0.53 | | 0.46 | 0.62 |
| Uniform Delay, d1 | 31.6 | 25.5 | 17.8 | | 34.6 | 9.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 13.5 | 0.2 | 1.3 | | 5.4 | 1.3 |
| Delay (s) | 45.1 | 25.7 | 19.2 | | 40.1 | 10.6 |
| Level of Service | D | C | B | | D | B |
| Approach Delay (s) | 37.9 | | 19.2 | | | 12.9 |
| Approach LOS | D | | B | | | B |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 19.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.69 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 63.2% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 46: Lakeshore Drive & El Embarcadero (WB)

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 350 | 233 | 416 | 206 | 189 | 199 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.94 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 372 | 243 | 452 | 224 | 205 | 216 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 166 |
| Lane Group Flow (vph) | 372 | 243 | 586 | 0 | 205 | 50 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.2 | 31.5 | 13.3 | | 11.8 | 11.8 |
| Effective Green, g (s) | 14.2 | 31.5 | 13.3 | | 11.8 | 11.8 |
| Actuated g/C Ratio | 0.28 | 0.61 | 0.26 | | 0.23 | 0.23 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 490 | 2173 | 872 | | 407 | 364 |
| v/s Ratio Prot | c0.21 | 0.07 | c0.17 | | c0.12 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.76 | 0.11 | 0.67 | | 0.50 | 0.14 |
| Uniform Delay, d1 | 17.0 | 4.1 | 17.0 | | 17.2 | 15.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 6.7 | 0.0 | 2.0 | | 1.0 | 0.2 |
| Delay (s) | 23.6 | 4.1 | 19.1 | | 18.2 | 15.9 |
| Level of Service | C | A | B | | B | B |
| Approach Delay (s) | | 15.9 | 19.1 | | 17.0 | |
| Approach LOS | | B | B | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 17.4 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.65 | | | |
| Actuated Cycle Length (s) | | | 51.3 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 58.0% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|--------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | 3TW | | | ↑↑ | ↑ | ↑ | ↑↑ | |
| Volume (vph) | 0 | 0 | 671 | 706 | 221 | 0 | 424 | 215 | 282 | 1398 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4932 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4932 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 729 | 767 | 240 | 0 | 456 | 234 | 307 | 1520 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 182 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1716 | 0 | 0 | 456 | 52 | 307 | 1520 | 0 |
| Turn Type | | | Split | | | | | Perm | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 1 | 2 |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1698 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.35 | | | 0.13 | | 0.17 | c0.43 | |
| v/s Ratio Perm | | | | | | | | 0.03 | | | |
| v/c Ratio | | | | 1.16dl | | | 0.78 | 0.20 | 0.47 | 0.75 | |
| Uniform Delay, d1 | | | | 34.8 | | | 42.4 | 38.2 | 25.6 | 17.1 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 24.4 | | | 10.0 | 1.7 | 2.4 | 2.6 | |
| Delay (s) | | | | 59.2 | | | 52.4 | 39.9 | 28.1 | 19.8 | |
| Level of Service | | | | E | | | D | D | C | B | |
| Approach Delay (s) | 0.0 | | | 59.2 | | | 48.2 | | | 21.2 | |
| Approach LOS | A | | | E | | | D | | | C | |

Intersection Summary

| | | | |
|---|-------|----------------------|-----|
| HCM Average Control Delay | 41.1 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 8.5 |
| Intersection Capacity Utilization | 82.9% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



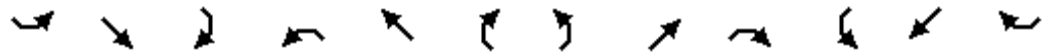
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 261 | 492 | 217 | 198 | 341 | 178 | 23 | 345 | 47 | 460 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3101 | 1441 | | 3340 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3101 | 1441 | | 3340 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 284 | 535 | 236 | 215 | 363 | 193 | 25 | 375 | 51 | 500 |
| RTOR Reduction (vph) | 0 | 0 | 80 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 256 | 705 | 229 | 0 | 578 | 0 | 0 | 0 | 426 | 500 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 30.6 | 30.6 | 30.6 | | 34.1 | | | | 28.8 | 66.4 |
| Effective Green, g (s) | 30.6 | 30.6 | 30.6 | | 34.1 | | | | 28.8 | 66.4 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.32 | | | | 0.27 | 0.63 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 465 | 895 | 416 | | 1074 | | | | 481 | 2217 |
| v/s Ratio Prot | 0.16 | c0.23 | 0.16 | | c0.17 | | | | c0.24 | 0.14 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.55 | 0.79 | 0.55 | | 0.54 | | | | 0.89 | 0.23 |
| Uniform Delay, d1 | 31.9 | 34.7 | 31.9 | | 29.5 | | | | 37.0 | 8.6 |
| Progression Factor | 0.70 | 0.71 | 0.57 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.8 | 2.7 | 0.9 | | 1.9 | | | | 17.5 | 0.2 |
| Delay (s) | 23.3 | 27.4 | 18.9 | | 31.4 | | | | 54.5 | 8.9 |
| Level of Service | C | C | B | | C | | | | D | A |
| Approach Delay (s) | | 24.5 | | | 31.4 | | | | | 29.9 |
| Approach LOS | | C | | | C | | | | | C |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 27.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.73 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 67.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2741 | 126 | 466 | 414 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4790 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4790 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.93 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2855 | 137 | 501 | 436 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 65 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2855 | 72 | 0 | 937 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | 0.48 | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2415 | 752 | | 2036 | | | | |
| v/s Ratio Prot | | | | | c0.56 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.05 | | 0.20 | | | | |
| v/c Ratio | | | | | 1.18 | 0.10 | | 0.46 | | | | |
| Uniform Delay, d1 | | | | | 21.0 | 11.6 | | 16.4 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 86.6 | 0.3 | | 0.8 | | | | |
| Delay (s) | | | | | 107.6 | 11.8 | | 17.2 | | | | |
| Level of Service | | | | | F | B | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 103.2 | | | 17.2 | | | 0.0 | |
| Approach LOS | | A | | | F | | | B | | | A | |

















Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 82.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.84 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 88.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group


















HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | |  |  | | | | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 1358 | 1734 | 0 | 0 | 0 | 0 | 0 | 1252 | 37 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4748 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4748 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1400 | 1885 | 0 | 0 | 0 | 0 | 0 | 1332 | 39 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 796 | 2485 | 0 | 0 | 0 | 0 | 0 | 1368 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2730 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.39 | |
| v/s Ratio Perm | | | | 0.52 | 0.52 | | | | | | | |
| v/c Ratio | | | | 0.91 | 0.91 | | | | | | 1.20 | |
| Uniform Delay, d1 | | | | 15.2 | 15.2 | | | | | | 27.0 | |
| Progression Factor | | | | 1.41 | 1.40 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 1.8 | 0.6 | | | | | | 96.5 | |
| Delay (s) | | | | 23.2 | 21.8 | | | | | | 123.5 | |
| Level of Service | | | | C | C | | | | | | F | |
| Approach Delay (s) | | 0.0 | | | 22.1 | | | 0.0 | | | 123.5 | |
| Approach LOS | | A | | | C | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 52.0 | | | HCM Level of Service | | | | D | | |
| HCM Volume to Capacity ratio | | | 1.01 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 88.3% | | | ICU Level of Service | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 90 | 238 | 7 | 11 | 520 | 16 | 11 | 7 | 10 | 22 | 17 | 16 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 98 | 253 | 8 | 12 | 565 | 17 | 12 | 8 | 11 | 24 | 18 | 17 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 98 | 261 | 595 | 30 | 60 | | | | | | | |
| Volume Left (vph) | 98 | 0 | 12 | 12 | 24 | | | | | | | |
| Volume Right (vph) | 0 | 8 | 17 | 11 | 17 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.8 | 5.3 | 4.7 | 6.1 | 6.1 | | | | | | | |
| Degree Utilization, x | 0.16 | 0.38 | 0.78 | 0.05 | 0.10 | | | | | | | |
| Capacity (veh/h) | 602 | 659 | 751 | 529 | 531 | | | | | | | |
| Control Delay (s) | 8.7 | 10.4 | 22.5 | 9.5 | 9.8 | | | | | | | |
| Approach Delay (s) | 9.9 | | 22.5 | 9.5 | 9.8 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 17.1 | | | | | | | | | |
| HCM Level of Service | | | C | | | | | | | | | |
| Intersection Capacity Utilization | | | 55.9% | ICU Level of Service | | | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 4.4 Worst Case Level Of Service: B[14.6]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 816 0 0 0 349 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 816 0 0 0 349 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 816 0 0 0 349 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.92 1.00 1.00 1.00

PHF Volume: 0 0 0 0 887 0 0 0 379 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 887 0 0 0 379 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 6.2 xxxxx xxxxx xxxxx

FollowUpTim:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 3.3 xxxxx xxxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 296 xxxxx xxxxx xxxxx

Potent Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 748 xxxxx xxxxx xxxxx

Move Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 748 xxxxx xxxxx xxxxx

Volume/Cap: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 0.51 xxxxx xxxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 2.9 xxxxx xxxxx xxxxx

Control Del:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 14.6 xxxxx xxxxx xxxxx

LOS by Move: * * * * * * * * * * B * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 14.6 xxxxxx

ApproachLOS: * * B *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: Oakland Avenue & I-580 Off-ramp

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

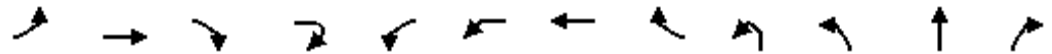


| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|-------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 738 | 349 | 1319 | 794 | 98 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1738 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1738 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 802 | 379 | 1434 | 863 | 107 |
| RTOR Reduction (vph) | 34 | 34 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 551 | 562 | 1434 | 970 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Effective Green, g (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.61 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 448 | 463 | 2153 | 356 | |
| v/s Ratio Prot | | | c0.41 | c0.61 | |
| v/s Ratio Perm | c0.33 | 0.32 | | | |
| v/c Ratio | 1.23 | 1.21 | 0.67 | 2.72 | |
| Uniform Delay, d1 | 22.0 | 22.0 | 7.7 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 122.0 | 115.0 | 1.6 | 784.0 | |
| Delay (s) | 144.0 | 137.0 | 9.4 | 807.3 | |
| Level of Service | F | F | A | F | |
| Approach Delay (s) | | 140.4 | 331.3 | | |
| Approach LOS | | F | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 268.4 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 1.35 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 91.7% | | ICU Level of Service | F |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
|------------------------|-------|------|------|------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 222 | 425 | 103 | 20 | 52 | 16 | 180 | 206 | 10 | 440 | 1240 | 103 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1522 | | 3433 | 3488 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1522 | | 3433 | 3488 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 236 | 452 | 110 | 21 | 57 | 17 | 196 | 224 | 11 | 478 | 1348 | 112 |
| RTOR Reduction (vph) | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 187 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 236 | 452 | 124 | 0 | 0 | 74 | 196 | 37 | 0 | 489 | 1453 | 0 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | 20 | | | | 9 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 14.8 | 27.2 | |
| Effective Green, g (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 14.8 | 27.2 | |
| Actuated g/C Ratio | 0.21 | 0.29 | 0.29 | | | 0.09 | 0.17 | 0.17 | | 0.16 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 372 | 1026 | 459 | | | 151 | 308 | 252 | | 565 | 1054 | |
| v/s Ratio Prot | c0.13 | 0.13 | | | | 0.04 | c0.11 | | | 0.14 | c0.42 | |
| v/s Ratio Perm | | | 0.08 | | | | | 0.02 | | | | |
| v/c Ratio | 0.63 | 0.44 | 0.27 | | | 0.49 | 0.64 | 0.15 | | 0.87 | 1.38 | |
| Uniform Delay, d1 | 32.4 | 26.0 | 24.6 | | | 39.3 | 35.0 | 32.1 | | 36.6 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.5 | 0.3 | 0.3 | | | 2.5 | 4.3 | 0.3 | | 13.1 | 176.4 | |
| Delay (s) | 35.9 | 26.3 | 24.9 | | | 41.8 | 39.3 | 32.4 | | 49.7 | 207.8 | |
| Level of Service | D | C | C | | | D | D | C | | D | F | |
| Approach Delay (s) | | 28.9 | | | | | 36.5 | | | | 168.1 | |
| Approach LOS | | C | | | | | D | | | | F | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 102.1 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.99 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 18.0 |
| Intersection Capacity Utilization | 86.8% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 3: 27th Street & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|-------|------|------|------|
| Lane Configurations | ↰ | ↑↑ | | |
| Volume (vph) | 222 | 515 | 47 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3435 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3435 | | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 239 | 554 | 51 | 84 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 |
| Lane Group Flow (vph) | 239 | 677 | 0 | 0 |
| Confl. Peds. (#/hr) | 26 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 11.0 | 22.4 | | |
| Effective Green, g (s) | 11.0 | 22.4 | | |
| Actuated g/C Ratio | 0.12 | 0.25 | | |
| Clearance Time (s) | 4.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 216 | 855 | | |
| v/s Ratio Prot | c0.14 | 0.20 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 1.11 | 0.79 | | |
| Uniform Delay, d1 | 39.5 | 31.6 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 92.7 | 7.4 | | |
| Delay (s) | 132.2 | 39.0 | | |
| Level of Service | F | D | | |
| Approach Delay (s) | | 63.0 | | |
| Approach LOS | | E | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 91 | 252 | 73 | 48 | 438 | 269 | 175 | 681 | 33 | 202 | 631 | 95 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1747 | 3383 | | | 3519 | 1536 | 1767 | 3511 | | 1768 | 3448 | |
| Flt Permitted | 0.43 | 1.00 | | | 0.88 | 1.00 | 0.27 | 1.00 | | 0.28 | 1.00 | |
| Satd. Flow (perm) | 783 | 3383 | | | 3097 | 1536 | 508 | 3511 | | 520 | 3448 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 99 | 274 | 79 | 52 | 456 | 292 | 190 | 740 | 36 | 220 | 686 | 103 |
| RTOR Reduction (vph) | 0 | 31 | 0 | 0 | 0 | 68 | 0 | 4 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 99 | 322 | 0 | 0 | 508 | 224 | 190 | 772 | 0 | 220 | 775 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 10 | | 10 | 6 | | 6 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 20 | | | 18 | | | 17 | | | 66 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 332 | 1433 | | | 1312 | 651 | 227 | 1570 | | 232 | 1541 | |
| v/s Ratio Prot | | 0.10 | | | | | | 0.22 | | | 0.22 | |
| v/s Ratio Perm | 0.13 | | | | c0.16 | 0.15 | 0.37 | | | c0.42 | | |
| v/c Ratio | 0.30 | 0.22 | | | 0.39 | 0.34 | 0.84 | 0.49 | | 0.95 | 0.50 | |
| Uniform Delay, d1 | 16.2 | 15.6 | | | 16.9 | 16.5 | 20.8 | 16.7 | | 22.6 | 16.8 | |
| Progression Factor | 0.85 | 0.84 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.9 | 0.3 | | | 0.9 | 1.4 | 29.1 | 1.1 | | 47.1 | 1.2 | |
| Delay (s) | 15.6 | 13.4 | | | 17.8 | 18.0 | 49.9 | 17.8 | | 69.6 | 17.9 | |
| Level of Service | B | B | | | B | B | D | B | | E | B | |
| Approach Delay (s) | | 13.9 | | | 17.8 | | | 24.1 | | | 29.2 | |
| Approach LOS | | B | | | B | | | C | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 22.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.67 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 107.0% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-----------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 210 | 409 | 137 | 64 | 660 | 115 | 210 | 506 | 46 | 133 | 464 | 350 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1554 | 1769 | 1863 | 1552 | 1763 | 3484 | | 1763 | 3258 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.35 | 1.00 | 1.00 | 0.20 | 1.00 | | 0.35 | 1.00 | |
| Satd. Flow (perm) | 226 | 1863 | 1554 | 648 | 1863 | 1552 | 368 | 3484 | | 656 | 3258 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 228 | 445 | 149 | 70 | 717 | 125 | 228 | 550 | 50 | 145 | 504 | 380 |
| RTOR Reduction (vph) | 0 | 0 | 91 | 0 | 0 | 80 | 0 | 8 | 0 | 0 | 161 | 0 |
| Lane Group Flow (vph) | 228 | 445 | 58 | 70 | 717 | 45 | 228 | 592 | 0 | 145 | 723 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 17 | | | 28 |
| Turn Type | pm+pt | | | Permpm+pt | | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | | 2 | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.40 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 298 | 725 | 605 | 329 | 622 | 519 | 143 | 1353 | | 255 | 1265 | |
| v/s Ratio Prot | c0.09 | 0.24 | | 0.01 | c0.38 | | | 0.17 | | | 0.22 | |
| v/s Ratio Perm | 0.30 | | 0.04 | 0.07 | | 0.03 | c0.62 | | | 0.22 | | |
| v/c Ratio | 0.77 | 0.61 | 0.10 | 0.21 | 1.15 | 0.09 | 1.59 | 0.44 | | 0.57 | 0.57 | |
| Uniform Delay, d1 | 17.6 | 20.8 | 16.5 | 16.6 | 28.3 | 19.4 | 26.0 | 19.2 | | 20.4 | 20.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.56 | 1.41 | 2.62 | 0.75 | 0.66 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.1 | 3.9 | 0.3 | 0.1 | 85.0 | 0.3 | 295.2 | 0.1 | | 1.7 | 0.4 | |
| Delay (s) | 27.7 | 24.7 | 16.8 | 26.0 | 125.0 | 51.2 | 314.8 | 12.8 | | 22.1 | 20.8 | |
| Level of Service | C | C | B | C | F | D | F | B | | C | C | |
| Approach Delay (s) | | 24.1 | | | 107.3 | | | 95.9 | | | 21.0 | |
| Approach LOS | | C | | | F | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 60.9 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 1.30 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 98.8% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 6: 27th Street & Northgate Avenue (NB)

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 246 | 661 | 0 | 0 | 257 | 1069 | 21 | 876 | 75 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1609 | 3384 | | | 3539 | 2787 | | 5013 | | | | |
| Flt Permitted | 0.58 | 0.94 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 983 | 3181 | | | 3539 | 2787 | | 5013 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 265 | 718 | 0 | 0 | 279 | 1102 | 23 | 952 | 82 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 46 | 0 | 24 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 238 | 745 | 0 | 0 | 279 | 1056 | 0 | 1033 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 4 | | 4 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | 5 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 393 | 1272 | | | 1416 | 1115 | | 2005 | | | | |
| v/s Ratio Prot | | | | | 0.08 | | | | | | | |
| v/s Ratio Perm | 0.24 | 0.23 | | | | 0.38 | | 0.21 | | | | |
| v/c Ratio | 0.61 | 0.59 | | | 0.20 | 0.95 | | 0.52 | | | | |
| Uniform Delay, d1 | 9.5 | 9.4 | | | 7.8 | 11.6 | | 9.1 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 6.8 | 2.0 | | | 0.3 | 17.0 | | 0.9 | | | | |
| Delay (s) | 16.3 | 11.4 | | | 8.1 | 28.5 | | 10.0 | | | | |
| Level of Service | B | B | | | A | C | | B | | | | |
| Approach Delay (s) | | 12.6 | | | 24.4 | | | 10.0 | | | 0.0 | |
| Approach LOS | | B | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 16.6 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.73 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 84.7% | | | ICU Level of Service | | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 7: 27th Street & I-980 Off Ramp

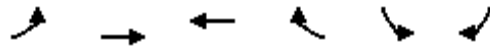
Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 492 | 38 | 12 | 243 | 0 | 0 | 0 | 0 | 412 | 307 | 205 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1552 | | 3531 | | | | | 1605 | 3325 | 1558 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1552 | | 3285 | | | | | 1605 | 3325 | 1558 |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 518 | 41 | 13 | 264 | 0 | 0 | 0 | 0 | 448 | 334 | 223 |
| RTOR Reduction (vph) | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 |
| Lane Group Flow (vph) | 0 | 518 | 14 | 0 | 277 | 0 | 0 | 0 | 0 | 255 | 527 | 115 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 1 | | 1 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 5 | | | 9 | | | 1 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 543 | | 1150 | | | | | 829 | 1718 | 805 |
| v/s Ratio Prot | | c0.15 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.08 | | | | | c0.16 | 0.16 | 0.07 |
| v/c Ratio | | 0.42 | 0.03 | | 0.24 | | | | | 0.31 | 0.31 | 0.14 |
| Uniform Delay, d1 | | 14.8 | 12.8 | | 13.8 | | | | | 8.3 | 8.3 | 7.6 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 1.0 | 0.1 | | 0.5 | | | | | 1.0 | 0.5 | 0.4 |
| Delay (s) | | 15.9 | 12.9 | | 14.3 | | | | | 9.3 | 8.8 | 7.9 |
| Level of Service | | B | B | | B | | | | | A | A | A |
| Approach Delay (s) | | 15.7 | | | 14.3 | | | 0.0 | | | 8.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.7 | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | | 0.35 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | | 50.3% | | | ICU Level of Service | | A | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 8: West Grand Avenue & Northgate Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 274 | 574 | 635 | 493 | 206 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.94 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3263 | | 3421 | 1421 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3263 | | 3421 | 1421 |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 298 | 617 | 690 | 508 | 224 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 125 | 0 | 6 | 90 |
| Lane Group Flow (vph) | 298 | 617 | 1073 | 0 | 230 | 13 |
| Confl. Peds. (#/hr) | 14 | | | 18 | | |
| Confl. Bikes (#/hr) | | | | 7 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 18.9 | 62.2 | 39.3 | | 9.8 | 9.8 |
| Effective Green, g (s) | 18.9 | 62.2 | 39.3 | | 9.8 | 9.8 |
| Actuated g/C Ratio | 0.24 | 0.78 | 0.49 | | 0.12 | 0.12 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 418 | 2752 | 1603 | | 419 | 174 |
| v/s Ratio Prot | c0.17 | 0.17 | c0.33 | | c0.07 | |
| v/s Ratio Perm | | | | | | 0.01 |
| v/c Ratio | 0.71 | 0.22 | 0.67 | | 0.55 | 0.07 |
| Uniform Delay, d1 | 28.1 | 2.4 | 15.4 | | 33.0 | 31.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 4.7 | 0.2 | 2.2 | | 0.8 | 0.1 |
| Delay (s) | 32.8 | 2.6 | 17.7 | | 33.8 | 31.1 |
| Level of Service | C | A | B | | C | C |
| Approach Delay (s) | | 12.4 | 17.7 | | 33.0 | |
| Approach LOS | | B | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 17.8 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.66 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 66.3% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|-------|-------|------|-------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 27 | 702 | 32 | 19 | 893 | 141 | 95 | 566 | 33 | 143 | 431 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1761 | 3340 | | 1769 | 3506 | | 1761 | 3406 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.37 | 1.00 | | 0.40 | 1.00 | |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 306 | 3340 | | 680 | 3506 | | 750 | 3406 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 29 | 763 | 35 | 21 | 971 | 153 | 103 | 615 | 36 | 155 | 454 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 22 | 0 |
| Lane Group Flow (vph) | 29 | 763 | 10 | 21 | 1110 | 0 | 103 | 646 | 0 | 155 | 547 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | 5 | 2 | | | 6 | | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | 6 | | | |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | 50.3 | 50.3 | | 40.2 | 40.2 | | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | 50.3 | 50.3 | | 40.2 | 40.2 | | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.59 | 0.59 | | 0.47 | 0.47 | | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 6.0 | | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 87 | 951 | 474 | 2075 | | 355 | 1611 | | |
| v/s Ratio Prot | | 0.22 | | | c0.33 | 0.01 | c0.18 | | | 0.16 | | |
| v/s Ratio Perm | 0.09 | | 0.01 | 0.07 | | 0.11 | | | c0.21 | | | |
| v/c Ratio | 0.33 | 0.78 | 0.02 | 0.24 | 1.17 | 0.22 | 0.31 | | 0.44 | 0.34 | | |
| Uniform Delay, d1 | 24.0 | 28.0 | 21.9 | 23.3 | 30.4 | 7.9 | 8.7 | | 14.9 | 14.1 | | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.27 | 1.29 | | |
| Incremental Delay, d2 | 9.7 | 6.2 | 0.1 | 6.5 | 86.6 | 0.1 | 0.4 | | 3.4 | 0.5 | | |
| Delay (s) | 33.7 | 34.2 | 22.0 | 29.8 | 117.0 | 8.0 | 9.1 | | 22.4 | 18.7 | | |
| Level of Service | C | C | C | C | F | A | A | | C | B | | |
| Approach Delay (s) | | 33.7 | | | 115.4 | | 8.9 | | | 19.5 | | |
| Approach LOS | | C | | | F | | A | | | B | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 52.4 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 71.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 82 | 480 | 42 | 105 | 356 | 35 | 342 | 679 | 173 | 58 | 506 | 108 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3379 | | | 3351 | | 1765 | 3539 | 1551 | 1752 | 3415 | |
| Flt Permitted | 0.31 | 1.00 | | | 0.62 | | 0.37 | 1.00 | 1.00 | 0.35 | 1.00 | |
| Satd. Flow (perm) | 572 | 3379 | | | 2091 | | 686 | 3539 | 1551 | 640 | 3415 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 89 | 522 | 46 | 114 | 387 | 38 | 372 | 715 | 188 | 63 | 550 | 117 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 9 | 0 | 0 | 0 | 68 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 89 | 557 | 0 | 0 | 530 | 0 | 372 | 715 | 120 | 63 | 651 | 0 |
| Confl. Peds. (#/hr) | 8 | | 8 | 2 | | 2 | 8 | | 8 | 32 | | 32 |
| Confl. Bikes (#/hr) | | | 6 | | | 6 | | | 4 | | | 28 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 23.1 | 23.1 | | | 23.1 | | 48.9 | 48.9 | 48.9 | 48.9 | 48.9 | |
| Effective Green, g (s) | 23.1 | 23.1 | | | 23.1 | | 48.9 | 48.9 | 48.9 | 48.9 | 48.9 | |
| Actuated g/C Ratio | 0.29 | 0.29 | | | 0.29 | | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 165 | 976 | | | 604 | | 419 | 2163 | 948 | 391 | 2087 | |
| v/s Ratio Prot | | 0.16 | | | | | | 0.20 | | | 0.19 | |
| v/s Ratio Perm | 0.16 | | | | c0.25 | | c0.54 | | 0.08 | 0.10 | | |
| v/c Ratio | 0.54 | 0.57 | | | 0.88 | | 0.89 | 0.33 | 0.13 | 0.16 | 0.31 | |
| Uniform Delay, d1 | 24.0 | 24.2 | | | 27.1 | | 13.2 | 7.6 | 6.6 | 6.7 | 7.5 | |
| Progression Factor | 1.00 | 1.00 | | | 1.06 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.7 | 0.5 | | | 13.1 | | 23.3 | 0.4 | 0.3 | 0.9 | 0.4 | |
| Delay (s) | 25.7 | 24.7 | | | 41.9 | | 36.5 | 8.0 | 6.8 | 7.6 | 7.9 | |
| Level of Service | C | C | | | D | | D | A | A | A | A | |
| Approach Delay (s) | | 24.9 | | | 41.9 | | | 16.1 | | | 7.8 | |
| Approach LOS | | C | | | D | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 20.4 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.88 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 84.8% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|-------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 6 | 670 | 220 | 119 | 382 | 2 | 0 | 0 | 0 | 88 | 254 | 75 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frpb, ped/bikes | | 0.95 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | 0.96 | | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3121 | | 1770 | 3424 | | | | | | 3380 | |
| Flt Permitted | | 0.95 | | 0.15 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 2971 | | 274 | 3424 | | | | | | 3380 | |
| Peak-hour factor, PHF | 0.92 | 0.99 | 0.92 | 0.93 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 7 | 677 | 239 | 128 | 415 | 2 | 0 | 0 | 0 | 96 | 270 | 82 |
| RTOR Reduction (vph) | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 0 | 885 | 0 | 128 | 417 | 0 | 0 | 0 | 0 | 0 | 424 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 8 | | 8 | 36 | | 36 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 18 | | | 14 | | | 2 | | | 8 |
| Turn Type | Perm | | pm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | | | | 4 | | |
| Actuated Green, G (s) | | 31.6 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | | 31.6 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | | 0.40 | | 0.54 | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1174 | | 267 | 1840 | | | | | | 1225 | |
| v/s Ratio Prot | | | | c0.04 | 0.12 | | | | | | | |
| v/s Ratio Perm | | c0.30 | | 0.22 | | | | | | | 0.13 | |
| v/c Ratio | | 0.75 | | 0.48 | 0.23 | | | | | | 0.35 | |
| Uniform Delay, d1 | | 20.8 | | 12.1 | 9.7 | | | | | | 18.6 | |
| Progression Factor | | 1.66 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | | 4.4 | | 0.5 | 0.3 | | | | | | 0.8 | |
| Delay (s) | | 39.0 | | 12.6 | 10.0 | | | | | | 19.4 | |
| Level of Service | | D | | B | B | | | | | | B | |
| Approach Delay (s) | | 39.0 | | | 10.6 | | | 0.0 | | | 19.4 | |
| Approach LOS | | D | | | B | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 26.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 70.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 12: Grand Avenue & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|-------|-------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↑↑↑ | ↗ | | ↔↔↔ | |
| Volume (vph) | 142 | 637 | 132 | 373 | 846 | 42 | 11 | 1495 | 1129 | 2 | 645 | 62 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1483 | 3433 | 3539 | 1460 | | 5083 | 1466 | | 4987 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.93 | 1.00 | | 0.94 | |
| Satd. Flow (perm) | 3433 | 3539 | 1483 | 3433 | 3539 | 1460 | | 4738 | 1466 | | 4665 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 154 | 692 | 143 | 381 | 910 | 46 | 12 | 1625 | 1227 | 2 | 672 | 67 |
| RTOR Reduction (vph) | 0 | 0 | 41 | 0 | 0 | 27 | 0 | 0 | 250 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 154 | 692 | 102 | 381 | 910 | 19 | 0 | 1637 | 977 | 0 | 729 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 8.9 | 34.6 | 34.6 | 14.4 | 41.1 | 41.1 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 8.9 | 34.6 | 34.6 | 14.4 | 41.1 | 41.1 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.09 | 0.35 | 0.35 | 0.14 | 0.41 | 0.41 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 306 | 1224 | 513 | 494 | 1455 | 600 | | 1706 | 528 | | 1679 | |
| v/s Ratio Prot | 0.04 | 0.20 | | c0.11 | c0.26 | | | | | | | |
| v/s Ratio Perm | | | 0.07 | | | 0.01 | | 0.35 | c0.67 | | 0.16 | |
| v/c Ratio | 0.50 | 0.57 | 0.20 | 0.77 | 0.63 | 0.03 | | 0.96 | 1.85 | | 0.43 | |
| Uniform Delay, d1 | 43.4 | 26.6 | 23.0 | 41.2 | 23.3 | 17.6 | | 31.3 | 32.0 | | 24.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.5 | 1.9 | 0.9 | 6.7 | 2.0 | 0.1 | | 14.1 | 389.7 | | 0.8 | |
| Delay (s) | 43.9 | 28.5 | 23.8 | 47.9 | 25.4 | 17.7 | | 45.4 | 421.7 | | 25.1 | |
| Level of Service | D | C | C | D | C | B | | D | F | | C | |
| Approach Delay (s) | | 30.2 | | | 31.5 | | | 206.6 | | | 25.1 | |
| Approach LOS | | C | | | C | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 115.1 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.12 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 126.7% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

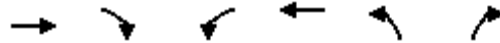
Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study






| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|----------------------|------|
| Lane Configurations | ←← | | ← | ↑↑↑ | ↑↑↑ | ← |
| Volume (vph) | 756 | 159 | 103 | 1542 | 930 | 168 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.99 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.97 | | 1.00 | 1.00 | 0.98 | |
| Flt Protected | 0.96 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3358 | | 1763 | 3725 | 6261 | |
| Flt Permitted | 0.96 | | 0.16 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3358 | | 294 | 3725 | 6261 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 |
| Adj. Flow (vph) | 822 | 173 | 112 | 1606 | 1011 | 183 |
| RTOR Reduction (vph) | 25 | 0 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 970 | 0 | 112 | 1606 | 1158 | 0 |
| Confl. Peds. (#/hr) | 30 | 30 | 106 | | | |
| Confl. Bikes (#/hr) | | 2 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 29.3 | | 37.2 | 30.5 | 30.5 | |
| Effective Green, g (s) | 29.3 | | 37.2 | 30.5 | 30.5 | |
| Actuated g/C Ratio | 0.37 | | 0.46 | 0.38 | 0.38 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 1230 | | 260 | 1420 | 2387 | |
| v/s Ratio Prot | c0.29 | | c0.04 | c0.43 | 0.18 | |
| v/s Ratio Perm | | | 0.16 | | | |
| v/c Ratio | 0.79 | | 0.43 | 1.13 | 0.49 | |
| Uniform Delay, d1 | 22.6 | | 12.7 | 24.8 | 18.8 | |
| Progression Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.4 | | 1.1 | 68.4 | 0.7 | |
| Delay (s) | 26.0 | | 13.8 | 93.1 | 19.5 | |
| Level of Service | C | | B | F | B | |
| Approach Delay (s) | 26.0 | | | 88.0 | 19.5 | |
| Approach LOS | C | | | F | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 51.3 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | | 0.91 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | | | 60.3% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 14: 21st Street & Access Road

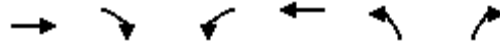
Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 544 | 10 | 28 | 256 | 11 | 335 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 579 | 11 | 30 | 278 | 12 | 364 |
| Pedestrians | 18 | | | 18 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 590 | | 941 | 602 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 590 | | 941 | 602 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 97 | | 96 | 26 |
| cM capacity (veh/h) | | | 986 | | 279 | 492 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 590 | 309 | 376 | | | |
| Volume Left | 0 | 30 | 12 | | | |
| Volume Right | 11 | 0 | 364 | | | |
| cSH | 1700 | 986 | 480 | | | |
| Volume to Capacity | 0.35 | 0.03 | 0.78 | | | |
| Queue Length 95th (ft) | 0 | 2 | 176 | | | |
| Control Delay (s) | 0.0 | 1.2 | 34.6 | | | |
| Lane LOS | | A | D | | | |
| Approach Delay (s) | 0.0 | 1.2 | 34.6 | | | |
| Approach LOS | | | D | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 10.5 | | | |
| Intersection Capacity Utilization | 66.5% | | | ICU Level of Service | C | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

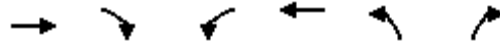
Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 333 | 41 | 66 | 203 | 30 | 221 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 362 | 45 | 72 | 221 | 33 | 240 |
| Pedestrians | 27 | | | 27 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 407 | | 775 | 411 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 407 | | 775 | 411 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 94 | | 90 | 62 |
| cM capacity (veh/h) | | | 1152 | | 336 | 626 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 407 | 292 | 273 | | | |
| Volume Left | 0 | 72 | 33 | | | |
| Volume Right | 45 | 0 | 240 | | | |
| cSH | 1700 | 1152 | 567 | | | |
| Volume to Capacity | 0.24 | 0.06 | 0.48 | | | |
| Queue Length 95th (ft) | 0 | 5 | 65 | | | |
| Control Delay (s) | 0.0 | 2.5 | 17.1 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 2.5 | 17.1 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.5 | | | |
| Intersection Capacity Utilization | | 61.8% | | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|----------------------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 398 | 32 | 34 | 151 | 114 | 207 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 410 | 35 | 37 | 161 | 124 | 225 |
| Pedestrians | 20 | | | 20 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.89 | | 0.89 | 0.89 |
| vC, conflicting volume | | | 445 | | 682 | 448 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 314 | | 581 | 317 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 97 | | 69 | 64 |
| cM capacity (veh/h) | | | 1109 | | 403 | 633 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 445 | 198 | 62 | 62 | 112 | 112 |
| Volume Left | 0 | 37 | 62 | 62 | 0 | 0 |
| Volume Right | 35 | 0 | 0 | 0 | 112 | 112 |
| cSH | 1700 | 1109 | 403 | 403 | 633 | 633 |
| Volume to Capacity | 0.26 | 0.03 | 0.15 | 0.15 | 0.18 | 0.18 |
| Queue Length 95th (ft) | 0 | 3 | 13 | 13 | 16 | 16 |
| Control Delay (s) | 0.0 | 1.8 | 15.6 | 15.6 | 11.9 | 11.9 |
| Lane LOS | | A | C | C | B | B |
| Approach Delay (s) | 0.0 | 1.8 | 13.2 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | 5.0 | | | | | |
| Intersection Capacity Utilization | 50.9% | | ICU Level of Service | | A | |
| Analysis Period (min) | 15 | | | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 237 | 103 | 75 | 238 | 0 | 0 | 0 | 0 | 78 | 529 | 29 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.98 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.99 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1436 | | 1805 | | | | | | 4806 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.79 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1436 | | 1442 | | | | | | 4806 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 258 | 112 | 82 | 259 | 0 | 0 | 0 | 0 | 85 | 545 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 258 | 93 | 0 | 341 | 0 | 0 | 0 | 0 | 0 | 658 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 25.0 | 25.0 | | 25.0 | | | | | | 47.0 | |
| Effective Green, g (s) | | 25.0 | 25.0 | | 25.0 | | | | | | 47.0 | |
| Actuated g/C Ratio | | 0.31 | 0.31 | | 0.31 | | | | | | 0.59 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 582 | 449 | | 451 | | | | | | 2824 | |
| v/s Ratio Prot | | 0.14 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.07 | | 0.24 | | | | | | 0.14 | |
| v/c Ratio | | 0.44 | 0.21 | | 0.76 | | | | | | 0.23 | |
| Uniform Delay, d1 | | 21.9 | 20.2 | | 24.8 | | | | | | 7.9 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 1.24 | |
| Incremental Delay, d2 | | 0.5 | 0.2 | | 7.1 | | | | | | 0.2 | |
| Delay (s) | | 22.5 | 20.5 | | 31.8 | | | | | | 10.0 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 21.9 | | | 31.8 | | | 0.0 | | | 10.0 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 18.6 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.41 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 56.3% | | | ICU Level of Service | | | B | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↖ | | | ↗ | | | ↖↗ | ↗ | | | |
| Volume (vph) | 13 | 121 | 1 | 0 | 134 | 108 | 21 | 380 | 200 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 1.00 | 0.81 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1844 | | | 1694 | | | 3509 | 1290 | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1800 | | | 1694 | | | 3509 | 1290 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 14 | 132 | 1 | 0 | 146 | 117 | 23 | 409 | 217 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 167 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 147 | 0 | 0 | 219 | 0 | 0 | 432 | 50 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | | 40 | | | 1 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 26.7 | | | 26.7 | | | 10.3 | 10.3 | | | |
| Effective Green, g (s) | | 26.7 | | | 26.7 | | | 10.3 | 10.3 | | | |
| Actuated g/C Ratio | | 0.59 | | | 0.59 | | | 0.23 | 0.23 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1068 | | | 1005 | | | 803 | 295 | | | |
| v/s Ratio Prot | | | | | c0.13 | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | | | | 0.12 | 0.04 | | | |
| v/c Ratio | | 0.14 | | | 0.22 | | | 0.54 | 0.17 | | | |
| Uniform Delay, d1 | | 4.1 | | | 4.3 | | | 15.3 | 13.9 | | | |
| Progression Factor | | 0.40 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.5 | | | 0.3 | 0.1 | | | |
| Delay (s) | | 1.9 | | | 4.8 | | | 15.6 | 14.0 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 1.9 | | | 4.8 | | | 15.1 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.7 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.31 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 8.0 | | |
| Intersection Capacity Utilization | | 39.7% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 19: 21st Street & Broadway

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 14 | 50 | 22 | 78 | 0 | 82 | 0 | 571 | 45 | 44 | 478 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.93 | | | 0.99 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1748 | 1761 | | | 1655 | | | 3478 | | | 3516 | |
| Flt Permitted | 0.70 | 1.00 | | | 0.84 | | | 1.00 | | | 0.85 | |
| Satd. Flow (perm) | 1295 | 1761 | | | 1431 | | | 3478 | | | 3009 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 |
| Adj. Flow (vph) | 15 | 54 | 24 | 85 | 0 | 89 | 0 | 621 | 49 | 48 | 483 | 0 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 51 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 15 | 64 | 0 | 0 | 123 | 0 | 0 | 657 | 0 | 0 | 531 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 24 | | 24 | 40 | | 40 | 48 | | 48 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | 17 | | | 7 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Permitted Phases | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 547 | 744 | | | 604 | | | 1314 | | | 1137 | |
| v/s Ratio Prot | 0.04 | | | | | | c0.19 | | | | | |
| v/s Ratio Perm | 0.01 | | | | c0.09 | | | | | | 0.18 | |
| v/c Ratio | 0.03 | 0.09 | | | 0.20 | | | 0.50 | | | 0.47 | |
| Uniform Delay, d1 | 7.6 | 7.8 | | | 8.2 | | | 10.7 | | | 10.6 | |
| Progression Factor | 1.00 | 1.00 | | | 1.03 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.2 | | | 0.7 | | | 1.4 | | | 1.4 | |
| Delay (s) | 7.7 | 8.0 | | | 9.2 | | | 12.1 | | | 12.0 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | 8.0 | | | | 9.2 | | 12.1 | | | | 12.0 | |
| Approach LOS | A | | | | A | | B | | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.34 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 60.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|-------|------|-------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | ↔ | ↔↔ | |
| Volume (vph) | 29 | 169 | 30 | 12 | 218 | 227 | 26 | 657 | 31 | 41 | 180 | 64 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.98 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.93 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3420 | | | 3210 | | | 3502 | | 1767 | 3370 | |
| Flt Permitted | | 0.78 | | | 0.94 | | | 0.94 | | 0.28 | 1.00 | |
| Satd. Flow (perm) | | 2702 | | | 3029 | | | 3293 | | 519 | 3370 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 32 | 184 | 33 | 13 | 237 | 247 | 28 | 714 | 34 | 42 | 196 | 70 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 200 | 0 | 0 | 4 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 0 | 224 | 0 | 0 | 297 | 0 | 0 | 772 | 0 | 42 | 242 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 3 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | pm+pt | | pm+pt | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 11.4 | | | 11.4 | | | 32.4 | | 39.6 | 39.6 | |
| Effective Green, g (s) | | 11.4 | | | 11.4 | | | 32.4 | | 39.6 | 39.6 | |
| Actuated g/C Ratio | | 0.19 | | | 0.19 | | | 0.54 | | 0.66 | 0.66 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 513 | | | 576 | | | 1778 | | 399 | 2224 | |
| v/s Ratio Prot | | | | | | | | | | 0.00 | c0.07 | |
| v/s Ratio Perm | | 0.08 | | | c0.10 | | | c0.23 | | 0.06 | | |
| v/c Ratio | | 0.44 | | | 0.52 | | | 0.43 | | 0.11 | 0.11 | |
| Uniform Delay, d1 | | 21.5 | | | 21.8 | | | 8.3 | | 4.1 | 3.7 | |
| Progression Factor | | 1.00 | | | 0.61 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | 0.6 | | | 0.8 | | 0.1 | 0.1 | |
| Delay (s) | | 22.1 | | | 13.9 | | | 9.1 | | 4.3 | 3.8 | |
| Level of Service | | C | | | B | | | A | | A | A | |
| Approach Delay (s) | | 22.1 | | | 13.9 | | | 9.1 | | | 3.9 | |
| Approach LOS | | C | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 11.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 74.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 21: 20th Street & Broadway

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | | ↕↕↕ | |
| Volume (vph) | 23 | 162 | 95 | 61 | 294 | 124 | 109 | 804 | 117 | 45 | 568 | 39 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.97 | | | 0.97 | | | 0.99 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | | 0.96 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Satd. Flow (prot) | | 3228 | | | 3236 | | | 3410 | | | 4989 | |
| Flt Permitted | | 0.90 | | | 0.87 | | | 0.72 | | | 0.80 | |
| Satd. Flow (perm) | | 2914 | | | 2843 | | | 2474 | | | 4026 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 25 | 176 | 103 | 66 | 320 | 135 | 118 | 874 | 123 | 49 | 617 | 42 |
| RTOR Reduction (vph) | 0 | 65 | 0 | 0 | 46 | 0 | 0 | 16 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 239 | 0 | 0 | 475 | 0 | 0 | 1099 | 0 | 0 | 696 | 0 |
| Confl. Peds. (#/hr) | 74 | | 74 | 120 | | 120 | 85 | | 85 | 65 | | 65 |
| Confl. Bikes (#/hr) | | | 30 | | | 13 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1068 | | | 1042 | | | 1305 | | | 1208 | |
| v/s Ratio Prot | | | | | | | | c0.10 | | | | |
| v/s Ratio Perm | | 0.08 | | | c0.17 | | | c0.31 | | | 0.17 | |
| v/c Ratio | | 0.22 | | | 0.46 | | | 0.84 | | | 0.58 | |
| Uniform Delay, d1 | | 13.1 | | | 14.4 | | | 13.5 | | | 17.8 | |
| Progression Factor | | 2.11 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 1.4 | | | 6.7 | | | 2.0 | |
| Delay (s) | | 28.1 | | | 15.9 | | | 20.2 | | | 19.8 | |
| Level of Service | | C | | | B | | | C | | | B | |
| Approach Delay (s) | | 28.1 | | | 15.9 | | | 20.2 | | | 19.8 | |
| Approach LOS | | C | | | B | | | C | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 20.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.67 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 89.4% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 38 | 346 | 0 | 0 | 453 | 129 | 80 | 417 | 298 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3513 | | | 3368 | 1319 | | 4993 | 1458 | | | |
| Flt Permitted | | 0.88 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3097 | | | 3368 | 1319 | | 4993 | 1458 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 41 | 376 | 0 | 0 | 492 | 137 | 87 | 453 | 320 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 36 | 0 | 0 | 212 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 417 | 0 | 0 | 505 | 87 | 0 | 540 | 108 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | 12 | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 56.9 | | | 56.9 | 56.9 | | 16.1 | 16.1 | | | |
| Effective Green, g (s) | | 56.9 | | | 56.9 | 56.9 | | 16.1 | 16.1 | | | |
| Actuated g/C Ratio | | 0.71 | | | 0.71 | 0.71 | | 0.20 | 0.20 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2203 | | | 2395 | 938 | | 1005 | 293 | | | |
| v/s Ratio Prot | | | | | c0.15 | | | | | | | |
| v/s Ratio Perm | | 0.13 | | | | 0.07 | | 0.11 | 0.07 | | | |
| v/c Ratio | | 0.19 | | | 0.21 | 0.09 | | 0.54 | 0.37 | | | |
| Uniform Delay, d1 | | 3.9 | | | 3.9 | 3.6 | | 28.6 | 27.6 | | | |
| Progression Factor | | 1.00 | | | 0.71 | 0.27 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.2 | 0.2 | | 0.6 | 0.8 | | | |
| Delay (s) | | 4.0 | | | 3.0 | 1.2 | | 29.2 | 28.3 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 4.0 | | | 2.6 | | | 28.9 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.8 | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | | 0.28 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | | 7.0 | | | |
| Intersection Capacity Utilization | | 57.4% | | | ICU Level of Service | | | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 23: 20th Street & Webster Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 450 | 192 | 157 | 462 | 0 | 0 | 0 | 0 | 82 | 531 | 119 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1439 | 1610 | 3378 | | | | | | 4528 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.94 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1439 | 1610 | 3193 | | | | | | 4528 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 489 | 209 | 171 | 502 | 0 | 0 | 0 | 0 | 89 | 577 | 129 |
| RTOR Reduction (vph) | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 0 | 489 | 171 | 154 | 519 | 0 | 0 | 0 | 0 | 0 | 759 | 0 |
| Confl. Peds. (#/hr) | 51 | | 51 | 114 | | 114 | 115 | | 115 | 333 | | 333 |
| Confl. Bikes (#/hr) | | | 8 | | | 3 | | | 17 | | | 6 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | | 4 |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Effective Green, g (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Actuated g/C Ratio | | 0.35 | 0.35 | 0.12 | 0.52 | | | | | | 0.38 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1239 | 504 | 201 | 1699 | | | | | | 1698 | |
| v/s Ratio Prot | | c0.14 | | c0.10 | 0.04 | | | | | | | |
| v/s Ratio Perm | | | 0.12 | | 0.12 | | | | | | 0.17 | |
| v/c Ratio | | 0.39 | 0.34 | 0.77 | 0.31 | | | | | | 0.45 | |
| Uniform Delay, d1 | | 19.6 | 19.2 | 33.9 | 10.7 | | | | | | 18.8 | |
| Progression Factor | | 1.10 | 1.13 | 1.00 | 1.00 | | | | | | 1.42 | |
| Incremental Delay, d2 | | 0.9 | 1.8 | 14.4 | 0.0 | | | | | | 0.1 | |
| Delay (s) | | 22.5 | 23.4 | 48.3 | 10.8 | | | | | | 26.7 | |
| Level of Service | | C | C | D | B | | | | | | C | |
| Approach Delay (s) | | 22.8 | | | 19.4 | | | 0.0 | | | 26.7 | |
| Approach LOS | | C | | | B | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 23.1 | | | HCM Level of Service | | | | | C | |
| HCM Volume to Capacity ratio | | | 0.47 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 12.0 | | |
| Intersection Capacity Utilization | | | 93.3% | | | ICU Level of Service | | | | F | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|-------|-------|------|-------|-------|-------|--------|--------|------|--------|--------|------|
| Lane Configurations | ↰ | ↰↰↰↰ | | | | ↰↰ | ↰↰ | ↰ | ↰ | | ↰ | ↰ |
| Volume (vph) | 14 | 416 | 103 | 97 | 31 | 829 | 190 | 272 | 51 | 0 | 160 | 109 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 0.48 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | | | 1.00 | 0.94 | 0.85 | 0.85 | | 0.85 | 0.85 |
| Flt Protected | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 841 | 4900 | | | | 3516 | 3186 | 1441 | 1583 | | 1583 | 1554 |
| Flt Permitted | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 841 | 4900 | | | | 3516 | 3186 | 1441 | 1583 | | 1583 | 1554 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 15 | 452 | 112 | 105 | 34 | 901 | 207 | 296 | 55 | 0 | 168 | 115 |
| RTOR Reduction (vph) | 0 | 68 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 87 |
| Lane Group Flow (vph) | 15 | 496 | 0 | 0 | 0 | 1040 | 346 | 157 | 23 | 0 | 168 | 28 |
| Confl. Peds. (#/hr) | 22 | | | | | | | | 74 | | | |
| Confl. Bikes (#/hr) | | | | | | 7 | | | 8 | | | 7 |
| Turn Type | Prot | | | Split | Split | | custom | custom | | custom | custom | |
| Protected Phases | 5 | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | | |
| Permitted Phases | | 1 | | | | | | 6 | | | 9 | 2 |
| Actuated Green, G (s) | 0.8 | 12.8 | | | | 16.0 | 17.2 | 29.2 | 29.2 | | 8.0 | 17.2 |
| Effective Green, g (s) | 0.8 | 12.8 | | | | 16.0 | 17.2 | 29.2 | 29.2 | | 8.0 | 17.2 |
| Actuated g/C Ratio | 0.01 | 0.18 | | | | 0.23 | 0.25 | 0.42 | 0.42 | | 0.11 | 0.25 |
| Clearance Time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 10 | 896 | | | | 804 | 783 | 601 | 660 | | 181 | 382 |
| v/s Ratio Prot | 0.02 | c0.10 | | | | c0.30 | c0.11 | 0.11 | 0.01 | | | |
| v/s Ratio Perm | | | | | | | | | | | c0.11 | 0.02 |
| v/c Ratio | 1.50 | 0.55 | | | | 1.29 | 0.44 | 0.26 | 0.03 | | 0.93 | 0.07 |
| Uniform Delay, d1 | 34.6 | 26.0 | | | | 27.0 | 22.3 | 13.3 | 12.1 | | 30.7 | 20.3 |
| Progression Factor | 1.00 | 1.00 | | | | 1.00 | 1.41 | 1.63 | 2.66 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 78.8 | 2.5 | | | | 141.3 | 0.1 | 1.0 | 0.1 | | 45.6 | 0.0 |
| Delay (s) | 513.4 | 28.5 | | | | 168.3 | 31.7 | 22.9 | 32.2 | | 76.3 | 20.3 |
| Level of Service | F | C | | | | F | C | C | C | | E | C |
| Approach Delay (s) | | 41.0 | | | | 168.3 | 29.3 | | | 53.6 | | |
| Approach LOS | | D | | | | F | C | | | D | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 93.6 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 65.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 26: Harrison Street & Lakeside Drive

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖↗ | ↑↑↑ | ↖↗ | ↗ |
| Volume (vph) | 1099 | 71 | 830 | 332 | 153 | 845 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5038 | | 3433 | 5085 | 3174 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5038 | | 3433 | 5085 | 3174 | 1441 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.99 | 0.92 | 0.92 | 0.93 |
| Adj. Flow (vph) | 1157 | 77 | 838 | 361 | 166 | 909 |
| RTOR Reduction (vph) | 10 | 0 | 0 | 0 | 319 | 318 |
| Lane Group Flow (vph) | 1224 | 0 | 838 | 361 | 303 | 136 |
| Confl. Bikes (#/hr) | | | | 16 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Effective Green, g (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Actuated g/C Ratio | 0.26 | | 0.27 | 0.59 | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 1295 | | 932 | 2978 | 952 | 432 |
| v/s Ratio Prot | c0.24 | | c0.24 | 0.07 | c0.10 | |
| v/s Ratio Perm | | | | | | 0.09 |
| v/c Ratio | 0.94 | | 0.90 | 0.12 | 0.32 | 0.32 |
| Uniform Delay, d1 | 25.5 | | 24.6 | 6.5 | 19.0 | 18.9 |
| Progression Factor | 1.05 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.0 | | 13.3 | 0.1 | 0.9 | 1.9 |
| Delay (s) | 28.7 | | 37.9 | 6.5 | 19.8 | 20.8 |
| Level of Service | C | | D | A | B | C |
| Approach Delay (s) | 28.7 | | | 28.5 | 20.3 | |
| Approach LOS | C | | | C | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 26.0 | | HCM Level of Service | | C |
| HCM Volume to Capacity ratio | | 0.70 | | | | |
| Actuated Cycle Length (s) | | 70.0 | | Sum of lost time (s) | 12.0 | |
| Intersection Capacity Utilization | | 69.8% | | ICU Level of Service | | C |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 28: 18th Street & Brush Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↰↱↲ | |
| Volume (vph) | 0 | 0 | 0 | 150 | 168 | 0 | 0 | 0 | 0 | 0 | 1270 | 147 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1766 | 3539 | | | | | | 6292 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1766 | 3539 | | | | | | 6292 | |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 163 | 183 | 0 | 0 | 0 | 0 | 0 | 1309 | 160 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 160 | 183 | 0 | 0 | 0 | 0 | 0 | 1450 | 0 |
| Confl. Peds. (#/hr) | 15 | | 15 | 2 | | 2 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 23.6 | 23.6 | | | | | | 42.4 | |
| Effective Green, g (s) | | | | 23.6 | 23.6 | | | | | | 42.4 | |
| Actuated g/C Ratio | | | | 0.31 | 0.31 | | | | | | 0.57 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 556 | 1114 | | | | | | 3557 | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | c0.23 | |
| v/s Ratio Perm | | | | c0.09 | | | | | | | | |
| v/c Ratio | | | | 0.29 | 0.16 | | | | | | 0.41 | |
| Uniform Delay, d1 | | | | 19.4 | 18.6 | | | | | | 9.2 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.73 | |
| Incremental Delay, d2 | | | | 1.3 | 0.3 | | | | | | 0.1 | |
| Delay (s) | | | | 20.7 | 18.9 | | | | | | 6.8 | |
| Level of Service | | | | C | B | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 19.7 | | | 0.0 | | | 6.8 | |
| Approach LOS | | A | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.3 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 45.9% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 200 | 397 | 1220 | 78 | 346 | 41 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.99 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 5027 | | 3404 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 5027 | | 3404 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 217 | 427 | 1312 | 85 | 376 | 45 |
| RTOR Reduction (vph) | 2 | 0 | 9 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 215 | 427 | 1388 | 0 | 421 | 0 |
| Confl. Peds. (#/hr) | | | | 17 | | |
| Confl. Bikes (#/hr) | | | | 6 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 15.9 | 15.9 | 26.0 | | 21.1 | |
| Effective Green, g (s) | 15.9 | 15.9 | 26.0 | | 21.1 | |
| Actuated g/C Ratio | 0.21 | 0.21 | 0.35 | | 0.28 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 375 | 1078 | 1743 | | 958 | |
| v/s Ratio Prot | | 0.08 | c0.28 | | c0.12 | |
| v/s Ratio Perm | c0.12 | | | | | |
| v/c Ratio | 0.57 | 0.40 | 0.80 | | 0.44 | |
| Uniform Delay, d1 | 26.5 | 25.4 | 22.1 | | 22.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 6.2 | 1.1 | 2.6 | | 0.3 | |
| Delay (s) | 32.7 | 26.5 | 24.7 | | 22.4 | |
| Level of Service | C | C | C | | C | |
| Approach Delay (s) | | 28.6 | 24.7 | | 22.4 | |
| Approach LOS | | C | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 25.3 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.62 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 58.5% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th Street & Castro Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|-------|-------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑ | ↑ | ↑ | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 274 | 878 | 1024 | 528 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.98 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.98 | 0.99 | | | | |
| Frt | | | | | 0.91 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3046 | 1417 | 1403 | 5828 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3046 | 1417 | 1403 | 5828 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 298 | 954 | 1113 | 568 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 62 | 62 | 337 | 271 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 713 | 415 | 219 | 854 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 4 | | 4 | 14 | | 14 | | | |
| Confl. Bikes (#/hr) | | | | | | 1 | | | | | | 4 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | | 2 | | | | |
| Actuated Green, G (s) | | | | | 42.6 | 42.6 | 22.4 | 22.4 | | | | |
| Effective Green, g (s) | | | | | 42.6 | 42.6 | 22.4 | 22.4 | | | | |
| Actuated g/C Ratio | | | | | 0.57 | 0.57 | 0.30 | 0.30 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1730 | 805 | 419 | 1741 | | | | |
| v/s Ratio Prot | | | | | 0.23 | | | | | | | |
| v/s Ratio Perm | | | | | | c0.29 | c0.16 | 0.15 | | | | |
| v/c Ratio | | | | | 0.41 | 0.52 | 0.52 | 0.49 | | | | |
| Uniform Delay, d1 | | | | | 9.1 | 9.9 | 21.9 | 21.6 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.7 | 2.4 | 1.2 | 0.2 | | | | |
| Delay (s) | | | | | 9.9 | 12.3 | 23.0 | 21.8 | | | | |
| Level of Service | | | | | A | B | C | C | | | | |
| Approach Delay (s) | | 0.0 | | | 10.8 | | | 22.2 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 17.3 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.52 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | Sum of lost time (s) | | | 10.0 | | | | |
| Intersection Capacity Utilization | | 73.4% | | | ICU Level of Service | | | D | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 31: 11th Street & Brush Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 251 | 72 | 0 | 0 | 0 | 0 | 0 | 0 | 561 | 908 | 55 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3407 | | | | | | | | 1522 | 4729 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3407 | | | | | | | | 1522 | 4729 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 273 | 78 | 0 | 0 | 0 | 0 | 0 | 0 | 610 | 987 | 60 |
| RTOR Reduction (vph) | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 231 | 42 | 0 |
| Lane Group Flow (vph) | 0 | 325 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 172 | 1212 | 0 |
| Confl. Peds. (#/hr) | 5 | | 5 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Effective Green, g (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Actuated g/C Ratio | | 0.47 | | | | | | | | 0.43 | 0.43 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1590 | | | | | | | | 649 | 2018 | |
| v/s Ratio Prot | | c0.10 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.11 | 0.26 | |
| v/c Ratio | | 0.20 | | | | | | | | 0.26 | 0.60 | |
| Uniform Delay, d1 | | 11.8 | | | | | | | | 13.9 | 16.6 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | 1.0 | 1.3 | |
| Delay (s) | | 12.1 | | | | | | | | 14.9 | 17.9 | |
| Level of Service | | B | | | | | | | | B | B | |
| Approach Delay (s) | | 12.1 | | | 0.0 | | | 0.0 | | | 17.2 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 16.3 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.39 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 45.1% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 32: 14th Street & Lakeside Dr.

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕ | ↗ | | | |
| Volume (vph) | 63 | 918 | 0 | 0 | 425 | 261 | 205 | 637 | 42 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.96 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3524 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Flt Permitted | | 0.89 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3130 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.99 | 0.96 | 0.96 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 68 | 998 | 0 | 0 | 443 | 272 | 223 | 692 | 46 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 117 | 0 | 0 | 4 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1066 | 0 | 0 | 443 | 155 | 0 | 915 | 42 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 52 | | 52 | 35 | | 35 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 5 | | | 21 | | | | | | 22 |
| Turn Type | Perm | | Perm | | Perm | | Perm | Perm | | Perm | | |
| Protected Phases | | 4 | | | 8 | 8 | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 939 | | | 1062 | 438 | | 1852 | 811 | | | |
| v/s Ratio Prot | | | | | 0.13 | | | | | | | |
| v/s Ratio Perm | | c0.34 | | | | 0.11 | | 0.26 | 0.03 | | | |
| v/c Ratio | | 1.14 | | | 0.42 | 0.35 | | 0.49 | 0.05 | | | |
| Uniform Delay, d1 | | 21.0 | | | 16.8 | 16.4 | | 8.9 | 6.7 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 74.1 | | | 1.2 | 2.2 | | 0.9 | 0.1 | | | |
| Delay (s) | | 95.1 | | | 18.0 | 18.7 | | 9.8 | 6.8 | | | |
| Level of Service | | F | | | B | B | | A | A | | | |
| Approach Delay (s) | | 95.1 | | | 18.3 | | | 9.7 | | | 0.0 | |
| Approach LOS | | F | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 45.1 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 83.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 33: 14th Street & Madison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 644 | 73 | 26 | 560 | 0 | 0 | 0 | 0 | 344 | 683 | 19 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3464 | | | 3531 | | | | | 1734 | 3521 | |
| Flt Permitted | | 1.00 | | | 0.91 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3464 | | | 3232 | | | | | 1734 | 3521 | |
| Peak-hour factor, PHF | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 700 | 79 | 28 | 609 | 0 | 0 | 0 | 0 | 366 | 711 | 21 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 760 | 0 | 0 | 637 | 0 | 0 | 0 | 0 | 366 | 727 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 25 | | 25 | 17 | | 17 | 24 | | 24 |
| Confl. Bikes (#/hr) | | | 16 | | | 17 | | | 2 | | | |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | 6 | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1463 | | | 1365 | | | | | 732 | 1487 | |
| v/s Ratio Prot | | c0.22 | | | | | | | | | 0.21 | |
| v/s Ratio Perm | | | | | 0.20 | | | | | c0.21 | | |
| v/c Ratio | | 0.52 | | | 0.47 | | | | | 0.50 | 0.49 | |
| Uniform Delay, d1 | | 9.6 | | | 9.4 | | | | | 9.5 | 9.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.3 | | | 1.1 | | | | | 2.4 | 1.2 | |
| Delay (s) | | 10.9 | | | 10.5 | | | | | 12.0 | 10.6 | |
| Level of Service | | B | | | B | | | | | B | B | |
| Approach Delay (s) | | 10.9 | | | 10.5 | | | 0.0 | | | 11.1 | |
| Approach LOS | | B | | | B | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 60.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 34: 14th Street & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 73 | 430 | 8 | 19 | 401 | 44 | 69 | 449 | 25 | 114 | 196 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 1.00 | | | 0.99 | | | 0.99 | | | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Satd. Flow (prot) | | 3484 | | | 3457 | | | 3475 | | | 3369 | |
| Flt Permitted | | 0.84 | | | 0.93 | | | 0.86 | | | 0.65 | |
| Satd. Flow (perm) | | 2949 | | | 3221 | | | 3001 | | | 2223 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 79 | 467 | 9 | 21 | 436 | 48 | 75 | 488 | 27 | 124 | 202 | 54 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 15 | 0 | 0 | 9 | 0 | 0 | 33 | 0 |
| Lane Group Flow (vph) | 0 | 553 | 0 | 0 | 490 | 0 | 0 | 581 | 0 | 0 | 347 | 0 |
| Confl. Peds. (#/hr) | 80 | | 80 | 58 | | 58 | 44 | | 44 | 41 | | 41 |
| Confl. Bikes (#/hr) | | | 14 | | | 10 | | | 7 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 22.8 | | | 22.8 | | | 14.7 | | | 14.7 | |
| Effective Green, g (s) | | 22.8 | | | 22.8 | | | 14.7 | | | 14.7 | |
| Actuated g/C Ratio | | 0.51 | | | 0.51 | | | 0.33 | | | 0.33 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1494 | | | 1632 | | | 980 | | | 726 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | c0.19 | | | 0.15 | | | c0.19 | | | 0.16 | |
| v/c Ratio | | 0.37 | | | 0.30 | | | 0.59 | | | 0.48 | |
| Uniform Delay, d1 | | 6.7 | | | 6.5 | | | 12.7 | | | 12.1 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | 0.5 | | | 1.0 | | | 0.5 | |
| Delay (s) | | 7.4 | | | 6.9 | | | 13.6 | | | 12.6 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 7.4 | | | 6.9 | | | 13.6 | | | 12.6 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.46 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 69.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 249 | 941 | 0 | 0 | 0 | 0 | 0 | 780 | 46 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6270 | | | | | | 5030 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6270 | | | | | | 5030 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 271 | 970 | 0 | 0 | 0 | 0 | 0 | 848 | 50 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1201 | 0 | 0 | 0 | 0 | 0 | 887 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 47 | | 47 | 36 | | 36 | 29 | | 29 |
| Confl. Bikes (#/hr) | | | 3 | | | 13 | | | 9 | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2717 | | | | | | 2222 | |
| v/s Ratio Prot | | | | | | | | | | | c0.18 | |
| v/s Ratio Perm | | | | | 0.19 | | | | | | | |
| v/c Ratio | | | | | 0.44 | | | | | | 0.40 | |
| Uniform Delay, d1 | | | | | 11.9 | | | | | | 11.4 | |
| Progression Factor | | | | | 0.46 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.5 | | | | | | 0.5 | |
| Delay (s) | | | | | 5.9 | | | | | | 11.9 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 5.9 | | | 0.0 | | | 11.9 | |
| Approach LOS | | A | | | A | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 8.4 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.42 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 43.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 36: 12th Street & Oak St.

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1015 | 60 | 178 | 989 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6330 | | | 6239 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6330 | | | 6239 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 65 | 193 | 1030 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 28 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1129 | 0 | 0 | 1195 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | 121 | 69 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | | | | 15 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3154 | | | 2142 | | | | |
| v/s Ratio Prot | | | | | c0.18 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.19 | | | | |
| v/c Ratio | | | | | 0.36 | | | 0.56 | | | | |
| Uniform Delay, d1 | | | | | 9.2 | | | 16.0 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.3 | | | 1.1 | | | | |
| Delay (s) | | | | | 9.5 | | | 17.1 | | | | |
| Level of Service | | | | | A | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 9.5 | | | 17.1 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.5 |
| Intersection Capacity Utilization | 46.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 37: 11th Street & Oak Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 68 | 0 | 0 | 1084 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.25 | 0.92 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 74 | 0 | 0 | 1178 | 0 | 0 |
| Pedestrians | 6 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 301 | 6 | 6 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 301 | 6 | 6 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 89 | 100 | 100 | | | |
| cM capacity (veh/h) | 663 | 1069 | 1605 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 74 | 295 | 295 | 295 | 295 | |
| Volume Left | 74 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 663 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.11 | 0.17 | 0.17 | 0.17 | 0.17 | |
| Queue Length 95th (ft) | 9 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.1 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 26.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 910 | 194 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 956 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.97 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6193 | | | | | | | | | 5068 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6193 | | | | | | | | | 5068 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 948 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 1028 | 0 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 1134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1073 | 0 |
| Confl. Peds. (#/hr) | 20 | | 20 | 30 | | 30 | 12 | | 12 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 5 | | | 7 | | | 3 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2374 | | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.18 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.21 | |
| v/c Ratio | | 0.48 | | | | | | | | | 0.49 | |
| Uniform Delay, d1 | | 14.0 | | | | | | | | | 12.2 | |
| Progression Factor | | 0.83 | | | | | | | | | 0.56 | |
| Incremental Delay, d2 | | 0.7 | | | | | | | | | 0.7 | |
| Delay (s) | | 12.2 | | | | | | | | | 7.6 | |
| Level of Service | | B | | | | | | | | | A | |
| Approach Delay (s) | | 12.2 | | | 0.0 | | | 0.0 | | | 7.6 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.0 | | | | HCM Level of Service | | | | B | |
| HCM Volume to Capacity ratio | | | 0.48 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | Sum of lost time (s) | | | 11.0 | | |
| Intersection Capacity Utilization | | | 45.4% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTL | | | | | | 4TTL | | | | |
| Volume (vph) | 31 | 724 | 0 | 0 | 0 | 0 | 0 | 335 | 134 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6384 | | | | | | 6045 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6384 | | | | | | 6045 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 34 | 787 | 0 | 0 | 0 | 0 | 0 | 364 | 138 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 808 | 0 | 0 | 0 | 0 | 0 | 482 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | 17 | 53 | | 53 | 68 | | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | 1 | | | 6 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 13.4 | | | | | | 39.6 | | | | |
| Effective Green, g (s) | | 13.4 | | | | | | 39.6 | | | | |
| Actuated g/C Ratio | | 0.22 | | | | | | 0.66 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1426 | | | | | | 3990 | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.13 | | | | | | | | | | |
| v/c Ratio | | 0.57 | | | | | | 0.12 | | | | |
| Uniform Delay, d1 | | 20.7 | | | | | | 3.8 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 0.1 | | | | |
| Delay (s) | | 21.0 | | | | | | 3.8 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 21.0 | | | 0.0 | | | 3.8 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.5 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.23 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 40.0% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 40: 7th St. & Oak St.

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 178 | 1117 | 0 | 0 | 0 | 0 | 0 | 947 | 394 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6347 | | | | | | 4832 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6347 | | | | | | 4832 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.98 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 193 | 1140 | 0 | 0 | 0 | 0 | 0 | 1007 | 410 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1313 | 0 | 0 | 0 | 0 | 0 | 1406 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 50 | | 50 | 14 | | 14 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 16 | | | 1 | | | 2 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2539 | | | | | | 1933 | | | | |
| v/s Ratio Prot | | | | | | | | c0.29 | | | | |
| v/s Ratio Perm | | 0.21 | | | | | | | | | | |
| v/c Ratio | | 0.52 | | | | | | 0.73 | | | | |
| Uniform Delay, d1 | | 10.2 | | | | | | 11.4 | | | | |
| Progression Factor | | 0.98 | | | | | | 1.56 | | | | |
| Incremental Delay, d2 | | 0.6 | | | | | | 1.9 | | | | |
| Delay (s) | | 10.6 | | | | | | 19.7 | | | | |
| Level of Service | | B | | | | | | B | | | | |
| Approach Delay (s) | | 10.6 | | | 0.0 | | | 19.7 | | | 0.0 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 15.2 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.62 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 9.0 | | |
| Intersection Capacity Utilization | | 55.5% | | | | | | ICU Level of Service | | B | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 41: 7th St. & Madison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 976 | 289 | 0 | 0 | 0 | 0 | 0 | 0 | 472 | 1514 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6152 | | | | | | | | | 5014 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6152 | | | | | | | | | 5014 | |
| Peak-hour factor, PHF | 0.25 | 0.99 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.95 | 0.25 |
| Adj. Flow (vph) | 0 | 986 | 314 | 0 | 0 | 0 | 0 | 0 | 0 | 513 | 1594 | 0 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 |
| Lane Group Flow (vph) | 0 | 1296 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2086 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 8 | | 8 | 2 | | 2 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 2 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2461 | | | | | | | | | 2228 | |
| v/s Ratio Prot | | c0.21 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.42 | |
| v/c Ratio | | 0.53 | | | | | | | | | 0.94 | |
| Uniform Delay, d1 | | 10.3 | | | | | | | | | 11.9 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.8 | | | | | | | | | 9.0 | |
| Delay (s) | | 11.1 | | | | | | | | | 20.9 | |
| Level of Service | | B | | | | | | | | | C | |
| Approach Delay (s) | | 11.1 | | | 0.0 | | | 0.0 | | | 20.9 | |
| Approach LOS | | B | | | A | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 17.2 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.74 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 66.7% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 42: I-880 NB On-ramp & Jackson Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↰ | | ↕ | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 7 | 369 | 56 | 351 | 352 | 0 | 0 | 216 | 1648 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | 0.93 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1726 | 1863 | 1471 | | 1817 | | | 1863 | 1559 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.72 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1726 | 1863 | 1471 | | 1350 | | | 1863 | 1559 |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 8 | 401 | 61 | 382 | 383 | 0 | 0 | 235 | 1682 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 41 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 8 | 401 | 15 | 0 | 765 | 0 | 0 | 235 | 1641 |
| Confl. Peds. (#/hr) | 4 | | 4 | 20 | | 20 | 1 | | 1 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 10 | | | 7 | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 14.4 | 14.4 | 14.4 | | 34.6 | | | 34.6 | 34.6 |
| Effective Green, g (s) | | | | 14.4 | 14.4 | 14.4 | | 34.6 | | | 34.6 | 34.6 |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | 0.24 | | 0.58 | | | 0.58 | 0.58 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 414 | 447 | 353 | | 779 | | | 1074 | 899 |
| v/s Ratio Prot | | | | c0.22 | | | | | | | 0.13 | |
| v/s Ratio Perm | | | | 0.00 | | 0.01 | | 0.57 | | | | c1.05 |
| v/c Ratio | | | | 0.02 | 0.90 | 0.04 | | 0.98 | | | 0.22 | 1.83 |
| Uniform Delay, d1 | | | | 17.4 | 22.1 | 17.5 | | 12.4 | | | 6.2 | 12.7 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 20.2 | 0.0 | | 28.2 | | | 0.5 | 375.8 |
| Delay (s) | | | | 17.4 | 42.2 | 17.6 | | 40.6 | | | 6.6 | 388.5 |
| Level of Service | | | | B | D | B | | D | | | A | F |
| Approach Delay (s) | | 0.0 | | | 38.6 | | | 40.6 | | | 341.6 | |
| Approach LOS | | A | | | D | | | D | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 223.4 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.55 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 173.8% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 43: 6th St. & Oak St.

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 184 | 627 | 66 | 56 | 735 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.89 | 0.85 |
| Flt Protected | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (prot) | | | 3500 | | 3169 | 1441 |
| Flt Permitted | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (perm) | | | 3500 | | 3169 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 |
| Adj. Flow (vph) | 0 | 200 | 682 | 72 | 61 | 782 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 882 | 0 | 524 | 391 |
| Confl. Peds. (#/hr) | 46 | | | | | |
| Confl. Bikes (#/hr) | 3 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1268 | | 1141 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.25 | | 0.17 | 0.27 |
| v/c Ratio | | | 0.70 | | 0.46 | 0.75 |
| Uniform Delay, d1 | | | 12.2 | | 11.0 | 12.6 |
| Progression Factor | | | 0.75 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.3 | | 1.3 | 9.7 |
| Delay (s) | | | 9.5 | | 12.4 | 22.4 |
| Level of Service | | | A | | B | C |
| Approach Delay (s) | | | 9.5 | | 16.7 | |
| Approach LOS | | | A | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 13.1 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.71 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 66.8% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 44: 5th St. & Oak St.

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 291 | 617 | 83 | 0 | 0 | 0 | 0 | 534 | 74 | 1 | 69 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | | | | 0.98 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4925 | | | | | | 1832 | | | 1862 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.84 | |
| Satd. Flow (perm) | | 1000 | | | | | | 1300 | | | 1300 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 |
| Adj. Flow (vph) | 316 | 663 | 90 | 0 | 0 | 0 | 0 | 580 | 80 | 1 | 75 | 0 |
| RTOR Reduction (vph) | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1045 | 0 | 0 | 0 | 0 | 0 | 649 | 0 | 0 | 76 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | 4 | | | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 500 | | | | | | 631 | | | 448 | |
| v/s Ratio Prot | | | | | | | | c0.35 | | | | |
| v/s Ratio Perm | | c1.05 | | | | | | | | | 0.06 | |
| v/c Ratio | | 2.09 | | | | | | 1.03 | | | 0.17 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 14.8 | | | 10.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.08 | |
| Incremental Delay, d2 | | 497.3 | | | | | | 43.3 | | | 0.8 | |
| Delay (s) | | 508.6 | | | | | | 58.0 | | | 1.5 | |
| Level of Service | | F | | | | | | E | | | A | |
| Approach Delay (s) | | 508.6 | | | 0.0 | | | 58.0 | | | 1.5 | |
| Approach LOS | | F | | | A | | | E | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 322.5 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.66 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 62.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 45: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



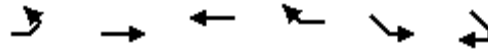
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|-------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 192 | 170 | 1237 | 903 | 149 | 870 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3312 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3312 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 209 | 185 | 1316 | 982 | 162 | 946 |
| RTOR Reduction (vph) | 0 | 152 | 139 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 209 | 33 | 2159 | 0 | 162 | 946 |
| Turn Type | Perm | | | Prot | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Actuated g/C Ratio | 0.18 | 0.18 | 0.44 | | 0.25 | 0.73 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 315 | 281 | 1468 | | 435 | 2595 |
| v/s Ratio Prot | c0.12 | | c0.65 | | 0.09 | c0.27 |
| v/s Ratio Perm | | 0.02 | | | | |
| v/c Ratio | 0.66 | 0.12 | 1.47 | | 0.37 | 0.36 |
| Uniform Delay, d1 | 34.5 | 31.1 | 25.0 | | 28.2 | 4.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.66 | 0.45 |
| Incremental Delay, d2 | 5.2 | 0.2 | 215.7 | | 1.8 | 0.3 |
| Delay (s) | 39.7 | 31.3 | 240.8 | | 20.6 | 2.3 |
| Level of Service | D | C | F | | C | A |
| Approach Delay (s) | 35.7 | | 240.8 | | | 4.9 |
| Approach LOS | D | | F | | | A |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 150.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.00 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 92.0% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis
46: Lakeshore Drive & El Embarcadero (WB)

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 254 | 299 | 247 | 109 | 532 | 447 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3377 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3377 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 276 | 325 | 268 | 118 | 578 | 486 |
| RTOR Reduction (vph) | 0 | 0 | 82 | 0 | 0 | 296 |
| Lane Group Flow (vph) | 276 | 325 | 304 | 0 | 578 | 190 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 12.6 | 27.2 | 10.6 | | 22.6 | 22.6 |
| Effective Green, g (s) | 12.6 | 27.2 | 10.6 | | 22.6 | 22.6 |
| Actuated g/C Ratio | 0.22 | 0.47 | 0.18 | | 0.39 | 0.39 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 386 | 1665 | 619 | | 692 | 619 |
| v/s Ratio Prot | c0.16 | 0.09 | c0.09 | | c0.33 | |
| v/s Ratio Perm | | | | | | 0.12 |
| v/c Ratio | 0.72 | 0.20 | 0.49 | | 0.84 | 0.31 |
| Uniform Delay, d1 | 20.9 | 8.9 | 21.2 | | 15.9 | 12.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 6.2 | 0.1 | 0.6 | | 8.6 | 0.3 |
| Delay (s) | 27.1 | 9.0 | 21.8 | | 24.5 | 12.5 |
| Level of Service | C | A | C | | C | B |
| Approach Delay (s) | | 17.3 | 21.8 | | 19.0 | |
| Approach LOS | | B | C | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 19.0 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.72 | | | |
| Actuated Cycle Length (s) | | | 57.8 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 63.9% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | 3TW | | | TT | T | T | TT | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 741 | 490 | 1085 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4962 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4962 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 329 | 1480 | 154 | 0 | 614 | 805 | 533 | 1179 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 52 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1952 | 0 | 0 | 614 | 753 | 533 | 1179 | 0 |
| Turn Type | | | Split | | | | | Perm | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 1 | 2 |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1654 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.39 | | | 0.17 | | c0.30 | 0.33 | |
| v/s Ratio Perm | | | | | | | | c0.48 | | | |
| v/c Ratio | | | | 1.18 | | | 0.89 | 2.45 | 0.92 | 0.59 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.3 | 36.2 | 29.1 | 12.7 | |
| Progression Factor | | | | 1.00 | | | 1.48 | 1.55 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 87.6 | | | 1.9 | 651.7 | 19.6 | 0.4 | |
| Delay (s) | | | | 117.6 | | | 54.0 | 707.9 | 48.7 | 13.1 | |
| Level of Service | | | | F | | | D | F | D | B | |
| Approach Delay (s) | 0.0 | | | 117.6 | | | 424.9 | | | 24.2 | |
| Approach LOS | A | | | F | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 171.8 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.37 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 88.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



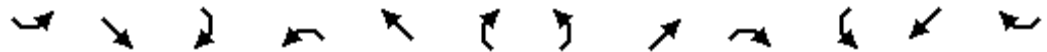
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|-------|------|--------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 414 | 1236 | 609 | 169 | 346 | 550 | 143 | 329 | 24 | 243 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.98 | 0.85 | | 0.90 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3143 | 1441 | | 3185 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3143 | 1441 | | 3185 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 450 | 1315 | 662 | 184 | 376 | 598 | 155 | 358 | 26 | 264 |
| RTOR Reduction (vph) | 0 | 0 | 15 | 0 | 14 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 405 | 1539 | 652 | 0 | 1115 | 0 | 0 | 0 | 384 | 264 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 978 | 448 | | 1309 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.25 | c0.49 | 0.45 | | c0.35 | | | | c0.22 | 0.07 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.81 | 1.57 | 1.46 | | 1.11dr | | | | 1.63 | 0.13 |
| Uniform Delay, d1 | 28.5 | 31.0 | 31.0 | | 24.0 | | | | 39.0 | 8.2 |
| Progression Factor | 0.65 | 0.67 | 0.65 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.3 | 258.6 | 205.9 | | 7.1 | | | | 300.8 | 0.1 |
| Delay (s) | 20.0 | 279.3 | 226.1 | | 31.1 | | | | 339.8 | 8.3 |
| Level of Service | B | F | F | | C | | | | F | A |
| Approach Delay (s) | | 225.5 | | | 31.1 | | | | | 204.7 |
| Approach LOS | | F | | | C | | | | | F |

Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 172.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.24 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 98.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1677 | 234 | 329 | 1088 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4863 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4863 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.98 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1747 | 254 | 336 | 1157 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 6 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1747 | 247 | 0 | 1487 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2543 | 792 | | 1783 | | | | |
| v/s Ratio Prot | | | | | c0.34 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.16 | | 0.31 | | | | |
| v/c Ratio | | | | | 0.69 | 0.31 | | 0.83 | | | | |
| Uniform Delay, d1 | | | | | 11.4 | 8.9 | | 17.3 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.19 | | | | |
| Incremental Delay, d2 | | | | | 1.5 | 1.0 | | 2.4 | | | | |
| Delay (s) | | | | | 13.0 | 9.9 | | 23.0 | | | | |
| Level of Service | | | | | B | A | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 12.6 | | | 23.0 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 17.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 66.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 50: Santa Clara Avenue & Harrison Street


















Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 673 | 1371 | 0 | 0 | 0 | 0 | 0 | 722 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4775 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4775 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 732 | 1413 | 0 | 0 | 0 | 0 | 0 | 785 | 71 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 37 | 30 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 483 | 1595 | 0 | 0 | 0 | 0 | 0 | 845 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2308 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.24 | |
| v/s Ratio Perm | | | | 0.32 | 0.33 | | | | | | | |
| v/c Ratio | | | | 0.66 | 0.69 | | | | | | 0.63 | |
| Uniform Delay, d1 | | | | 11.7 | 12.0 | | | | | | 15.0 | |
| Progression Factor | | | | 1.43 | 1.38 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 3.3 | 1.2 | | | | | | 2.3 | |
| Delay (s) | | | | 20.0 | 17.8 | | | | | | 17.3 | |
| Level of Service | | | | C | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 18.4 | | | 0.0 | | | 17.3 | |
| Approach LOS | | A | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 18.1 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.66 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 66.8% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 230 | 567 | 11 | 18 | 249 | 20 | 16 | 24 | 30 | 68 | 50 | 45 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 250 | 603 | 12 | 20 | 271 | 22 | 17 | 26 | 33 | 74 | 54 | 49 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 250 | 615 | 312 | 76 | 177 | | | | | | | |
| Volume Left (vph) | 250 | 0 | 20 | 17 | 74 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 22 | 33 | 49 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.18 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.4 | 5.9 | 5.9 | 6.9 | 6.7 | | | | | | | |
| Degree Utilization, x | 0.44 | 1.00 | 0.52 | 0.15 | 0.33 | | | | | | | |
| Capacity (veh/h) | 553 | 615 | 597 | 487 | 517 | | | | | | | |
| Control Delay (s) | 13.2 | 59.3 | 15.1 | 11.1 | 12.9 | | | | | | | |
| Approach Delay (s) | 46.0 | | 15.1 | 11.1 | 12.9 | | | | | | | |
| Approach LOS | E | | C | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 33.3 | | | | | | | | | |
| HCM Level of Service | | | D | | | | | | | | | |
| Intersection Capacity Utilization | | | 71.6% | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 21.6 Worst Case Level Of Service: F[68.7]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 1253 0 0 0 581 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 1253 0 0 0 581 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 1253 0 0 0 581 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.93 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1362 0 0 0 625 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1362 0 0 0 625 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 454 xxxx xxxx xxxxx

Potent Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 610 xxxx xxxx xxxxx

Move Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 610 xxxx xxxx xxxxx

Volume/Cap: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 1.02 xxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 16.2 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 68.7 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * F * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 68.7 xxxxxx

ApproachLOS: * * F *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis

2: I-580 EB On-Ramp & Oakland Avenue

Cumulative AM
Kaiser Center Transportation Study

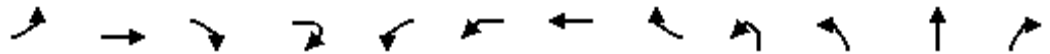


| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|-------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 553 | 195 | 1186 | 498 | 33 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1730 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1730 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 570 | 212 | 1289 | 541 | 36 |
| RTOR Reduction (vph) | 49 | 49 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 339 | 345 | 1289 | 577 | 0 |
| Confl. Peds. (#/hr) | | | | | 2 |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 14.4 | 14.4 | 38.1 | 15.1 | |
| Effective Green, g (s) | 14.4 | 14.4 | 38.1 | 15.1 | |
| Actuated g/C Ratio | 0.24 | 0.24 | 0.64 | 0.25 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 403 | 415 | 2247 | 398 | |
| v/s Ratio Prot | | | c0.36 | c0.36 | |
| v/s Ratio Perm | c0.20 | 0.20 | | | |
| v/c Ratio | 0.84 | 0.83 | 0.57 | 1.45 | |
| Uniform Delay, d1 | 21.7 | 21.7 | 6.3 | 22.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 14.1 | 12.8 | 1.1 | 216.0 | |
| Delay (s) | 35.9 | 34.4 | 7.4 | 238.5 | |
| Level of Service | D | C | A | F | |
| Approach Delay (s) | | 35.1 | 78.8 | | |
| Approach LOS | | D | E | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 65.9 | | HCM Level of Service | E |
| HCM Volume to Capacity ratio | | 0.89 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 60.0% | | ICU Level of Service | B |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
|------------------------|------|------|-------|------|------|------|-------|------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 81 | 141 | 132 | 36 | 84 | 31 | 200 | 177 | 16 | 487 | 620 | 47 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.95 | | | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1497 | | | 1770 | 1863 | 1462 | | 3433 | 3497 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1497 | | | 1770 | 1863 | 1462 | | 3433 | 3497 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 88 | 153 | 143 | 39 | 91 | 34 | 217 | 186 | 17 | 529 | 674 | 51 |
| RTOR Reduction (vph) | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 149 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 88 | 153 | 170 | 0 | 0 | 125 | 217 | 37 | 0 | 546 | 719 | 0 |
| Confl. Peds. (#/hr) | 21 | | 21 | | | | | 27 | | 9 | | 8 |
| Confl. Bikes (#/hr) | | | 8 | | | | | 24 | | | | 1 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 8.6 | 16.5 | 16.5 | | | 10.0 | 17.9 | 17.9 | | 18.1 | 34.6 | |
| Effective Green, g (s) | 8.6 | 16.5 | 16.5 | | | 10.0 | 17.9 | 17.9 | | 18.1 | 34.6 | |
| Actuated g/C Ratio | 0.10 | 0.18 | 0.18 | | | 0.11 | 0.20 | 0.20 | | 0.20 | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 169 | 649 | 274 | | | 197 | 371 | 291 | | 690 | 1344 | |
| v/s Ratio Prot | 0.05 | 0.04 | | | | 0.07 | c0.12 | | | c0.16 | 0.21 | |
| v/s Ratio Perm | | | c0.11 | | | | | 0.03 | | | | |
| v/c Ratio | 0.52 | 0.24 | 0.62 | | | 0.63 | 0.58 | 0.13 | | 0.79 | 0.54 | |
| Uniform Delay, d1 | 38.7 | 31.4 | 33.9 | | | 38.3 | 32.7 | 29.6 | | 34.2 | 21.5 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.9 | 0.2 | 4.1 | | | 6.5 | 2.3 | 0.2 | | 6.2 | 1.5 | |
| Delay (s) | 41.6 | 31.6 | 38.0 | | | 44.8 | 35.0 | 29.8 | | 40.3 | 23.0 | |
| Level of Service | D | C | D | | | D | D | C | | D | C | |
| Approach Delay (s) | | 36.4 | | | | | 35.5 | | | | 30.4 | |
| Approach LOS | | D | | | | | D | | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 97.0 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.92 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 87.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|-------|------|------|
| Lane Configurations | | | | |
| Volume (vph) | 163 | 1145 | 155 | 108 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3440 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3440 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 177 | 1245 | 168 | 117 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 |
| Lane Group Flow (vph) | 177 | 1524 | 0 | 0 |
| Confl. Peds. (#/hr) | 18 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 12.9 | 29.4 | | |
| Effective Green, g (s) | 12.9 | 29.4 | | |
| Actuated g/C Ratio | 0.14 | 0.33 | | |
| Clearance Time (s) | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 254 | 1124 | | |
| v/s Ratio Prot | 0.10 | 0.44 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.70 | 1.36 | | |
| Uniform Delay, d1 | 36.7 | 30.3 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 8.1 | 166.0 | | |
| Delay (s) | 44.7 | 196.3 | | |
| Level of Service | D | F | | |
| Approach Delay (s) | | 180.6 | | |
| Approach LOS | | F | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 65 | 184 | 89 | 38 | 321 | 332 | 56 | 527 | 42 | 109 | 590 | 49 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1748 | 3319 | | | 3516 | 1543 | 1761 | 3484 | | 1766 | 3493 | |
| Flt Permitted | 0.52 | 1.00 | | | 0.89 | 1.00 | 0.32 | 1.00 | | 0.38 | 1.00 | |
| Satd. Flow (perm) | 953 | 3319 | | | 3140 | 1543 | 596 | 3484 | | 709 | 3493 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 71 | 198 | 97 | 41 | 338 | 361 | 61 | 543 | 46 | 118 | 641 | 53 |
| RTOR Reduction (vph) | 0 | 56 | 0 | 0 | 0 | 119 | 0 | 7 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 71 | 239 | 0 | 0 | 379 | 242 | 61 | 582 | 0 | 118 | 687 | 0 |
| Confl. Peds. (#/hr) | 25 | | 25 | 18 | | 13 | 19 | | 13 | 6 | | 6 |
| Confl. Bikes (#/hr) | | 16 | 16 | 59 | | 5 | | 5 | 59 | | | 6 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 404 | 1406 | | | 1330 | 654 | 266 | 1558 | | 317 | 1562 | |
| v/s Ratio Prot | | 0.07 | | | | | | 0.17 | | | c0.20 | |
| v/s Ratio Perm | 0.07 | | | | 0.12 | c0.16 | 0.10 | | | 0.17 | | |
| v/c Ratio | 0.18 | 0.17 | | | 0.28 | 0.37 | 0.23 | 0.37 | | 0.37 | 0.44 | |
| Uniform Delay, d1 | 15.3 | 15.2 | | | 16.1 | 16.8 | 14.5 | 15.6 | | 15.6 | 16.2 | |
| Progression Factor | 1.29 | 1.28 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.9 | 0.2 | | | 0.5 | 1.6 | 2.0 | 0.7 | | 3.3 | 0.9 | |
| Delay (s) | 20.5 | 19.7 | | | 16.6 | 18.4 | 16.5 | 16.3 | | 18.9 | 17.1 | |
| Level of Service | C | B | | | B | B | B | B | | B | B | |
| Approach Delay (s) | | 19.8 | | | 17.5 | | | 16.3 | | | 17.3 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 17.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 101.3% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|-----------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 394 | 406 | 153 | 50 | 280 | 122 | 94 | 415 | 26 | 53 | 377 | 154 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1561 | 1765 | 1863 | 1546 | 1762 | 3498 | | 1765 | 3363 | |
| Flt Permitted | 0.42 | 1.00 | 1.00 | 0.51 | 1.00 | 1.00 | 0.26 | 1.00 | | 0.35 | 1.00 | |
| Satd. Flow (perm) | 788 | 1863 | 1561 | 942 | 1863 | 1546 | 476 | 3498 | | 647 | 3363 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 428 | 441 | 166 | 54 | 304 | 133 | 98 | 451 | 28 | 58 | 410 | 167 |
| RTOR Reduction (vph) | 0 | 0 | 71 | 0 | 0 | 76 | 0 | 7 | 0 | 0 | 65 | 0 |
| Lane Group Flow (vph) | 428 | 441 | 95 | 54 | 304 | 57 | 98 | 472 | 0 | 58 | 512 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | Permpm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 56.8 | 48.6 | 48.6 | 40.3 | 36.6 | 36.6 | 19.2 | 19.2 | | 19.2 | 19.2 | |
| Effective Green, g (s) | 56.8 | 48.6 | 48.6 | 40.3 | 36.6 | 36.6 | 19.2 | 19.2 | | 19.2 | 19.2 | |
| Actuated g/C Ratio | 0.67 | 0.57 | 0.57 | 0.47 | 0.43 | 0.43 | 0.23 | 0.23 | | 0.23 | 0.23 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 708 | 1065 | 893 | 482 | 802 | 666 | 108 | 790 | | 146 | 760 | |
| v/s Ratio Prot | c0.11 | 0.24 | | 0.00 | 0.16 | | | 0.13 | | | 0.15 | |
| v/s Ratio Perm | c0.29 | | 0.06 | 0.05 | | 0.04 | c0.21 | | | 0.09 | | |
| v/c Ratio | 0.60 | 0.41 | 0.11 | 0.11 | 0.38 | 0.09 | 0.91 | 0.60 | | 0.40 | 0.67 | |
| Uniform Delay, d1 | 7.3 | 10.2 | 8.3 | 12.1 | 16.5 | 14.3 | 32.0 | 29.4 | | 28.0 | 30.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.65 | 0.65 | 0.27 | 0.92 | 0.90 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.0 | 1.2 | 0.2 | 0.0 | 1.3 | 0.2 | 54.4 | 0.8 | | 0.6 | 1.9 | |
| Delay (s) | 8.3 | 11.4 | 8.5 | 7.9 | 12.1 | 4.1 | 83.9 | 27.3 | | 28.6 | 31.9 | |
| Level of Service | A | B | A | A | B | A | F | C | | C | C | |
| Approach Delay (s) | | 9.7 | | | 9.5 | | | 36.9 | | | 31.6 | |
| Approach LOS | | A | | | A | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 20.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 78.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

6: 27th Street & I-980 On Ramp

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 177 | 943 | 0 | 0 | 171 | 328 | 5 | 298 | 29 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1608 | 3387 | | | 3539 | 2787 | | 5006 | | | | |
| Flt Permitted | 0.63 | 0.95 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 1074 | 3217 | | | 3539 | 2787 | | 5006 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 192 | 1025 | 0 | 0 | 186 | 357 | 5 | 324 | 32 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 214 | 0 | 19 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 173 | 1044 | 0 | 0 | 186 | 143 | 0 | 342 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 6 | | 6 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 4 | | | 3 |
| Turn Type | Perm | | | | | Perm | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 430 | 1287 | | | 1416 | 1115 | | 2002 | | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | 0.16 | 0.32 | | | | 0.05 | | 0.07 | | | | |
| v/c Ratio | 0.40 | 0.81 | | | 0.13 | 0.13 | | 0.17 | | | | |
| Uniform Delay, d1 | 8.6 | 10.7 | | | 7.6 | 7.6 | | 7.7 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 2.8 | 5.6 | | | 0.2 | 0.2 | | 0.2 | | | | |
| Delay (s) | 11.4 | 16.3 | | | 7.8 | 7.8 | | 7.9 | | | | |
| Level of Service | B | B | | | A | A | | A | | | | |
| Approach Delay (s) | | 15.6 | | | 7.8 | | | 7.9 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 12.3 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.49 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 60.9% | | | ICU Level of Service | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 321 | 31 | 12 | 181 | 0 | 0 | 0 | 0 | 786 | 1141 | 405 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1558 | | 3527 | | | | | 1610 | 3369 | 1583 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1558 | | 3290 | | | | | 1610 | 3369 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 0 | 349 | 34 | 13 | 197 | 0 | 0 | 0 | 0 | 854 | 1227 | 440 |
| RTOR Reduction (vph) | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 213 |
| Lane Group Flow (vph) | 0 | 349 | 12 | 0 | 210 | 0 | 0 | 0 | 0 | 675 | 1406 | 227 |
| Confl. Peds. (#/hr) | 2 | | 2 | 10 | | 10 | 6 | | 6 | | | |
| Confl. Bikes (#/hr) | | | 3 | | | 4 | | | 1 | | | |
| Turn Type | | Perm | | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | | 8 | | | | | | 6 | |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 545 | | 1152 | | | | | 832 | 1741 | 818 |
| v/s Ratio Prot | | c0.10 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.06 | | | | | c0.42 | 0.42 | 0.14 |
| v/c Ratio | | 0.28 | 0.02 | | 0.18 | | | | | 0.81 | 0.81 | 0.28 |
| Uniform Delay, d1 | | 14.1 | 12.8 | | 13.5 | | | | | 12.1 | 12.0 | 8.2 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.6 | 0.1 | | 0.3 | | | | | 8.5 | 4.1 | 0.8 |
| Delay (s) | | 14.6 | 12.8 | | 13.9 | | | | | 20.5 | 16.2 | 9.0 |
| Level of Service | | B | B | | B | | | | | C | B | A |
| Approach Delay (s) | | 14.5 | | | 13.9 | | | 0.0 | | | 16.1 | |
| Approach LOS | | B | | | B | | | A | | | B | |

Intersection Summary

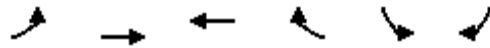
| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 15.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.60 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 72.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 225 | 654 | 769 | 141 | 883 | 227 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.98 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3440 | | 3431 | 1414 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3440 | | 3431 | 1414 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 245 | 711 | 836 | 153 | 960 | 247 |
| RTOR Reduction (vph) | 0 | 0 | 18 | 0 | 3 | 151 |
| Lane Group Flow (vph) | 245 | 711 | 971 | 0 | 982 | 71 |
| Confl. Peds. (#/hr) | 14 | | | 11 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 10 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 13.7 | 46.3 | 28.6 | | 25.7 | 25.7 |
| Effective Green, g (s) | 13.7 | 46.3 | 28.6 | | 25.7 | 25.7 |
| Actuated g/C Ratio | 0.17 | 0.58 | 0.36 | | 0.32 | 0.32 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 303 | 2048 | 1230 | | 1102 | 454 |
| v/s Ratio Prot | c0.14 | 0.20 | c0.28 | | c0.29 | |
| v/s Ratio Perm | | | | | | 0.05 |
| v/c Ratio | 0.81 | 0.35 | 0.79 | | 0.89 | 0.16 |
| Uniform Delay, d1 | 31.9 | 8.9 | 23.0 | | 25.8 | 19.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 13.8 | 0.5 | 5.2 | | 9.1 | 0.1 |
| Delay (s) | 45.7 | 9.3 | 28.2 | | 34.9 | 19.5 |
| Level of Service | D | A | C | | C | B |
| Approach Delay (s) | | 18.7 | 28.2 | | 32.1 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 26.8 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.83 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 76.0% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|-------|-------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 125 | 892 | 410 | 79 | 482 | 74 | 232 | 296 | 35 | 99 | 409 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1767 | 3427 | 1553 | 1768 | 3350 | | 1769 | 3473 | | 1757 | 3430 | |
| Flt Permitted | 0.27 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.36 | 1.00 | | 0.54 | 1.00 | |
| Satd. Flow (perm) | 500 | 3427 | 1553 | 297 | 3350 | | 669 | 3473 | | 1003 | 3430 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 136 | 929 | 446 | 86 | 524 | 80 | 252 | 312 | 38 | 108 | 445 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 314 | 0 | 13 | 0 | 0 | 6 | 0 | 0 | 21 | 0 |
| Lane Group Flow (vph) | 136 | 929 | 132 | 86 | 591 | 0 | 252 | 344 | 0 | 108 | 521 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | 4 | | | | 4 | 5 | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | 6 | | | |
| Actuated Green, G (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 49.4 | 49.4 | | 34.9 | 34.9 | |
| Effective Green, g (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 49.4 | 49.4 | | 34.9 | 34.9 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | | 0.58 | 0.58 | | 0.41 | 0.41 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 148 | 1012 | 459 | 88 | 989 | | 518 | 2018 | | 412 | 1408 | |
| v/s Ratio Prot | | 0.27 | | | 0.18 | | c0.06 | 0.10 | | | 0.15 | |
| v/s Ratio Perm | 0.27 | | 0.08 | c0.29 | | | c0.23 | | | 0.11 | | |
| v/c Ratio | 0.92 | 0.92 | 0.29 | 0.98 | 0.60 | | 0.49 | 0.17 | | 0.26 | 0.37 | |
| Uniform Delay, d1 | 29.0 | 29.0 | 23.1 | 29.7 | 25.6 | | 9.2 | 8.3 | | 16.5 | 17.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.11 | 1.15 | |
| Incremental Delay, d2 | 55.0 | 14.3 | 1.6 | 89.9 | 2.7 | | 0.3 | 0.2 | | 1.5 | 0.7 | |
| Delay (s) | 83.9 | 43.3 | 24.6 | 119.5 | 28.3 | | 9.5 | 8.5 | | 19.9 | 20.8 | |
| Level of Service | F | D | C | F | C | | A | A | | B | C | |
| Approach Delay (s) | | 41.4 | | | 39.7 | | | 8.9 | | | 20.6 | |
| Approach LOS | | D | | | D | | | A | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 31.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 79.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 100 | 751 | 72 | 108 | 556 | 83 | 116 | 479 | 104 | 69 | 415 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1755 | 3368 | | | 3324 | | 1764 | 3539 | 1527 | 1762 | 3430 | |
| Flt Permitted | 0.23 | 1.00 | | | 0.61 | | 0.40 | 1.00 | 1.00 | 0.42 | 1.00 | |
| Satd. Flow (perm) | 424 | 3368 | | | 2040 | | 741 | 3539 | 1527 | 772 | 3430 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 109 | 816 | 78 | 117 | 604 | 90 | 126 | 521 | 113 | 75 | 451 | 98 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 12 | 0 | 0 | 0 | 45 | 0 | 22 | 0 |
| Lane Group Flow (vph) | 109 | 885 | 0 | 0 | 799 | 0 | 126 | 521 | 68 | 75 | 527 | 0 |
| Confl. Peds. (#/hr) | 34 | | 34 | 37 | | 37 | 8 | | 8 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 11 | | | 8 | | | 35 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | 2 | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 34.1 | 34.1 | | | 34.1 | | 37.9 | 37.9 | 37.9 | 37.9 | 37.9 | |
| Effective Green, g (s) | 34.1 | 34.1 | | | 34.1 | | 37.9 | 37.9 | 37.9 | 37.9 | 37.9 | |
| Actuated g/C Ratio | 0.43 | 0.43 | | | 0.43 | | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 181 | 1436 | | | 870 | | 351 | 1677 | 723 | 366 | 1625 | |
| v/s Ratio Prot | | 0.26 | | | | | | 0.15 | | | 0.15 | |
| v/s Ratio Perm | 0.26 | | | | c0.39 | | c0.17 | | 0.04 | 0.10 | | |
| v/c Ratio | 0.60 | 0.62 | | | 0.92 | | 0.36 | 0.31 | 0.09 | 0.20 | 0.32 | |
| Uniform Delay, d1 | 17.7 | 17.9 | | | 21.6 | | 13.3 | 13.0 | 11.6 | 12.3 | 13.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.31 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.8 | 0.6 | | | 14.0 | | 2.8 | 0.5 | 0.3 | 1.3 | 0.5 | |
| Delay (s) | 21.5 | 18.4 | | | 42.4 | | 16.2 | 13.5 | 11.8 | 13.5 | 13.6 | |
| Level of Service | C | B | | | D | | B | B | B | B | B | |
| Approach Delay (s) | | 18.8 | | | 42.4 | | | 13.7 | | | 13.6 | |
| Approach LOS | | B | | | D | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 22.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 86.4% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 0 | 444 | 359 | 137 | 505 | 0 | 0 | 0 | 0 | 12 | 188 | 22 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frbp, ped/bikes | | 0.97 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Frt | | 0.93 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 3113 | | 1770 | 3427 | | | | | | 3419 | |
| Flt Permitted | | 1.00 | | 0.16 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 3113 | | 295 | 3427 | | | | | | 3419 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 477 | 390 | 149 | 549 | 0 | 0 | 0 | 0 | 13 | 204 | 24 |
| RTOR Reduction (vph) | 0 | 177 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 690 | 0 | 149 | 549 | 0 | 0 | 0 | 0 | 0 | 231 | 0 |
| Confl. Peds. (#/hr) | 26 | | 26 | 28 | | 28 | 21 | | 21 | 101 | | 101 |
| Confl. Bikes (#/hr) | | | 4 | | | 4 | | | 3 | | | 6 |
| Turn Type | Perm | | pm+pt | | pm+pt | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 30.2 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | 30.2 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | 0.38 | | 0.54 | | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | 1175 | | 302 | | 1842 | | | | | | 1239 | |
| v/s Ratio Prot | c0.22 | | c0.05 | | 0.16 | | | | | | | |
| v/s Ratio Perm | | | 0.22 | | | | | | | | 0.07 | |
| v/c Ratio | 0.59 | | 0.49 | | 0.30 | | | | | | 0.19 | |
| Uniform Delay, d1 | 19.9 | | 11.9 | | 10.2 | | | | | | 17.4 | |
| Progression Factor | 2.34 | | 1.00 | | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | 1.9 | | 0.5 | | 0.4 | | | | | | 0.3 | |
| Delay (s) | 48.5 | | 12.4 | | 10.6 | | | | | | 17.8 | |
| Level of Service | D | | B | | B | | | | | | B | |
| Approach Delay (s) | 48.5 | | | | 11.0 | | 0.0 | | | | 17.8 | |
| Approach LOS | D | | | | B | | A | | | | B | |























Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 29.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 70.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Cumulative AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  | |  |  | |  |  |
| Volume (vph) | 116 | 257 | 100 | 618 | 834 | 137 | 265 | 1023 | 392 | 48 | 1183 | 294 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 1.00 | 0.94 | | 1.00 | 0.90 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1479 | 3433 | 3539 | 1484 | | 5034 | 1419 | | 4880 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.68 | 1.00 | | 0.74 | |
| Satd. Flow (perm) | 3433 | 3539 | 1479 | 3433 | 3539 | 1484 | | 3460 | 1419 | | 3595 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 126 | 279 | 109 | 672 | 907 | 149 | 288 | 1112 | 426 | 52 | 1272 | 320 |
| RTOR Reduction (vph) | 0 | 0 | 4 | 0 | 0 | 74 | 0 | 0 | 273 | 0 | 41 | 0 |
| Lane Group Flow (vph) | 126 | 279 | 105 | 672 | 907 | 75 | 0 | 1400 | 153 | 0 | 1603 | 0 |
| Confl. Peds. (#/hr) | 38 | | 38 | 34 | | 34 | 60 | | 60 | 28 | | 28 |
| Confl. Bikes (#/hr) | | | 12 | | | 18 | | | 39 | | | 9 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 8.1 | 33.0 | 33.0 | 16.0 | 41.9 | 41.9 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 8.1 | 33.0 | 33.0 | 16.0 | 41.9 | 41.9 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.08 | 0.33 | 0.33 | 0.16 | 0.42 | 0.42 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 278 | 1168 | 488 | 549 | 1483 | 622 | | 1246 | 511 | | 1294 | |
| v/s Ratio Prot | 0.04 | 0.08 | | c0.20 | c0.26 | | | | | | | |
| v/s Ratio Perm | | | 0.07 | | | 0.05 | | 0.40 | 0.11 | | c0.45 | |
| v/c Ratio | 0.45 | 0.24 | 0.22 | 1.22 | 0.61 | 0.12 | | 3.84dl | 0.30 | | 1.24 | |
| Uniform Delay, d1 | 43.8 | 24.4 | 24.2 | 42.0 | 22.7 | 17.8 | | 32.0 | 23.0 | | 32.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.5 | 1.0 | 116.3 | 1.9 | 0.4 | | 66.6 | 1.5 | | 114.3 | |
| Delay (s) | 44.3 | 24.8 | 25.2 | 158.3 | 24.6 | 18.2 | | 98.6 | 24.5 | | 146.3 | |
| Level of Service | D | C | C | F | C | B | | F | C | | F | |
| Approach Delay (s) | | 29.7 | | | 76.0 | | | 81.3 | | | 146.3 | |
| Approach LOS | | C | | | E | | | F | | | F | |

Intersection Summary

| | | | |
|---|--------|----------------------|------|
| HCM Average Control Delay | 93.8 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.95 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 110.3% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

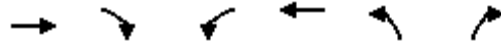
Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|----------------------|------|
| Lane Configurations | WT | | WT | TTT | TTT | |
| Volume (vph) | 68 | 43 | 114 | 1089 | 1252 | 360 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.97 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.94 | | 1.00 | 1.00 | 0.97 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3202 | | 1768 | 3725 | 6191 | |
| Flt Permitted | 0.97 | | 0.10 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3202 | | 188 | 3725 | 6191 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.93 | 0.92 |
| Adj. Flow (vph) | 74 | 47 | 124 | 1134 | 1346 | 391 |
| RTOR Reduction (vph) | 43 | 0 | 0 | 0 | 30 | 0 |
| Lane Group Flow (vph) | 78 | 0 | 124 | 1134 | 1707 | 0 |
| Confl. Peds. (#/hr) | 36 | 36 | 109 | | | |
| Confl. Bikes (#/hr) | | 14 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 6.3 | | 60.2 | 53.8 | 53.8 | |
| Effective Green, g (s) | 6.3 | | 60.2 | 53.8 | 53.8 | |
| Actuated g/C Ratio | 0.08 | | 0.75 | 0.67 | 0.67 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 252 | | 268 | 2505 | 4163 | |
| v/s Ratio Prot | c0.02 | | c0.04 | 0.30 | 0.28 | |
| v/s Ratio Perm | | | c0.31 | | | |
| v/c Ratio | 0.31 | | 0.46 | 0.45 | 0.41 | |
| Uniform Delay, d1 | 34.8 | | 3.1 | 6.2 | 5.9 | |
| Progression Factor | 1.00 | | 1.48 | 1.01 | 1.00 | |
| Incremental Delay, d2 | 0.7 | | 1.0 | 0.5 | 0.3 | |
| Delay (s) | 35.5 | | 5.6 | 6.7 | 6.2 | |
| Level of Service | D | | A | A | A | |
| Approach Delay (s) | 35.5 | | | 6.6 | 6.2 | |
| Approach LOS | D | | | A | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 7.5 | | HCM Level of Service | A |
| HCM Volume to Capacity ratio | | | 0.44 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | | | 60.6% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 14: 21st Street & Access Road

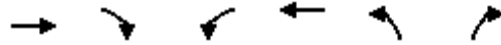
Cumulative AM
Kaiser Center Transportation Study






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 120 | 30 | 89 | 390 | 1 | 1 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 130 | 33 | 97 | 424 | 1 | 1 |
| Pedestrians | 7 | | | 7 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 165 | | 773 | 156 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 165 | | 773 | 156 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 93 | | 100 | 100 |
| cM capacity (veh/h) | | | 1411 | | 340 | 883 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 163 | 521 | 2 | | | |
| Volume Left | 0 | 97 | 1 | | | |
| Volume Right | 33 | 0 | 1 | | | |
| cSH | 1700 | 1411 | 491 | | | |
| Volume to Capacity | 0.10 | 0.07 | 0.00 | | | |
| Queue Length 95th (ft) | 0 | 6 | 0 | | | |
| Control Delay (s) | 0.0 | 2.0 | 12.4 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 2.0 | 12.4 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.6 | | | |
| Intersection Capacity Utilization | | 49.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

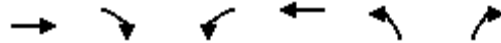
Cumulative AM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 148 | 105 | 150 | 241 | 2 | 2 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 161 | 114 | 163 | 262 | 2 | 2 |
| Pedestrians | 24 | | | 24 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 2 | | | 2 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 277 | | 832 | 244 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 277 | | 832 | 244 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 87 | | 99 | 100 |
| cM capacity (veh/h) | | | 1284 | | 290 | 778 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 275 | 425 | 4 | | | |
| Volume Left | 0 | 163 | 2 | | | |
| Volume Right | 114 | 0 | 2 | | | |
| cSH | 1700 | 1284 | 422 | | | |
| Volume to Capacity | 0.16 | 0.13 | 0.01 | | | |
| Queue Length 95th (ft) | 0 | 11 | 1 | | | |
| Control Delay (s) | 0.0 | 3.9 | 13.6 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 3.9 | 13.6 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | 54.1% | | | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 111 | 8 | 40 | 473 | 25 | 16 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 1.00 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 121 | 8 | 43 | 514 | 27 | 17 |
| Pedestrians | 16 | | | 16 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | | 131 | 744 | 143 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | | 131 | 744 | 143 |
| tC, single (s) | | | | 4.1 | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | | 2.2 | 3.5 | 3.3 |
| p0 queue free % | | | | 97 | 93 | 98 |
| cM capacity (veh/h) | | | | 1452 | 365 | 891 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 129 | 558 | 14 | 14 | 9 | 9 |
| Volume Left | 0 | 43 | 14 | 14 | 0 | 0 |
| Volume Right | 8 | 0 | 0 | 0 | 9 | 9 |
| cSH | 1700 | 1452 | 365 | 365 | 891 | 891 |
| Volume to Capacity | 0.08 | 0.03 | 0.04 | 0.04 | 0.01 | 0.01 |
| Queue Length 95th (ft) | 0 | 2 | 3 | 3 | 1 | 1 |
| Control Delay (s) | 0.0 | 0.9 | 15.2 | 15.2 | 9.1 | 9.1 |
| Lane LOS | | A | C | C | A | A |
| Approach Delay (s) | 0.0 | 0.9 | 12.8 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.5 | | | |
| Intersection Capacity Utilization | 47.9% | | | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 227 | 67 | 59 | 61 | 0 | 0 | 0 | 0 | 184 | 477 | 36 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.95 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1341 | | 1724 | | | | | | 4795 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.56 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1341 | | 992 | | | | | | 4795 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 247 | 73 | 64 | 66 | 0 | 0 | 0 | 0 | 200 | 518 | 39 |
| RTOR Reduction (vph) | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 247 | 31 | 0 | 130 | 0 | 0 | 0 | 0 | 0 | 754 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 16.7 | 16.7 | | 16.7 | | | | | | 55.3 | |
| Effective Green, g (s) | | 16.7 | 16.7 | | 16.7 | | | | | | 55.3 | |
| Actuated g/C Ratio | | 0.21 | 0.21 | | 0.21 | | | | | | 0.69 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 389 | 280 | | 207 | | | | | | 3315 | |
| v/s Ratio Prot | | c0.13 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.02 | | 0.13 | | | | | | 0.16 | |
| v/c Ratio | | 0.63 | 0.11 | | 0.63 | | | | | | 0.23 | |
| Uniform Delay, d1 | | 28.9 | 25.6 | | 28.8 | | | | | | 4.5 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.86 | |
| Incremental Delay, d2 | | 3.4 | 0.2 | | 5.8 | | | | | | 0.1 | |
| Delay (s) | | 32.2 | 25.8 | | 34.7 | | | | | | 4.0 | |
| Level of Service | | C | C | | C | | | | | | A | |
| Approach Delay (s) | | 30.8 | | | 34.7 | | | 0.0 | | | 4.0 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.4 | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | | 0.32 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | | 56.7% | | | ICU Level of Service | | B | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↰ | | | ↰↰ | ↰ | | | |
| Volume (vph) | 8 | 198 | 4 | 0 | 45 | 39 | 12 | 242 | 96 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 1.00 | 0.87 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1848 | | | 1647 | | | 3514 | 1377 | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1840 | | | 1647 | | | 3514 | 1377 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 9 | 215 | 4 | 0 | 49 | 42 | 13 | 263 | 104 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 15 | 0 | 0 | 0 | 86 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 227 | 0 | 0 | 76 | 0 | 0 | 276 | 18 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 29.1 | | | 29.1 | | | 7.9 | 7.9 | | | |
| Effective Green, g (s) | | 29.1 | | | 29.1 | | | 7.9 | 7.9 | | | |
| Actuated g/C Ratio | | 0.65 | | | 0.65 | | | 0.18 | 0.18 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1190 | | | 1065 | | | 617 | 242 | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | | c0.12 | | | | | | 0.08 | 0.01 | | | |
| v/c Ratio | | 0.19 | | | 0.07 | | | 0.45 | 0.08 | | | |
| Uniform Delay, d1 | | 3.2 | | | 2.9 | | | 16.6 | 15.5 | | | |
| Progression Factor | | 0.81 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.1 | | | 0.2 | 0.0 | | | |
| Delay (s) | | 3.0 | | | 3.1 | | | 16.8 | 15.5 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 3.0 | | | 3.1 | | | 16.4 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.3 | | | | | | HCM Level of Service | B | | | |
| HCM Volume to Capacity ratio | | 0.25 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 37.0% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 13 | 136 | 21 | 28 | 0 | 41 | 0 | 381 | 46 | 50 | 422 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.92 | | | 0.98 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1751 | 1819 | | | 1648 | | | 3453 | | | 3509 | |
| Flt Permitted | 0.71 | 1.00 | | | 0.88 | | | 1.00 | | | 0.87 | |
| Satd. Flow (perm) | 1306 | 1819 | | | 1480 | | | 3453 | | | 3052 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 14 | 148 | 23 | 30 | 0 | 45 | 0 | 414 | 50 | 54 | 459 | 0 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 26 | 0 | 0 | 21 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 14 | 158 | 0 | 0 | 49 | 0 | 0 | 443 | 0 | 0 | 513 | 0 |
| Confl. Peds. (#/hr) | 16 | | 16 | 17 | | 17 | 43 | | 43 | 44 | | 44 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | 16 |
| Turn Type | Perm | | | Perm | | | | Perm | | | | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | 4 | | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 551 | 768 | | | 625 | | | 1304 | | | 1153 | |
| v/s Ratio Prot | | c0.09 | | | | | | 0.13 | | | | |
| v/s Ratio Perm | 0.01 | | | | 0.03 | | | | | | c0.17 | |
| v/c Ratio | 0.03 | 0.21 | | | 0.08 | | | 0.34 | | | 0.44 | |
| Uniform Delay, d1 | 7.6 | 8.2 | | | 7.8 | | | 10.0 | | | 10.5 | |
| Progression Factor | 1.00 | 1.00 | | | 1.28 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.6 | | | 0.2 | | | 0.7 | | | 1.2 | |
| Delay (s) | 7.7 | 8.8 | | | 10.2 | | | 10.7 | | | 11.7 | |
| Level of Service | A | A | | | B | | | B | | | B | |
| Approach Delay (s) | | 8.7 | | | 10.2 | | | 10.7 | | | 11.7 | |
| Approach LOS | | A | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.32 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 70.7% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | ↔ | ↔↔ | |
| Volume (vph) | 22 | 92 | 24 | 15 | 234 | 119 | 40 | 547 | 28 | 188 | 194 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | 0.95 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3402 | | | 3325 | | | 3498 | | 1769 | 3381 | |
| Flt Permitted | | 0.85 | | | 0.94 | | | 0.92 | | 0.32 | 1.00 | |
| Satd. Flow (perm) | | 2921 | | | 3128 | | | 3216 | | 589 | 3381 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 24 | 100 | 26 | 16 | 249 | 129 | 43 | 558 | 30 | 204 | 211 | 76 |
| RTOR Reduction (vph) | 0 | 21 | 0 | 0 | 106 | 0 | 0 | 5 | 0 | 0 | 25 | 0 |
| Lane Group Flow (vph) | 0 | 129 | 0 | 0 | 288 | 0 | 0 | 626 | 0 | 204 | 262 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 10.9 | | | 10.9 | | | 27.3 | | 40.1 | 40.1 | |
| Effective Green, g (s) | | 10.9 | | | 10.9 | | | 27.3 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | | 0.18 | | | 0.18 | | | 0.46 | | 0.67 | 0.67 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 531 | | | 568 | | | 1463 | | 557 | 2260 | |
| v/s Ratio Prot | | | | | | | | | | c0.05 | 0.08 | |
| v/s Ratio Perm | | 0.04 | | | c0.09 | | | c0.19 | | 0.19 | | |
| v/c Ratio | | 0.24 | | | 0.51 | | | 0.43 | | 0.37 | 0.12 | |
| Uniform Delay, d1 | | 21.0 | | | 22.1 | | | 11.1 | | 4.4 | 3.6 | |
| Progression Factor | | 1.00 | | | 1.02 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 0.7 | | | 0.9 | | 0.4 | 0.1 | |
| Delay (s) | | 21.3 | | | 23.1 | | | 12.0 | | 4.8 | 3.7 | |
| Level of Service | | C | | | C | | | B | | A | A | |
| Approach Delay (s) | | 21.3 | | | 23.1 | | | 12.0 | | | 4.1 | |
| Approach LOS | | C | | | C | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 13.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 62.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔↔ | |
| Volume (vph) | 10 | 176 | 71 | 56 | 177 | 128 | 69 | 552 | 79 | 72 | 477 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.98 | | | 0.96 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.96 | | | 0.95 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | | 3317 | | | 3151 | | | 3413 | | | 4982 | |
| Flt Permitted | | 0.94 | | | 0.87 | | | 0.84 | | | 0.78 | |
| Satd. Flow (perm) | | 3118 | | | 2752 | | | 2888 | | | 3896 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 11 | 191 | 77 | 61 | 192 | 139 | 75 | 594 | 86 | 78 | 518 | 33 |
| RTOR Reduction (vph) | 0 | 49 | 0 | 0 | 88 | 0 | 0 | 17 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 230 | 0 | 0 | 304 | 0 | 0 | 738 | 0 | 0 | 619 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 99 | | 99 | 72 | | 72 | 49 | | 49 |
| Confl. Bikes (#/hr) | | | 7 | | | 33 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1143 | | | 1009 | | | 1457 | | | 1169 | |
| v/s Ratio Prot | | | | | | | | c0.06 | | | | |
| v/s Ratio Perm | | 0.07 | | | c0.11 | | | c0.19 | | | 0.16 | |
| v/c Ratio | | 0.20 | | | 0.30 | | | 0.51 | | | 0.53 | |
| Uniform Delay, d1 | | 13.0 | | | 13.5 | | | 10.6 | | | 17.5 | |
| Progression Factor | | 0.85 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 0.8 | | | 1.3 | | | 1.7 | |
| Delay (s) | | 11.4 | | | 14.3 | | | 11.9 | | | 19.2 | |
| Level of Service | | B | | | B | | | B | | | B | |
| Approach Delay (s) | | 11.4 | | | 14.3 | | | 11.9 | | | 19.2 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.42 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 79.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 34 | 330 | 0 | 0 | 301 | 102 | 39 | 227 | 113 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3513 | | | 3366 | 1337 | | 5008 | 1458 | | | |
| Flt Permitted | | 0.91 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3198 | | | 3366 | 1337 | | 5008 | 1458 | | | |
| Peak-hour factor, PHF | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 35 | 359 | 0 | 0 | 327 | 111 | 42 | 247 | 123 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 22 | 0 | 0 | 107 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 394 | 0 | 0 | 337 | 79 | 0 | 289 | 16 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 62.8 | | | 62.8 | 62.8 | | 10.2 | 10.2 | | | |
| Effective Green, g (s) | | 62.8 | | | 62.8 | 62.8 | | 10.2 | 10.2 | | | |
| Actuated g/C Ratio | | 0.78 | | | 0.78 | 0.78 | | 0.13 | 0.13 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2510 | | | 2642 | 1050 | | 639 | 186 | | | |
| v/s Ratio Prot | | | | | 0.10 | | | | | | | |
| v/s Ratio Perm | | c0.12 | | | | 0.06 | | 0.06 | 0.01 | | | |
| v/c Ratio | | 0.16 | | | 0.13 | 0.07 | | 0.45 | 0.08 | | | |
| Uniform Delay, d1 | | 2.1 | | | 2.1 | 2.0 | | 32.3 | 30.8 | | | |
| Progression Factor | | 1.00 | | | 0.28 | 0.14 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.1 | | | 0.1 | 0.1 | | 0.5 | 0.2 | | | |
| Delay (s) | | 2.2 | | | 0.7 | 0.4 | | 32.8 | 31.0 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 2.2 | | | 0.6 | | | 32.3 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.20 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 56.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 23: 20th Street & Webster Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 270 | 179 | 188 | 298 | 0 | 0 | 0 | 0 | 80 | 406 | 107 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.90 | 1.00 | 1.00 | | | | | | 0.94 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 0.99 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1422 | 1610 | 3354 | | | | | | 4451 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.93 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1422 | 1610 | 3134 | | | | | | 4451 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 293 | 188 | 204 | 324 | 0 | 0 | 0 | 0 | 87 | 441 | 116 |
| RTOR Reduction (vph) | 0 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 0 |
| Lane Group Flow (vph) | 0 | 293 | 97 | 171 | 357 | 0 | 0 | 0 | 0 | 0 | 601 | 0 |
| Confl. Peds. (#/hr) | 53 | | 53 | 86 | | 86 | 105 | | 105 | 331 | | 331 |
| Confl. Bikes (#/hr) | | | 16 | | | 2 | | | 1 | | | 14 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Effective Green, g (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | 0.20 | 0.51 | | | | | | 0.39 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 929 | 373 | 322 | 1650 | | | | | | 1725 | |
| v/s Ratio Prot | | c0.08 | | c0.11 | 0.04 | | | | | | | |
| v/s Ratio Perm | | | 0.07 | | 0.07 | | | | | | 0.13 | |
| v/c Ratio | | 0.32 | 0.26 | 0.53 | 0.22 | | | | | | 0.35 | |
| Uniform Delay, d1 | | 23.7 | 23.4 | 28.6 | 10.7 | | | | | | 17.3 | |
| Progression Factor | | 1.05 | 1.25 | 1.17 | 1.93 | | | | | | 1.16 | |
| Incremental Delay, d2 | | 0.9 | 1.7 | 0.7 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 25.7 | 31.0 | 34.3 | 20.6 | | | | | | 20.2 | |
| Level of Service | | C | C | C | C | | | | | | C | |
| Approach Delay (s) | | 27.8 | | | 25.0 | | | 0.0 | | | 20.2 | |
| Approach LOS | | C | | | C | | | A | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.38 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 87.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

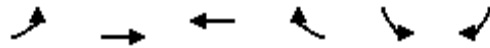
Cumulative AM
Kaiser Center Transportation Study










| Movement | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER |
|-----------------------------------|------|-------|-------|-------|----------------------|--------|--------|------|------|------|
| Lane Configurations | 🚗🚗🚗 | | | | 🚗🚗 | 🚗🚗 | 🚗 | 🚗 | | |
| Volume (vph) | 175 | 204 | 102 | 62 | 451 | 516 | 555 | 116 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Lane Util. Factor | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | |
| Frpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Frt | 0.92 | | | | 1.00 | 0.96 | 0.85 | 0.85 | | |
| Flt Protected | 0.98 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (prot) | 4720 | | | | 3492 | 3245 | 1441 | 1583 | | |
| Flt Permitted | 0.98 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (perm) | 4720 | | | | 3492 | 3245 | 1441 | 1583 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.94 | 0.96 | 0.92 | 0.96 | 0.96 | 0.92 | 0.92 |
| Adj. Flow (vph) | 190 | 222 | 109 | 66 | 470 | 561 | 578 | 121 | 0 | 0 |
| RTOR Reduction (vph) | 169 | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 0 | 0 |
| Lane Group Flow (vph) | 243 | 0 | 0 | 0 | 645 | 786 | 353 | 73 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | 102 | | |
| Confl. Bikes (#/hr) | | | | | 6 | | | 10 | | |
| Turn Type | | | Split | Split | | custom | custom | | | |
| Protected Phases | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | |
| Permitted Phases | 1 | | | | | | 6 | | | |
| Actuated Green, G (s) | 19.0 | | | | 24.0 | 25.0 | 48.0 | 48.0 | | |
| Effective Green, g (s) | 19.0 | | | | 24.0 | 25.0 | 48.0 | 48.0 | | |
| Actuated g/C Ratio | 0.24 | | | | 0.30 | 0.31 | 0.60 | 0.60 | | |
| Clearance Time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 1121 | | | | 1048 | 1014 | 865 | 950 | | |
| v/s Ratio Prot | 0.05 | | | | c0.18 | c0.24 | c0.24 | 0.05 | | |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.22 | | | | 0.62 | 0.78 | 0.41 | 0.08 | | |
| Uniform Delay, d1 | 24.5 | | | | 24.0 | 24.9 | 8.5 | 6.7 | | |
| Progression Factor | 2.62 | | | | 1.00 | 0.59 | 0.65 | 0.27 | | |
| Incremental Delay, d2 | 0.4 | | | | 0.8 | 3.2 | 1.3 | 0.1 | | |
| Delay (s) | 64.6 | | | | 24.8 | 18.0 | 6.8 | 2.0 | | |
| Level of Service | E | | | | C | B | A | A | | |
| Approach Delay (s) | 64.6 | | | | 24.8 | 13.4 | | | 0.0 | |
| Approach LOS | E | | | | C | B | | | A | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | 25.7 | | | HCM Level of Service | | | | C | |
| HCM Volume to Capacity ratio | | 0.63 | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | | 12.0 | |
| Intersection Capacity Utilization | | 69.8% | | | ICU Level of Service | | | | C | |
| Analysis Period (min) | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 25: 20th Street & Access Road Exit

Cumulative AM
Kaiser Center Transportation Study

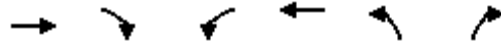


| Movement | EBL | EBT | WBT | WBR | SBL | SBR | |
|-----------------------------------|---|---|---|------|----------------------|---|------|
| Lane Configurations |  |    |   | | |  | |
| Volume (veh/h) | 40 | 350 | 550 | 0 | 0 | 38 | |
| Sign Control | | Free | Free | | Stop | | |
| Grade | | 0% | 0% | | 0% | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Hourly flow rate (vph) | 43 | 380 | 598 | 0 | 0 | 41 | |
| Pedestrians | | | | | | | |
| Lane Width (ft) | | | | | | | |
| Walking Speed (ft/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | None | None | | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (ft) | | 431 | 98 | | | | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 598 | | | | 812 | 299 | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 598 | | | | 812 | 299 | |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 | |
| p0 queue free % | 96 | | | | 100 | 94 | |
| cM capacity (veh/h) | 975 | | | | 303 | 697 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | EB 4 | WB 1 | WB 2 | SB 1 |
| Volume Total | 43 | 127 | 127 | 127 | 299 | 299 | 41 |
| Volume Left | 43 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 41 |
| cSH | 975 | 1700 | 1700 | 1700 | 1700 | 1700 | 697 |
| Volume to Capacity | 0.04 | 0.07 | 0.07 | 0.07 | 0.18 | 0.18 | 0.06 |
| Queue Length 95th (ft) | 3 | 0 | 0 | 0 | 0 | 0 | 5 |
| Control Delay (s) | 8.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.5 |
| Lane LOS | A | | | | | | B |
| Approach Delay (s) | 0.9 | | | | 0.0 | | 10.5 |
| Approach LOS | | | | | | | B |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.8 | | | | |
| Intersection Capacity Utilization | | 25.2% | | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | | |
| | | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: Harrison Street & Lakeside Drive

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|------------------------|------|------|-------|-------|------|-------|
| Lane Configurations | ↑↑↑ | | ↵↵ | ↑↑↑ | ↵↵ | ↵ |
| Volume (vph) | 570 | 56 | 532 | 995 | 192 | 1129 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5017 | | 3433 | 5085 | 3173 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5017 | | 3433 | 5085 | 3173 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.97 |
| Adj. Flow (vph) | 620 | 61 | 554 | 1082 | 209 | 1164 |
| RTOR Reduction (vph) | 15 | 0 | 0 | 0 | 347 | 347 |
| Lane Group Flow (vph) | 666 | 0 | 554 | 1082 | 444 | 235 |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 33.0 | | 16.4 | 54.4 | 17.6 | 17.6 |
| Effective Green, g (s) | 33.0 | | 16.4 | 54.4 | 17.6 | 17.6 |
| Actuated g/C Ratio | 0.41 | | 0.20 | 0.68 | 0.22 | 0.22 |
| Clearance Time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 2070 | | 704 | 3458 | 698 | 317 |
| v/s Ratio Prot | 0.13 | | c0.16 | c0.21 | 0.14 | |
| v/s Ratio Perm | | | | | | c0.16 |
| v/c Ratio | 0.32 | | 0.79 | 0.31 | 0.64 | 0.74 |
| Uniform Delay, d1 | 15.9 | | 30.1 | 5.2 | 28.3 | 29.1 |
| Progression Factor | 0.59 | | 0.83 | 1.29 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.4 | | 8.3 | 0.2 | 1.9 | 9.0 |
| Delay (s) | 9.8 | | 33.5 | 6.9 | 30.2 | 38.1 |
| Level of Service | A | | C | A | C | D |
| Approach Delay (s) | 9.8 | | | 15.9 | 33.5 | |
| Approach LOS | A | | | B | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 21.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 66.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↱↱↱ | |
| Volume (vph) | 0 | 0 | 0 | 82 | 110 | 0 | 0 | 0 | 0 | 0 | 3648 | 14 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1770 | 3539 | | | | | | 6403 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1770 | 3539 | | | | | | 6403 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 88 | 120 | 0 | 0 | 0 | 0 | 0 | 3800 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 88 | 120 | 0 | 0 | 0 | 0 | 0 | 3815 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Effective Green, g (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Actuated g/C Ratio | | | | 0.12 | 0.12 | | | | | | 0.76 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 217 | 434 | | | | | | 4849 | |
| v/s Ratio Prot | | | | | 0.03 | | | | | | c0.60 | |
| v/s Ratio Perm | | | | c0.05 | | | | | | | | |
| v/c Ratio | | | | 0.41 | 0.28 | | | | | | 0.79 | |
| Uniform Delay, d1 | | | | 30.4 | 29.9 | | | | | | 5.5 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.97 | |
| Incremental Delay, d2 | | | | 5.5 | 1.6 | | | | | | 0.9 | |
| Delay (s) | | | | 35.9 | 31.5 | | | | | | 6.2 | |
| Level of Service | | | | D | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 33.3 | | | 0.0 | | | 6.2 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.6 | | | HCM Level of Service | | | | | A | |
| HCM Volume to Capacity ratio | | | 0.73 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | | 9.0 | | |
| Intersection Capacity Utilization | | | 66.4% | | | ICU Level of Service | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Cumulative AM
Kaiser Center Transportation Study




















| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|------|-------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 219 | 1172 | 646 | 84 | 594 | 131 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.98 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 4970 | | 3376 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 4970 | | 3376 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.95 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 238 | 1221 | 680 | 91 | 632 | 142 |
| RTOR Reduction (vph) | 30 | 0 | 25 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 208 | 1221 | 746 | 0 | 774 | 0 |
| Confl. Peds. (#/hr) | | | | 22 | | |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 32.1 | 32.1 | 17.4 | | 13.5 | |
| Effective Green, g (s) | 32.1 | 32.1 | 17.4 | | 13.5 | |
| Actuated g/C Ratio | 0.43 | 0.43 | 0.23 | | 0.18 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 758 | 2176 | 1153 | | 608 | |
| v/s Ratio Prot | | c0.24 | c0.15 | | c0.23 | |
| v/s Ratio Perm | 0.12 | | | | | |
| v/c Ratio | 0.27 | 0.56 | 0.65 | | 1.27 | |
| Uniform Delay, d1 | 13.9 | 16.1 | 26.0 | | 30.8 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.9 | 1.1 | 1.3 | | 135.4 | |
| Delay (s) | 14.8 | 17.2 | 27.3 | | 166.1 | |
| Level of Service | B | B | C | | F | |
| Approach Delay (s) | | 16.8 | 27.3 | | 166.1 | |
| Approach LOS | | B | C | | F | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 58.0 | | HCM Level of Service | E |
| HCM Volume to Capacity ratio | | | 0.74 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 69.1% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th St. & Castro Street

Cumulative AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | |  |  |  |  |  | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 180 | 281 | 357 | 358 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.99 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.99 | 1.00 | | | | |
| Frt | | | | | 0.93 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3150 | 1423 | 1425 | 5925 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3150 | 1423 | 1425 | 5925 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 191 | 305 | 388 | 389 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 56 | 59 | 154 | 154 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 284 | 98 | 40 | 429 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 5 | | 5 | | | |
| Confl. Bikes (#/hr) | | | 6 | | | 2 | | | 5 | | | |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 37.5 | 37.5 | 12.5 | 12.5 | | | | |
| Effective Green, g (s) | | | | | 37.5 | 37.5 | 12.5 | 12.5 | | | | |
| Actuated g/C Ratio | | | | | 0.62 | 0.62 | 0.21 | 0.21 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1969 | 889 | 297 | 1234 | | | | |
| v/s Ratio Prot | | | | | c0.09 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.07 | 0.03 | 0.07 | | | | |
| v/c Ratio | | | | | 0.14 | 0.11 | 0.14 | 0.35 | | | | |
| Uniform Delay, d1 | | | | | 4.6 | 4.5 | 19.4 | 20.3 | | | | |
| Progression Factor | | | | | 3.81 | 6.84 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.1 | 0.1 | 0.2 | 0.2 | | | | |
| Delay (s) | | | | | 17.8 | 31.1 | 19.6 | 20.4 | | | | |
| Level of Service | | | | | B | C | B | C | | | | |
| Approach Delay (s) | | 0.0 | | | 22.0 | | | 20.2 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 20.9 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.20 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 30.3% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 198 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 1216 | 1366 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frbp, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3427 | | | | | | | | 1522 | 4723 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3427 | | | | | | | | 1522 | 4723 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 213 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 1322 | 1485 | 41 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 345 | 63 | 0 |
| Lane Group Flow (vph) | 0 | 257 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 356 | 2084 | 0 |
| Confl. Peds. (#/hr) | 6 | | 6 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | 1 | | 1 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Effective Green, g (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Actuated g/C Ratio | | 0.52 | | | | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1771 | | | | | | | | 634 | 1968 | |
| v/s Ratio Prot | | c0.08 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.23 | 0.44 | |
| v/c Ratio | | 0.15 | | | | | | | | 0.56 | 1.06 | |
| Uniform Delay, d1 | | 15.2 | | | | | | | | 26.7 | 35.0 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | 3.6 | 38.0 | |
| Delay (s) | | 15.3 | | | | | | | | 30.2 | 73.0 | |
| Level of Service | | B | | | | | | | | C | E | |
| Approach Delay (s) | | 15.3 | | | 0.0 | | | 0.0 | | | 62.5 | |
| Approach LOS | | B | | | A | | | A | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 58.5 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.55 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 61.5% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔ | ↔ | | | |
| Volume (vph) | 46 | 353 | 0 | 0 | 740 | 649 | 157 | 683 | 31 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | | 1.00 | 0.97 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3515 | | | 3539 | 1548 | | 3491 | 1531 | | | |
| Flt Permitted | | 0.71 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2520 | | | 3539 | 1548 | | 3491 | 1531 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 50 | 384 | 0 | 0 | 804 | 676 | 171 | 711 | 34 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 117 | 0 | 0 | 16 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 434 | 0 | 0 | 804 | 559 | 0 | 882 | 18 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 35 | | 35 | 6 | | 6 | 26 | | 26 | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 33 | | | 6 | | 10 | | | | 5 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | Perm | | | |
| Protected Phases | | 4 | | | 8 | 8 | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 756 | | | 1062 | 464 | | 1862 | 817 | | | |
| v/s Ratio Prot | | | | | 0.23 | | | | | | | |
| v/s Ratio Perm | | 0.17 | | | | 0.36 | | 0.25 | 0.01 | | | |
| v/c Ratio | | 0.57 | | | 0.76 | 1.20 | | 0.47 | 0.02 | | | |
| Uniform Delay, d1 | | 17.8 | | | 19.0 | 21.0 | | 8.7 | 6.6 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 3.2 | | | 5.0 | 11.2 | | 0.9 | 0.1 | | | |
| Delay (s) | | 20.9 | | | 24.1 | 132.2 | | 9.6 | 6.7 | | | |
| Level of Service | | C | | | C | F | | A | A | | | |
| Approach Delay (s) | | 20.9 | | | 73.4 | | | 9.5 | | | 0.0 | |
| Approach LOS | | C | | | E | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 44.7 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.74 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 91.8% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 315 | 135 | 156 | 930 | 0 | 0 | 0 | 0 | 212 | 417 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.99 | 1.00 | |
| Frt | | 0.95 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3335 | | | 3507 | | | | | 1746 | 3505 | |
| Flt Permitted | | 1.00 | | | 0.80 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3335 | | | 2819 | | | | | 1746 | 3505 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 342 | 147 | 170 | 969 | 0 | 0 | 0 | 0 | 230 | 434 | 25 |
| RTOR Reduction (vph) | 0 | 85 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 0 | 404 | 0 | 0 | 1139 | 0 | 0 | 0 | 0 | 230 | 450 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 28 | | 28 | 18 | | 18 | 16 | | 16 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 3 | | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | 6 | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1408 | | | 1190 | | | | | 737 | 1480 | |
| v/s Ratio Prot | | 0.12 | | | | | | | | | 0.13 | |
| v/s Ratio Perm | | | | | c0.40 | | | | | c0.13 | | |
| v/c Ratio | | 0.29 | | | 0.96 | | | | | 0.31 | 0.30 | |
| Uniform Delay, d1 | | 8.5 | | | 12.6 | | | | | 8.7 | 8.6 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 17.6 | | | | | 1.1 | 0.5 | |
| Delay (s) | | 9.1 | | | 30.2 | | | | | 9.8 | 9.1 | |
| Level of Service | | A | | | C | | | | | A | A | |
| Approach Delay (s) | | 9.1 | | | 30.2 | | | 0.0 | | | 9.3 | |
| Approach LOS | | A | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 19.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 67.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 51 | 191 | 14 | 9 | 460 | 114 | 76 | 478 | 31 | 34 | 85 | 32 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | 0.97 | | | 0.99 | | | 0.97 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3462 | | | 3387 | | | 3466 | | | 3344 | |
| Flt Permitted | | 0.81 | | | 0.95 | | | 0.89 | | | 0.80 | |
| Satd. Flow (perm) | | 2846 | | | 3222 | | | 3109 | | | 2721 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 55 | 208 | 15 | 10 | 500 | 124 | 83 | 520 | 34 | 37 | 92 | 35 |
| RTOR Reduction (vph) | 0 | 8 | 0 | 0 | 42 | 0 | 0 | 10 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 0 | 270 | 0 | 0 | 592 | 0 | 0 | 627 | 0 | 0 | 141 | 0 |
| Confl. Peds. (#/hr) | 30 | | 30 | 55 | | 55 | 41 | | 41 | 40 | | 40 |
| Confl. Bikes (#/hr) | | | 7 | | | 19 | | | 6 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 22.2 | | | 22.2 | | | 15.3 | | | 15.3 | |
| Effective Green, g (s) | | 22.2 | | | 22.2 | | | 15.3 | | | 15.3 | |
| Actuated g/C Ratio | | 0.49 | | | 0.49 | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1404 | | | 1590 | | | 1057 | | | 925 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | 0.10 | | | 0.18 | | | 0.20 | | | 0.05 | |
| v/c Ratio | | 0.19 | | | 0.37 | | | 0.59 | | | 0.15 | |
| Uniform Delay, d1 | | 6.4 | | | 7.1 | | | 12.3 | | | 10.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.7 | | | 0.9 | | | 0.1 | |
| Delay (s) | | 6.7 | | | 7.7 | | | 13.2 | | | 10.4 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 6.7 | | | 7.7 | | | 13.2 | | | 10.4 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.8 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.46 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 70.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

35: 12th St. & Madison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 478 | 1728 | 0 | 0 | 0 | 0 | 0 | 591 | 104 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6291 | | | | | | 4933 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6291 | | | | | | 4933 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 520 | 1781 | 0 | 0 | 0 | 0 | 0 | 603 | 113 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 87 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2214 | 0 | 0 | 0 | 0 | 0 | 714 | 0 |
| Confl. Peds. (#/hr) | 48 | | 48 | 30 | | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | 9 | | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2726 | | | | | | 2179 | |
| v/s Ratio Prot | | | | | | | | | | | c0.14 | |
| v/s Ratio Perm | | | | | 0.35 | | | | | | | |
| v/c Ratio | | | | | 0.81 | | | | | | 0.33 | |
| Uniform Delay, d1 | | | | | 14.9 | | | | | | 10.9 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 2.1 | | | | | | 0.4 | |
| Delay (s) | | | | | 9.1 | | | | | | 11.3 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 9.1 | | | 0.0 | | | 11.3 | |
| Approach LOS | | A | | | A | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 54.7% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th St. & Oak St.

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1936 | 89 | 372 | 904 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6342 | | | 6163 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6342 | | | 6163 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1996 | 97 | 400 | 983 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2087 | 0 | 0 | 1382 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | 1 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3160 | | | 2116 | | | | |
| v/s Ratio Prot | | | | | c0.33 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.22 | | | | |
| v/c Ratio | | | | | 0.66 | | | 0.65 | | | | |
| Uniform Delay, d1 | | | | | 11.3 | | | 16.7 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 1.1 | | | 1.6 | | | | |
| Delay (s) | | | | | 12.4 | | | 18.3 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 12.4 | | | 18.3 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.5 |
| Intersection Capacity Utilization | 65.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 76 | 0 | 0 | 1222 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 83 | 0 | 0 | 1234 | 0 | 0 |
| Pedestrians | 12 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 1 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 321 | 12 | 12 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 321 | 12 | 12 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 87 | 100 | 100 | | | |
| cM capacity (veh/h) | 641 | 1055 | 1589 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 83 | 309 | 309 | 309 | 309 | |
| Volume Left | 83 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 641 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.13 | 0.18 | 0.18 | 0.18 | 0.18 | |
| Queue Length 95th (ft) | 11 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.4 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.4 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 28.6% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 457 | 174 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 949 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6057 | | | | | | | | | 5063 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6057 | | | | | | | | | 5063 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 497 | 189 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 999 | 0 |
| RTOR Reduction (vph) | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 659 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1056 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2322 | | | | | | | | | 2194 | |
| v/s Ratio Prot | | c0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.21 | |
| v/c Ratio | | 0.28 | | | | | | | | | 0.48 | |
| Uniform Delay, d1 | | 12.8 | | | | | | | | | 12.2 | |
| Progression Factor | | 0.78 | | | | | | | | | 0.96 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | | 0.6 | |
| Delay (s) | | 10.3 | | | | | | | | | 12.4 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 10.3 | | | 0.0 | | | 0.0 | | | 12.4 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 11.6 | | | | HCM Level of Service | | | | B | |
| HCM Volume to Capacity ratio | | | 0.39 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | Sum of lost time (s) | | | 11.0 | | |
| Intersection Capacity Utilization | | | 43.0% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4111 | | | | | | 1111 | | | | |
| Volume (vph) | 99 | 463 | 0 | 0 | 0 | 0 | 0 | 377 | 68 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6304 | | | | | | 6231 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6304 | | | | | | 6231 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 108 | 498 | 0 | 0 | 0 | 0 | 0 | 410 | 74 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 90 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 516 | 0 | 0 | 0 | 0 | 0 | 463 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | 56 | 21 | | 21 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 5 | | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 10.0 | | | | | | 43.0 | | | | |
| Effective Green, g (s) | | 10.0 | | | | | | 43.0 | | | | |
| Actuated g/C Ratio | | 0.17 | | | | | | 0.72 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1051 | | | | | | 4466 | | | | |
| v/s Ratio Prot | | | | | | | | c0.07 | | | | |
| v/s Ratio Perm | | 0.08 | | | | | | | | | | |
| v/c Ratio | | 0.49 | | | | | | 0.10 | | | | |
| Uniform Delay, d1 | | 22.7 | | | | | | 2.6 | | | | |
| Progression Factor | | 1.03 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.0 | | | | |
| Delay (s) | | 23.5 | | | | | | 2.6 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 23.5 | | | 0.0 | | | 2.6 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.2 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.18 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 39.9% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 156 | 739 | 0 | 0 | 0 | 0 | 0 | 1269 | 334 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.97 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6335 | | | | | | 4904 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6335 | | | | | | 4904 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 168 | 803 | 0 | 0 | 0 | 0 | 0 | 1379 | 363 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 966 | 0 | 0 | 0 | 0 | 0 | 1703 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 59 | | 59 | 12 | | 12 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 2 | | | 1 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2534 | | | | | | 1962 | | | | |
| v/s Ratio Prot | | | | | | | | c0.35 | | | | |
| v/s Ratio Perm | | 0.15 | | | | | | | | | | |
| v/c Ratio | | 0.38 | | | | | | 0.87 | | | | |
| Uniform Delay, d1 | | 9.6 | | | | | | 12.4 | | | | |
| Progression Factor | | 0.85 | | | | | | 0.77 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 3.6 | | | | |
| Delay (s) | | 8.4 | | | | | | 13.2 | | | | |
| Level of Service | | A | | | | | | B | | | | |
| Approach Delay (s) | | 8.4 | | | 0.0 | | | 13.2 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 55.0% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|--------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 647 | 564 | 0 | 0 | 0 | 0 | 0 | 0 | 270 | 1578 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.93 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 5917 | | | | | | | | | 5041 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 5917 | | | | | | | | | 5041 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 703 | 613 | 0 | 0 | 0 | 0 | 0 | 0 | 293 | 1610 | 0 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 0 |
| Lane Group Flow (vph) | 0 | 1312 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1846 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 10 | | 10 | 8 | | 8 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 7 | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2367 | | | | | | | | | 2240 | |
| v/s Ratio Prot | | c0.22 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.37 | |
| v/c Ratio | | 0.95dr | | | | | | | | | 0.82 | |
| Uniform Delay, d1 | | 10.4 | | | | | | | | | 11.0 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.9 | | | | | | | | | 3.6 | |
| Delay (s) | | 11.3 | | | | | | | | | 14.6 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 11.3 | | | 0.0 | | | 0.0 | | | 14.6 | |
| Approach LOS | | B | | | A | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 63.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|--------|-------|------|------|----------------------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↷ | ↷ | | ↕ | | | ↷ | ↷ |
| Volume (vph) | 0 | 0 | 0 | 27 | 400 | 61 | 260 | 325 | 0 | 0 | 192 | 2043 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1736 | 1863 | 1503 | | 1821 | | | 1863 | 1558 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.76 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1736 | 1863 | 1503 | | 1413 | | | 1863 | 1558 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 29 | 417 | 66 | 283 | 353 | 0 | 0 | 209 | 2151 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 76 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 29 | 417 | 19 | 0 | 636 | 0 | 0 | 209 | 2075 |
| Confl. Peds. (#/hr) | 1 | | 1 | 23 | | 23 | 2 | | 2 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 12.8 | 12.8 | 12.8 | | 21.2 | | | 21.2 | 21.2 |
| Effective Green, g (s) | | | | 12.8 | 12.8 | 12.8 | | 21.2 | | | 21.2 | 21.2 |
| Actuated g/C Ratio | | | | 0.28 | 0.28 | 0.28 | | 0.47 | | | 0.47 | 0.47 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 494 | 530 | 428 | | 666 | | | 878 | 734 |
| v/s Ratio Prot | | | | c0.22 | | | | | | | 0.11 | |
| v/s Ratio Perm | | | | 0.02 | | 0.01 | | 0.45 | | | | c1.33 |
| v/c Ratio | | | | 0.06 | 0.79 | 0.04 | | 0.95 | | | 0.24 | 2.83 |
| Uniform Delay, d1 | | | | 11.7 | 14.8 | 11.7 | | 11.4 | | | 7.1 | 11.9 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 7.6 | 0.0 | | 25.4 | | | 0.6 | 826.1 |
| Delay (s) | | | | 11.8 | 22.4 | 11.7 | | 36.9 | | | 7.7 | 838.0 |
| Level of Service | | | | B | C | B | | D | | | A | F |
| Approach Delay (s) | | 0.0 | | | 20.4 | | | 36.9 | | | 764.5 | |
| Approach LOS | | A | | | C | | | D | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 524.0 | | | | HCM Level of Service | | | | F | |
| HCM Volume to Capacity ratio | | | 2.06 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | Sum of lost time (s) | | | 11.0 | | |
| Intersection Capacity Utilization | | | 193.3% | | | | ICU Level of Service | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Cumulative AM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|---|--------|------|-------|------|----------------------|-------|
| Lane Configurations | ← | ← | ↑↑ | ← | ↑↑ | ← |
| Volume (vph) | 0 | 166 | 580 | 162 | 65 | 997 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frbp, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3497 | | 3191 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3497 | | 3191 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 180 | 604 | 176 | 71 | 1084 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 784 | 0 | 789 | 542 |
| Confl. Peds. (#/hr) | 51 | 2 | | | | |
| Confl. Bikes (#/hr) | 2 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1267 | | 1149 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.22 | | 0.25 | c0.38 |
| v/c Ratio | | | 0.62 | | 0.95dr | 1.04 |
| Uniform Delay, d1 | | | 11.8 | | 12.2 | 14.4 |
| Progression Factor | | | 0.85 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.2 | | 3.4 | 51.6 |
| Delay (s) | | | 10.2 | | 15.6 | 66.0 |
| Level of Service | | | B | | B | E |
| Approach Delay (s) | | | 10.2 | | 36.1 | |
| Approach LOS | | | B | | D | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 26.5 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.82 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 76.0% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 410 | 746 | 206 | 0 | 0 | 0 | 0 | 311 | 92 | 4 | 158 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.97 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4857 | | | | | | 1800 | | | 1861 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.99 | |
| Satd. Flow (perm) | | 1850 | | | | | | 1500 | | | 1600 | |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 432 | 811 | 224 | 0 | 0 | 0 | 0 | 338 | 100 | 4 | 172 | 0 |
| RTOR Reduction (vph) | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1410 | 0 | 0 | 0 | 0 | 0 | 414 | 0 | 0 | 176 | 0 |
| Confl. Peds. (#/hr) | 14 | | 14 | 52 | | 52 | 1 | | 1 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 5 | | | 2 | | | | | | |
| Turn Type | Perm | | | | | Perm | | | | | | |
| Protected Phases | 1 | | | | | 2 | | | | | 2 | |
| Permitted Phases | 1 | | | | | 2 | | | | | | |
| Actuated Green, G (s) | 22.5 | | | | | 15.5 | | | | | 15.5 | |
| Effective Green, g (s) | 22.5 | | | | | 15.5 | | | | | 15.5 | |
| Actuated g/C Ratio | 0.50 | | | | | 0.34 | | | | | 0.34 | |
| Clearance Time (s) | 3.5 | | | | | 3.5 | | | | | 3.5 | |
| Lane Grp Cap (vph) | 925 | | | | | 620 | | | | | 551 | |
| v/s Ratio Prot | | | | | | c0.23 | | | | | | |
| v/s Ratio Perm | c0.76 | | | | | 0.11 | | | | | | |
| v/c Ratio | 1.52 | | | | | 0.67 | | | | | | |
| Uniform Delay, d1 | 11.2 | | | | | 12.6 | | | | | | |
| Progression Factor | 1.00 | | | | | 1.00 | | | | | | |
| Incremental Delay, d2 | 241.2 | | | | | 5.6 | | | | | | |
| Delay (s) | 252.5 | | | | | 18.2 | | | | | | |
| Level of Service | F | | | | | B | | | | | | |
| Approach Delay (s) | 252.5 | | | | | 0.0 | | 18.2 | | | 10.9 | |
| Approach LOS | F | | | | | A | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 182.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.17 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 58.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Cumulative AM
Kaiser Center Transportation Study



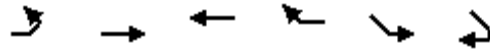
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 418 | 267 | 629 | 307 | 154 | 1364 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.95 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3365 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3365 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 454 | 290 | 684 | 334 | 167 | 1483 |
| RTOR Reduction (vph) | 0 | 209 | 62 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 454 | 81 | 956 | 0 | 167 | 1483 |
| Turn Type | Perm | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 25.1 | 25.1 | 38.9 | | 14.0 | 56.9 |
| Effective Green, g (s) | 25.1 | 25.1 | 38.9 | | 14.0 | 56.9 |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.43 | | 0.16 | 0.63 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 494 | 441 | 1454 | | 275 | 2237 |
| v/s Ratio Prot | c0.26 | | 0.28 | | 0.09 | c0.42 |
| v/s Ratio Perm | | 0.05 | | | | |
| v/c Ratio | 0.92 | 0.18 | 0.66 | | 0.61 | 0.66 |
| Uniform Delay, d1 | 31.5 | 24.7 | 20.3 | | 35.4 | 10.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 22.1 | 0.2 | 2.3 | | 9.6 | 1.6 |
| Delay (s) | 53.5 | 24.9 | 22.6 | | 45.0 | 12.0 |
| Level of Service | D | C | C | | D | B |
| Approach Delay (s) | 42.3 | | 22.6 | | | 15.4 |
| Approach LOS | D | | C | | | B |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 23.4 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.74 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 68.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 46: Lakeshore Drive & El Embarcadero (WB)

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | ↰ | ↱↱ | ↰↱ | | ↰ | ↰ |
| Volume (vph) | 427 | 437 | 466 | 220 | 221 | 219 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3369 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3369 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.94 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 454 | 455 | 507 | 239 | 240 | 238 |
| RTOR Reduction (vph) | 0 | 0 | 82 | 0 | 0 | 181 |
| Lane Group Flow (vph) | 454 | 455 | 664 | 0 | 240 | 57 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.1 | 32.4 | 14.3 | | 12.7 | 12.7 |
| Effective Green, g (s) | 14.1 | 32.4 | 14.3 | | 12.7 | 12.7 |
| Actuated g/C Ratio | 0.27 | 0.61 | 0.27 | | 0.24 | 0.24 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 470 | 2159 | 907 | | 423 | 379 |
| v/s Ratio Prot | c0.26 | 0.13 | c0.20 | | c0.14 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 0.97 | 0.21 | 0.73 | | 0.57 | 0.15 |
| Uniform Delay, d1 | 19.3 | 4.6 | 17.7 | | 17.8 | 15.9 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 32.6 | 0.0 | 3.1 | | 1.7 | 0.2 |
| Delay (s) | 51.8 | 4.7 | 20.7 | | 19.5 | 16.1 |
| Level of Service | D | A | C | | B | B |
| Approach Delay (s) | | 28.2 | 20.7 | | 17.8 | |
| Approach LOS | | C | C | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 23.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.76 | | |
| Actuated Cycle Length (s) | 53.1 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 65.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Cumulative AM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|--------|------|------|-------|------|------|-------|------|
| Lane Configurations | | | | 311 | | | 11 | 1 | 1 | 11 | |
| Volume (vph) | 0 | 0 | 722 | 760 | 349 | 0 | 490 | 274 | 374 | 1367 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4904 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4904 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 785 | 826 | 379 | 0 | 527 | 298 | 407 | 1486 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 129 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1968 | 0 | 0 | 527 | 169 | 407 | 1486 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1689 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.40 | | | c0.15 | | 0.23 | c0.42 | |
| v/s Ratio Perm | | | | | | | | 0.11 | | | |
| v/c Ratio | | | | 1.24dl | | | 0.90 | 0.65 | 0.63 | 0.74 | |
| Uniform Delay, d1 | | | | 34.8 | | | 43.4 | 41.4 | 27.5 | 16.8 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 81.3 | | | 19.7 | 11.9 | 4.5 | 2.4 | |
| Delay (s) | | | | 116.1 | | | 63.1 | 53.2 | 32.0 | 19.3 | |
| Level of Service | | | | F | | | E | D | C | B | |
| Approach Delay (s) | 0.0 | | | 116.1 | | | 59.5 | | | 22.0 | |
| Approach LOS | A | | | F | | | E | | | C | |

Intersection Summary

| | | | |
|---|-------|----------------------|------|
| HCM Average Control Delay | 68.3 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.95 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 85.1% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 291 | 589 | 239 | 228 | 398 | 323 | 24 | 739 | 50 | 516 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.97 | 0.85 | | 0.93 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3111 | 1441 | | 3289 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3111 | 1441 | | 3289 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 316 | 640 | 260 | 248 | 423 | 351 | 26 | 803 | 54 | 561 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 284 | 820 | 284 | 0 | 798 | 0 | 0 | 0 | 857 | 561 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 32.0 | 32.0 | 32.0 | | 29.0 | | | | 32.5 | 65.0 |
| Effective Green, g (s) | 32.0 | 32.0 | 32.0 | | 29.0 | | | | 32.5 | 65.0 |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | | 0.27 | | | | 0.31 | 0.61 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 486 | 939 | 435 | | 900 | | | | 543 | 2170 |
| v/s Ratio Prot | 0.18 | c0.26 | 0.20 | | c0.24 | | | | c0.48 | 0.16 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.58 | 0.87 | 0.65 | | 0.89 | | | | 1.58 | 0.26 |
| Uniform Delay, d1 | 31.4 | 35.1 | 32.2 | | 36.9 | | | | 36.8 | 9.4 |
| Progression Factor | 0.77 | 0.78 | 0.70 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.6 | 3.3 | 1.2 | | 12.5 | | | | 269.0 | 0.3 |
| Delay (s) | 24.8 | 30.8 | 23.7 | | 49.5 | | | | 305.7 | 9.7 |
| Level of Service | C | C | C | | D | | | | F | A |
| Approach Delay (s) | | 27.9 | | | 49.5 | | | | | 188.6 |
| Approach LOS | | C | | | D | | | | | F |

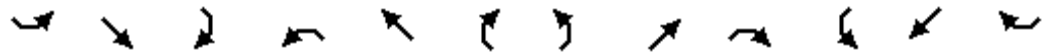
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 94.5 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.12 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 98.2% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Cumulative AM
Kaiser Center Transportation Study

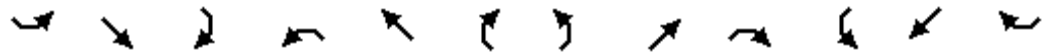


| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|------|--------|------|------|----------------------|------|------|--------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 3040 | 149 | 551 | 481 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4789 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4789 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.93 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 3167 | 162 | 592 | 506 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 3167 | 93 | 0 | 1098 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | 0.48 | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2415 | 752 | | 2035 | | | | |
| v/s Ratio Prot | | | | | c0.62 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.06 | | 0.23 | | | | |
| v/c Ratio | | | | | 1.31 | 0.12 | | 0.89dl | | | | |
| Uniform Delay, d1 | | | | | 21.0 | 11.7 | | 17.2 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 143.2 | 0.3 | | 1.0 | | | | |
| Delay (s) | | | | | 164.2 | 12.0 | | 18.2 | | | | |
| Level of Service | | | | | F | B | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 156.8 | | | 18.2 | | | 0.0 | |
| Approach LOS | | A | | | F | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 122.4 | | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | 0.95 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 127.7% | | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

50: MacArthur Blvd (WB) & Harrison Street

Cumulative AM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱↱↱ | | | | | | ↱↱ | |
| Volume (vph) | 0 | 0 | 0 | 1406 | 2049 | 0 | 0 | 0 | 0 | 0 | 1431 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4759 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4759 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1449 | 2227 | 0 | 0 | 0 | 0 | 0 | 1522 | 46 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 898 | 2778 | 0 | 0 | 0 | 0 | 0 | 1565 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2736 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.44 | |
| v/s Ratio Perm | | | | c0.59 | 0.58 | | | | | | | |
| v/c Ratio | | | | 1.03 | 1.02 | | | | | | 1.37 | |
| Uniform Delay, d1 | | | | 17.0 | 17.0 | | | | | | 27.0 | |
| Progression Factor | | | | 1.36 | 1.34 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 16.7 | 9.6 | | | | | | 170.8 | |
| Delay (s) | | | | 39.8 | 32.5 | | | | | | 197.8 | |
| Level of Service | | | | D | C | | | | | | F | |
| Approach Delay (s) | | 0.0 | | | 34.3 | | | 0.0 | | | 197.8 | |
| Approach LOS | | A | | | C | | | A | | | F | |

Intersection Summary


















| | | | |
|-----------------------------------|--------|----------------------|-----|
| HCM Average Control Delay | 83.2 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.15 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 138.0% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

51: Oakland Avenue & Monte Vista Avenue

Cumulative AM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 107 | 273 | 9 | 13 | 565 | 19 | 13 | 9 | 12 | 26 | 20 | 19 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 116 | 290 | 10 | 14 | 614 | 21 | 14 | 10 | 13 | 28 | 22 | 21 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 116 | 300 | 649 | 37 | 71 | | | | | | | |
| Volume Left (vph) | 116 | 0 | 14 | 14 | 28 | | | | | | | |
| Volume Right (vph) | 0 | 10 | 21 | 13 | 21 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 6.0 | 5.5 | 4.9 | 6.5 | 6.4 | | | | | | | |
| Degree Utilization, x | 0.19 | 0.46 | 0.88 | 0.07 | 0.13 | | | | | | | |
| Capacity (veh/h) | 576 | 641 | 731 | 515 | 521 | | | | | | | |
| Control Delay (s) | 9.2 | 11.8 | 32.6 | 9.9 | 10.3 | | | | | | | |
| Approach Delay (s) | 11.1 | | 32.6 | 9.9 | 10.3 | | | | | | | |
| Approach LOS | B | | D | A | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 22.9 | | | | | | | | | |
| HCM Level of Service | | | C | | | | | | | | | |
| Intersection Capacity Utilization | | | 61.3% | ICU Level of Service | | | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 6.3 Worst Case Level Of Service: C[20.6]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 987 0 0 0 433 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 987 0 0 0 433 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 987 0 0 0 433 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.92 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1073 0 0 0 471 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1073 0 0 0 471 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 358 xxxxx xxxx xxxxx

Potent Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 691 xxxxx xxxx xxxxx

Move Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 691 xxxxx xxxx xxxxx

Volume/Cap: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 0.68 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 5.4 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 20.6 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * C * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 20.6 xxxxxx

ApproachLOS: * * C *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: Oakland Avenue & I-580 Off-ramp

Cumulative PM
Kaiser Center Transportation Study
























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|-------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 934 | 442 | 1574 | 644 | 124 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1738 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1738 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 1015 | 480 | 1711 | 700 | 135 |
| RTOR Reduction (vph) | 18 | 18 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 723 | 736 | 1711 | 835 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Effective Green, g (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.61 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 448 | 463 | 2153 | 356 | |
| v/s Ratio Prot | | | c0.48 | c0.53 | |
| v/s Ratio Perm | c0.43 | 0.42 | | | |
| v/c Ratio | 1.61 | 1.59 | 0.79 | 2.35 | |
| Uniform Delay, d1 | 22.0 | 22.0 | 8.9 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 286.8 | 275.8 | 3.1 | 614.2 | |
| Delay (s) | 308.8 | 297.8 | 12.0 | 637.4 | |
| Level of Service | F | F | B | F | |
| Approach Delay (s) | | 303.3 | 217.1 | | |
| Approach LOS | | F | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 249.0 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 1.43 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 95.6% | | ICU Level of Service | F |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |  |  | | |  |  |  | |  |  |  |
| Volume (vph) | 242 | 485 | 154 | 23 | 60 | 19 | 206 | 235 | 11 | 399 | 1069 | 120 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1525 | | 3433 | 3473 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1525 | | 3433 | 3473 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 257 | 516 | 164 | 24 | 65 | 21 | 224 | 255 | 12 | 434 | 1162 | 130 |
| RTOR Reduction (vph) | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 209 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 257 | 516 | 182 | 0 | 0 | 86 | 224 | 46 | 0 | 446 | 1282 | 0 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | 20 | | | | 9 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 17.6 | 25.8 | 25.8 | | | 8.0 | 16.2 | 16.2 | | 14.5 | 27.2 | |
| Effective Green, g (s) | 17.6 | 25.8 | 25.8 | | | 8.0 | 16.2 | 16.2 | | 14.5 | 27.2 | |
| Actuated g/C Ratio | 0.20 | 0.29 | 0.29 | | | 0.09 | 0.18 | 0.18 | | 0.16 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 346 | 1015 | 454 | | | 157 | 335 | 275 | | 553 | 1050 | |
| v/s Ratio Prot | c0.15 | 0.15 | | | | 0.05 | c0.12 | | | 0.13 | c0.37 | |
| v/s Ratio Perm | | | 0.12 | | | | | 0.03 | | | | |
| v/c Ratio | 0.74 | 0.51 | 0.40 | | | 0.55 | 0.67 | 0.17 | | 0.81 | 1.22 | |
| Uniform Delay, d1 | 34.1 | 26.8 | 25.9 | | | 39.3 | 34.4 | 31.2 | | 36.4 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 8.4 | 0.4 | 0.6 | | | 3.9 | 5.0 | 0.3 | | 8.4 | 108.2 | |
| Delay (s) | 42.4 | 27.2 | 26.5 | | | 43.1 | 39.4 | 31.5 | | 44.8 | 139.6 | |
| Level of Service | D | C | C | | | D | D | C | | D | F | |
| Approach Delay (s) | | 31.1 | | | | | 36.4 | | | | 115.3 | |
| Approach LOS | | C | | | | | D | | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 78.9 | | | | HCM Level of Service | | E | | | | |
| HCM Volume to Capacity ratio | | 0.99 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 90.0 | | | | Sum of lost time (s) | | 18.0 | | | | |
| Intersection Capacity Utilization | | 87.1% | | | | ICU Level of Service | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|-------|------|------|------|
| Lane Configurations | ↰ | ↑↑ | | |
| Volume (vph) | 258 | 584 | 54 | 91 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3434 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3434 | | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 277 | 628 | 58 | 98 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 |
| Lane Group Flow (vph) | 277 | 771 | 0 | 0 |
| Confl. Peds. (#/hr) | 26 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 11.0 | 22.7 | | |
| Effective Green, g (s) | 11.0 | 22.7 | | |
| Actuated g/C Ratio | 0.12 | 0.25 | | |
| Clearance Time (s) | 4.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 216 | 866 | | |
| v/s Ratio Prot | c0.16 | 0.22 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 1.28 | 0.89 | | |
| Uniform Delay, d1 | 39.5 | 32.5 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 157.6 | 13.3 | | |
| Delay (s) | 197.1 | 45.8 | | |
| Level of Service | F | D | | |
| Approach Delay (s) | | 85.3 | | |
| Approach LOS | | F | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 104 | 283 | 80 | 54 | 389 | 307 | 164 | 745 | 39 | 234 | 714 | 110 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1745 | 3386 | | | 3515 | 1536 | 1768 | 3509 | | 1768 | 3446 | |
| Flt Permitted | 0.46 | 1.00 | | | 0.85 | 1.00 | 0.22 | 1.00 | | 0.24 | 1.00 | |
| Satd. Flow (perm) | 837 | 3386 | | | 3000 | 1536 | 417 | 3509 | | 454 | 3446 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 113 | 308 | 87 | 59 | 405 | 334 | 178 | 810 | 42 | 254 | 776 | 120 |
| RTOR Reduction (vph) | 0 | 31 | 0 | 0 | 0 | 55 | 0 | 4 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 113 | 364 | 0 | 0 | 464 | 279 | 178 | 848 | 0 | 254 | 882 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 10 | | 10 | 6 | | 6 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 20 | | | 18 | | | 17 | | | 66 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 354 | 1434 | | | 1271 | 651 | 186 | 1569 | | 203 | 1541 | |
| v/s Ratio Prot | | 0.11 | | | | | | 0.24 | | | 0.26 | |
| v/s Ratio Perm | 0.13 | | | | 0.15 | c0.18 | 0.43 | | | c0.56 | | |
| v/c Ratio | 0.32 | 0.25 | | | 0.37 | 0.43 | 0.96 | 0.54 | | 1.25 | 0.57 | |
| Uniform Delay, d1 | 16.3 | 15.8 | | | 16.7 | 17.3 | 22.7 | 17.1 | | 23.5 | 17.5 | |
| Progression Factor | 0.92 | 0.91 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.7 | 0.3 | | | 0.8 | 2.1 | 55.6 | 1.3 | | 147.0 | 1.5 | |
| Delay (s) | 16.8 | 14.7 | | | 17.5 | 19.3 | 78.3 | 18.5 | | 170.5 | 19.0 | |
| Level of Service | B | B | | | B | B | E | B | | F | B | |
| Approach Delay (s) | | 15.2 | | | 18.3 | | | 28.8 | | | 52.5 | |
| Approach LOS | | B | | | B | | | C | | | D | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 32.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 108.8% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|-----------|-------|------|-------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 239 | 459 | 155 | 73 | 604 | 130 | 203 | 555 | 54 | 154 | 532 | 405 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1554 | 1769 | 1863 | 1552 | 1765 | 3480 | | 1764 | 3257 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.28 | 1.00 | 1.00 | 0.14 | 1.00 | | 0.32 | 1.00 | |
| Satd. Flow (perm) | 230 | 1863 | 1554 | 527 | 1863 | 1552 | 261 | 3480 | | 586 | 3257 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 260 | 499 | 168 | 79 | 657 | 141 | 221 | 603 | 59 | 167 | 578 | 440 |
| RTOR Reduction (vph) | 0 | 0 | 103 | 0 | 0 | 87 | 0 | 9 | 0 | 0 | 162 | 0 |
| Lane Group Flow (vph) | 260 | 499 | 65 | 79 | 657 | 54 | 221 | 653 | 0 | 167 | 856 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 17 | | | 28 |
| Turn Type | pm+pt | | | Permpm+pt | | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | | 2 | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.39 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 308 | 721 | 601 | 290 | 612 | 509 | 101 | 1351 | | 228 | 1264 | |
| v/s Ratio Prot | c0.11 | 0.27 | | 0.02 | c0.35 | | | 0.19 | | | 0.26 | |
| v/s Ratio Perm | 0.32 | | 0.04 | 0.09 | | 0.03 | c0.85 | | | 0.29 | | |
| v/c Ratio | 0.84 | 0.69 | 0.11 | 0.27 | 1.07 | 0.11 | 2.19 | 0.48 | | 0.73 | 0.68 | |
| Uniform Delay, d1 | 19.8 | 21.8 | 16.7 | 17.2 | 28.6 | 19.9 | 26.0 | 19.6 | | 22.2 | 21.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.49 | 1.35 | 2.32 | 0.74 | 0.65 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 17.9 | 5.4 | 0.4 | 0.2 | 56.2 | 0.4 | 562.7 | 0.1 | | 10.0 | 1.1 | |
| Delay (s) | 37.8 | 27.2 | 17.0 | 25.7 | 94.8 | 46.5 | 582.1 | 12.8 | | 32.2 | 22.7 | |
| Level of Service | D | C | B | C | F | D | F | B | | C | C | |
| Approach Delay (s) | | 28.3 | | | 80.8 | | | 155.3 | | | 24.1 | |
| Approach LOS | | C | | | F | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 67.9 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 1.55 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 100.7% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

6: 27th Street & Northgate Avenue (NB)

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 280 | 745 | 0 | 0 | 293 | 1032 | 25 | 940 | 87 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1609 | 3383 | | | 3539 | 2787 | | 5008 | | | | |
| Flt Permitted | 0.56 | 0.93 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 947 | 3158 | | | 3539 | 2787 | | 5008 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 301 | 810 | 0 | 0 | 318 | 1064 | 27 | 1022 | 95 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 265 | 846 | 0 | 0 | 318 | 1029 | 0 | 1118 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 4 | | 4 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | 5 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 379 | 1263 | | | 1416 | 1115 | | 2003 | | | | |
| v/s Ratio Prot | | | | | 0.09 | | | | | | | |
| v/s Ratio Perm | 0.28 | 0.27 | | | | 0.37 | | 0.22 | | | | |
| v/c Ratio | 0.70 | 0.67 | | | 0.22 | 0.92 | | 0.56 | | | | |
| Uniform Delay, d1 | 10.0 | 9.8 | | | 7.9 | 11.4 | | 9.3 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 10.3 | 2.8 | | | 0.4 | 13.8 | | 1.1 | | | | |
| Delay (s) | 20.3 | 12.7 | | | 8.3 | 25.2 | | 10.4 | | | | |
| Level of Service | C | B | | | A | C | | B | | | | |
| Approach Delay (s) | | 14.5 | | | 21.3 | | | 10.4 | | | 0.0 | |
| Approach LOS | | B | | | C | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 15.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.74 | | |
| Actuated Cycle Length (s) | 40.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 87.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: 27th Street & I-980 Off Ramp

Cumulative PM
Kaiser Center Transportation Study

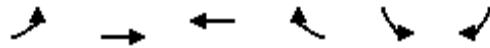


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 562 | 44 | 13 | 278 | 0 | 0 | 0 | 0 | 469 | 333 | 237 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1552 | | 3531 | | | | | 1605 | 3322 | 1558 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1552 | | 3276 | | | | | 1605 | 3322 | 1558 |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 592 | 48 | 14 | 302 | 0 | 0 | 0 | 0 | 510 | 362 | 258 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 125 |
| Lane Group Flow (vph) | 0 | 592 | 17 | 0 | 316 | 0 | 0 | 0 | 0 | 286 | 586 | 133 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 1 | | 1 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 5 | | | 9 | | | 1 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 543 | | 1147 | | | | | 829 | 1716 | 805 |
| v/s Ratio Prot | | c0.17 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.10 | | | | | c0.18 | 0.18 | 0.09 |
| v/c Ratio | | 0.48 | 0.03 | | 0.28 | | | | | 0.34 | 0.34 | 0.17 |
| Uniform Delay, d1 | | 15.2 | 12.8 | | 14.0 | | | | | 8.5 | 8.5 | 7.7 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 1.3 | 0.1 | | 0.6 | | | | | 1.1 | 0.5 | 0.4 |
| Delay (s) | | 16.5 | 12.9 | | 14.6 | | | | | 9.7 | 9.1 | 8.1 |
| Level of Service | | B | B | | B | | | | | A | A | A |
| Approach Delay (s) | | 16.3 | | | 14.6 | | | 0.0 | | | 9.0 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 12.1 | | HCM Level of Service | | B | | | | | | |
| HCM Volume to Capacity ratio | | 0.40 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | | 8.0 | | | | | | |
| Intersection Capacity Utilization | | 51.9% | | ICU Level of Service | | A | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 313 | 649 | 706 | 490 | 218 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.94 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3280 | | 3412 | 1421 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3280 | | 3412 | 1421 |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 340 | 698 | 767 | 505 | 237 | 134 |
| RTOR Reduction (vph) | 0 | 0 | 115 | 0 | 10 | 100 |
| Lane Group Flow (vph) | 340 | 698 | 1157 | 0 | 246 | 15 |
| Confl. Peds. (#/hr) | 14 | | | 18 | | |
| Confl. Bikes (#/hr) | | | | 7 | | 1 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 5 | 2 | 6 | | 4 | |
| Permitted Phases | | | | | | 4 |
| Actuated Green, G (s) | 22.8 | 61.8 | 35.0 | | 10.2 | 10.2 |
| Effective Green, g (s) | 22.8 | 61.8 | 35.0 | | 10.2 | 10.2 |
| Actuated g/C Ratio | 0.29 | 0.77 | 0.44 | | 0.13 | 0.13 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 504 | 2734 | 1435 | | 435 | 181 |
| v/s Ratio Prot | c0.19 | 0.20 | c0.35 | | c0.07 | |
| v/s Ratio Perm | | | | | | 0.01 |
| v/c Ratio | 0.67 | 0.26 | 0.81 | | 0.57 | 0.08 |
| Uniform Delay, d1 | 25.3 | 2.6 | 19.6 | | 32.8 | 30.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.8 | 0.2 | 4.9 | | 1.0 | 0.1 |
| Delay (s) | 28.1 | 2.8 | 24.5 | | 33.8 | 30.8 |
| Level of Service | C | A | C | | C | C |
| Approach Delay (s) | | 11.1 | 24.5 | | 32.9 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 20.5 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.73 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 70.8% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|-------|-------|------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 31 | 775 | 36 | 21 | 927 | 132 | 110 | 616 | 39 | 158 | 497 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1762 | 3348 | | 1769 | 3504 | | 1762 | 3405 | |
| Flt Permitted | 0.16 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.32 | 1.00 | | 0.38 | 1.00 | |
| Satd. Flow (perm) | 303 | 3427 | 1532 | 302 | 3348 | | 589 | 3504 | | 706 | 3405 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 34 | 842 | 39 | 23 | 1008 | 143 | 120 | 670 | 42 | 172 | 523 | 134 |
| RTOR Reduction (vph) | 0 | 0 | 28 | 0 | 13 | 0 | 0 | 5 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 34 | 842 | 11 | 23 | 1138 | 0 | 120 | 707 | 0 | 172 | 634 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | 5 | 2 | | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | 24.6 | 24.6 | 24.6 | 24.6 | 24.6 | 49.9 | 49.9 | | | 39.4 | 39.4 | |
| Effective Green, g (s) | 24.6 | 24.6 | 24.6 | 24.6 | 24.6 | 49.9 | 49.9 | | | 39.4 | 39.4 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.59 | 0.59 | | | 0.46 | 0.46 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 6.0 | | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 992 | 443 | 87 | 969 | 429 | 2057 | | | 327 | 1578 | |
| v/s Ratio Prot | | 0.25 | | | c0.34 | 0.02 | c0.20 | | | | 0.19 | |
| v/s Ratio Perm | 0.11 | | 0.01 | 0.08 | | 0.14 | | | | c0.24 | | |
| v/c Ratio | 0.39 | 0.85 | 0.03 | 0.26 | 1.17 | 0.28 | 0.34 | | | 0.53 | 0.40 | |
| Uniform Delay, d1 | 24.2 | 28.4 | 21.6 | 23.2 | 30.2 | 8.4 | 9.1 | | | 16.2 | 15.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.25 | 1.27 | |
| Incremental Delay, d2 | 12.3 | 9.0 | 0.1 | 7.3 | 89.5 | 0.1 | 0.5 | | | 5.0 | 0.6 | |
| Delay (s) | 36.5 | 37.4 | 21.7 | 30.5 | 119.7 | 8.5 | 9.5 | | | 25.2 | 19.7 | |
| Level of Service | D | D | C | C | F | A | A | | | C | B | |
| Approach Delay (s) | | 36.7 | | | 118.0 | | 9.4 | | | | 20.8 | |
| Approach LOS | | D | | | F | | A | | | | C | |





















Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 52.6 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.76 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 73.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | |  |  |  |  |  | |
| Volume (vph) | 92 | 522 | 41 | 120 | 392 | 39 | 287 | 721 | 200 | 59 | 579 | 125 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1765 | 3384 | | | 3350 | | 1766 | 3539 | 1550 | 1753 | 3413 | |
| Flt Permitted | 0.29 | 1.00 | | | 0.61 | | 0.31 | 1.00 | 1.00 | 0.32 | 1.00 | |
| Satd. Flow (perm) | 547 | 3384 | | | 2059 | | 585 | 3539 | 1550 | 586 | 3413 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 100 | 567 | 45 | 130 | 426 | 42 | 312 | 759 | 217 | 64 | 629 | 136 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 8 | 0 | 0 | 0 | 82 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 100 | 603 | 0 | 0 | 590 | 0 | 312 | 759 | 135 | 64 | 747 | 0 |
| Confl. Peds. (#/hr) | 8 | | 8 | 2 | | 2 | 8 | | 8 | 32 | | 32 |
| Confl. Bikes (#/hr) | | | 6 | | | 6 | | | 4 | | | 28 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 26.4 | 26.4 | | | 26.4 | | 45.6 | 45.6 | 45.6 | 45.6 | 45.6 | |
| Effective Green, g (s) | 26.4 | 26.4 | | | 26.4 | | 45.6 | 45.6 | 45.6 | 45.6 | 45.6 | |
| Actuated g/C Ratio | 0.33 | 0.33 | | | 0.33 | | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 181 | 1117 | | | 679 | | 333 | 2017 | 884 | 334 | 1945 | |
| v/s Ratio Prot | | 0.18 | | | | | | 0.21 | | | 0.22 | |
| v/s Ratio Perm | 0.18 | | | | c0.29 | | c0.53 | | 0.09 | 0.11 | | |
| v/c Ratio | 0.55 | 0.54 | | | 0.87 | | 0.94 | 0.38 | 0.15 | 0.19 | 0.38 | |
| Uniform Delay, d1 | 22.0 | 21.9 | | | 25.2 | | 15.9 | 9.4 | 8.1 | 8.3 | 9.5 | |
| Progression Factor | 1.00 | 1.00 | | | 1.14 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.1 | 0.3 | | | 10.9 | | 35.6 | 0.5 | 0.4 | 1.3 | 0.6 | |
| Delay (s) | 24.0 | 22.1 | | | 39.5 | | 51.5 | 10.0 | 8.5 | 9.6 | 10.0 | |
| Level of Service | C | C | | | D | | D | A | A | A | B | |
| Approach Delay (s) | | 22.4 | | | 39.5 | | | 19.8 | | | 10.0 | |
| Approach LOS | | C | | | D | | | B | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 21.4 | | | | | HCM Level of Service | | C | | | |
| HCM Volume to Capacity ratio | | 0.91 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | | Sum of lost time (s) | | 8.0 | | | |
| Intersection Capacity Utilization | | 84.0% | | | | | ICU Level of Service | | E | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

11: Grand Avenue & Webster Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 7 | 763 | 218 | 134 | 427 | 3 | 0 | 0 | 0 | 99 | 306 | 88 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frpb, ped/bikes | | 0.95 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | 0.97 | | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3150 | | 1770 | 3423 | | | | | | 3384 | |
| Flt Permitted | | 0.95 | | 0.11 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 2996 | | 211 | 3423 | | | | | | 3384 | |
| Peak-hour factor, PHF | 0.92 | 0.99 | 0.92 | 0.93 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 8 | 771 | 237 | 144 | 464 | 3 | 0 | 0 | 0 | 108 | 326 | 96 |
| RTOR Reduction (vph) | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 0 | 984 | 0 | 144 | 467 | 0 | 0 | 0 | 0 | 0 | 506 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 8 | | 8 | 36 | | 36 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 18 | | | 14 | | | 2 | | | 8 |
| Turn Type | Perm | | pm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 30.3 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | 30.3 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | 0.38 | | 0.54 | | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | 1135 | | 263 | | 1840 | | | | | | 1227 | |
| v/s Ratio Prot | | | c0.05 | | 0.14 | | | | | | | |
| v/s Ratio Perm | c0.33 | | 0.24 | | | | | | | | 0.15 | |
| v/c Ratio | 0.87 | | 0.55 | | 0.25 | | | | | | 0.41 | |
| Uniform Delay, d1 | 23.0 | | 13.4 | | 9.9 | | | | | | 19.1 | |
| Progression Factor | 1.58 | | 1.00 | | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | 8.8 | | 1.3 | | 0.3 | | | | | | 1.0 | |
| Delay (s) | 45.0 | | 14.6 | | 10.2 | | | | | | 20.1 | |
| Level of Service | D | | B | | B | | | | | | C | |
| Approach Delay (s) | 45.0 | | | | 11.3 | | 0.0 | | | | 20.1 | |
| Approach LOS | D | | | | B | | A | | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 29.4 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 73.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|-------|------|------|-------|-------|------|------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↑↑↑ | ↗ | | ↑↑↑ | |
| Volume (vph) | 383 | 723 | 163 | 373 | 969 | 52 | 13 | 1215 | 1286 | 3 | 703 | 218 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1483 | 3433 | 3539 | 1458 | | 5082 | 1466 | | 4823 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.92 | 1.00 | | 0.94 | |
| Satd. Flow (perm) | 3433 | 3539 | 1483 | 3433 | 3539 | 1458 | | 4692 | 1466 | | 4514 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 416 | 786 | 177 | 381 | 1042 | 57 | 14 | 1321 | 1398 | 3 | 732 | 237 |
| RTOR Reduction (vph) | 0 | 0 | 34 | 0 | 0 | 8 | 0 | 0 | 243 | 0 | 58 | 0 |
| Lane Group Flow (vph) | 416 | 786 | 143 | 381 | 1042 | 49 | 0 | 1335 | 1155 | 0 | 914 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 14.9 | 34.6 | 34.6 | 14.4 | 35.1 | 35.1 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 14.9 | 34.6 | 34.6 | 14.4 | 35.1 | 35.1 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.15 | 0.35 | 0.35 | 0.14 | 0.35 | 0.35 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 512 | 1224 | 513 | 494 | 1242 | 512 | | 1689 | 528 | | 1625 | |
| v/s Ratio Prot | c0.12 | 0.22 | | 0.11 | c0.29 | | | | | | | |
| v/s Ratio Perm | | | 0.10 | | | 0.03 | | 0.28 | c0.79 | | 0.20 | |
| v/c Ratio | 0.81 | 0.64 | 0.28 | 0.77 | 0.84 | 0.09 | | 0.79 | 2.19 | | 0.56 | |
| Uniform Delay, d1 | 41.2 | 27.5 | 23.7 | 41.2 | 29.9 | 21.8 | | 28.6 | 32.0 | | 25.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 9.1 | 2.6 | 1.4 | 6.7 | 6.9 | 0.4 | | 3.9 | 541.0 | | 1.4 | |
| Delay (s) | 50.3 | 30.1 | 25.0 | 47.9 | 36.7 | 22.2 | | 32.5 | 573.0 | | 27.1 | |
| Level of Service | D | C | C | D | D | C | | C | F | | C | |
| Approach Delay (s) | | 35.5 | | | 39.1 | | | 309.0 | | | 27.1 | |
| Approach LOS | | D | | | D | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|-----|
| HCM Average Control Delay | 148.9 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.32 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 136.5% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

13: 21st Street & Harrison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|-------|-------|-------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 360 | 96 | 117 | 1762 | 1069 | 103 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.99 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.97 | | 1.00 | 1.00 | 0.99 | |
| Flt Protected | 0.96 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3340 | | 1763 | 3725 | 6323 | |
| Flt Permitted | 0.96 | | 0.17 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3340 | | 313 | 3725 | 6323 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 |
| Adj. Flow (vph) | 391 | 104 | 127 | 1835 | 1162 | 112 |
| RTOR Reduction (vph) | 43 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 452 | 0 | 127 | 1835 | 1261 | 0 |
| Confl. Peds. (#/hr) | 30 | 30 | 106 | | | |
| Confl. Bikes (#/hr) | | 2 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 16.4 | | 50.1 | 43.4 | 43.4 | |
| Effective Green, g (s) | 16.4 | | 50.1 | 43.4 | 43.4 | |
| Actuated g/C Ratio | 0.20 | | 0.63 | 0.54 | 0.54 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 685 | | 317 | 2021 | 3430 | |
| v/s Ratio Prot | c0.14 | | c0.03 | c0.49 | 0.20 | |
| v/s Ratio Perm | | | 0.22 | | | |
| v/c Ratio | 0.66 | | 0.40 | 0.91 | 0.37 | |
| Uniform Delay, d1 | 29.2 | | 6.3 | 16.5 | 10.5 | |
| Progression Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.3 | | 0.8 | 7.4 | 0.3 | |
| Delay (s) | 31.5 | | 7.1 | 23.9 | 10.8 | |
| Level of Service | C | | A | C | B | |
| Approach Delay (s) | 31.5 | | | 22.9 | 10.8 | |
| Approach LOS | C | | | C | B | |

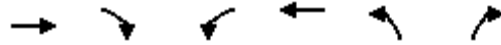
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 19.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 55.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis

14: 21st Street & Access Road

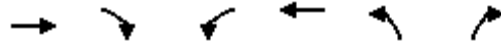
Cumulative PM
Kaiser Center Transportation Study






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | 👉 | | | 👈 | 👈 | 👈 |
| Volume (veh/h) | 369 | 11 | 22 | 221 | 12 | 57 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 393 | 12 | 24 | 240 | 13 | 62 |
| Pedestrians | 18 | | | 18 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 405 | | 705 | 417 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 405 | | 705 | 417 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 98 | | 97 | 90 |
| cM capacity (veh/h) | | | 1154 | | 389 | 627 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 405 | 264 | 75 | | | |
| Volume Left | 0 | 24 | 13 | | | |
| Volume Right | 12 | 0 | 62 | | | |
| cSH | 1700 | 1154 | 566 | | | |
| Volume to Capacity | 0.24 | 0.02 | 0.13 | | | |
| Queue Length 95th (ft) | 0 | 2 | 11 | | | |
| Control Delay (s) | 0.0 | 0.9 | 12.3 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 0.9 | 12.3 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.6 | | | |
| Intersection Capacity Utilization | | 45.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

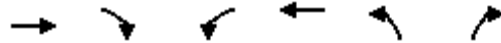
Cumulative PM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 317 | 9 | 9 | 224 | 30 | 63 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 345 | 10 | 10 | 243 | 33 | 68 |
| Pedestrians | 27 | | | 27 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | | 354 | 640 | 376 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | | 354 | 640 | 376 |
| tC, single (s) | | | | 4.1 | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | | 2.2 | 3.5 | 3.3 |
| p0 queue free % | | | | 99 | 92 | 90 |
| cM capacity (veh/h) | | | | 1204 | 427 | 655 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 354 | 253 | 101 | | | |
| Volume Left | 0 | 10 | 33 | | | |
| Volume Right | 10 | 0 | 68 | | | |
| cSH | 1700 | 1204 | 558 | | | |
| Volume to Capacity | 0.21 | 0.01 | 0.18 | | | |
| Queue Length 95th (ft) | 0 | 1 | 16 | | | |
| Control Delay (s) | 0.0 | 0.4 | 12.9 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 0.4 | 12.9 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | | 2.0 | | |
| Intersection Capacity Utilization | 36.6% | | | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 449 | 3 | 16 | 185 | 47 | 86 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 463 | 3 | 17 | 197 | 51 | 93 |
| Pedestrians | 20 | | | 20 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | | 0.88 | 0.88 | 0.88 |
| vC, conflicting volume | | | | 466 | 716 | 485 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | | 329 | 612 | 350 |
| tC, single (s) | | | | 4.1 | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | | 2.2 | 3.5 | 3.3 |
| p0 queue free % | | | | 98 | 87 | 84 |
| cM capacity (veh/h) | | | | 1086 | 390 | 602 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 466 | 214 | 26 | 26 | 47 | 47 |
| Volume Left | 0 | 17 | 26 | 26 | 0 | 0 |
| Volume Right | 3 | 0 | 0 | 0 | 47 | 47 |
| cSH | 1700 | 1086 | 390 | 390 | 602 | 602 |
| Volume to Capacity | 0.27 | 0.02 | 0.07 | 0.07 | 0.08 | 0.08 |
| Queue Length 95th (ft) | 0 | 1 | 5 | 5 | 6 | 6 |
| Control Delay (s) | 0.0 | 0.8 | 14.9 | 14.9 | 11.5 | 11.5 |
| Lane LOS | | A | B | B | B | B |
| Approach Delay (s) | 0.0 | 0.8 | 12.7 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | 2.4 | | | | | |
| Intersection Capacity Utilization | 39.5% | | | ICU Level of Service | | A |
| Analysis Period (min) | 15 | | | | | |
| | | | | | | |

HCM Signalized Intersection Capacity Analysis

17: 21st Street & Webster Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 250 | 126 | 92 | 209 | 0 | 0 | 0 | 0 | 62 | 640 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.98 | | | | | | 0.98 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 1863 | 1437 | | 1792 | | | | | | 4860 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.70 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 1863 | 1437 | | 1270 | | | | | | 4860 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 272 | 137 | 100 | 227 | 0 | 0 | 0 | 0 | 67 | 660 | 38 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 272 | 127 | 0 | 327 | 0 | 0 | 0 | 0 | 0 | 761 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 25.2 | 25.2 | | 25.2 | | | | | | 46.8 | |
| Effective Green, g (s) | | 25.2 | 25.2 | | 25.2 | | | | | | 46.8 | |
| Actuated g/C Ratio | | 0.32 | 0.32 | | 0.32 | | | | | | 0.58 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 587 | 453 | | 400 | | | | | | 2843 | |
| v/s Ratio Prot | | 0.15 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.09 | | 0.26 | | | | | | 0.16 | |
| v/c Ratio | | 0.46 | 0.28 | | 0.82 | | | | | | 0.27 | |
| Uniform Delay, d1 | | 22.0 | 20.6 | | 25.3 | | | | | | 8.2 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 1.19 | |
| Incremental Delay, d2 | | 0.6 | 0.3 | | 12.2 | | | | | | 0.2 | |
| Delay (s) | | 22.6 | 20.9 | | 37.5 | | | | | | 9.9 | |
| Level of Service | | C | C | | D | | | | | | A | |
| Approach Delay (s) | | 22.0 | | | 37.5 | | | 0.0 | | | 9.9 | |
| Approach LOS | | C | | | D | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 19.2 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.46 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 57.7% | | | ICU Level of Service | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: 21st Street & Franklin Street

Cumulative PM
Kaiser Center Transportation Study

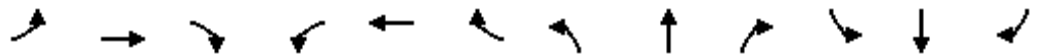


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰↱ | ↱ | | | |
| Volume (vph) | 15 | 122 | 1 | 0 | 116 | 83 | 25 | 420 | 223 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 1.00 | 0.82 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1842 | | | 1705 | | | 3507 | 1296 | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1796 | | | 1705 | | | 3507 | 1296 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 16 | 133 | 1 | 0 | 126 | 90 | 27 | 452 | 242 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 183 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 150 | 0 | 0 | 178 | 0 | 0 | 479 | 59 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | | 40 | | | 1 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 26.0 | | | 26.0 | | | 11.0 | 11.0 | | | |
| Effective Green, g (s) | | 26.0 | | | 26.0 | | | 11.0 | 11.0 | | | |
| Actuated g/C Ratio | | 0.58 | | | 0.58 | | | 0.24 | 0.24 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1038 | | | 985 | | | 857 | 317 | | | |
| v/s Ratio Prot | | | | | c0.10 | | | | | | | |
| v/s Ratio Perm | | 0.08 | | | | | | 0.14 | 0.05 | | | |
| v/c Ratio | | 0.14 | | | 0.18 | | | 0.56 | 0.19 | | | |
| Uniform Delay, d1 | | 4.4 | | | 4.5 | | | 14.9 | 13.5 | | | |
| Progression Factor | | 0.41 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.4 | | | 0.5 | 0.1 | | | |
| Delay (s) | | 2.0 | | | 4.9 | | | 15.3 | 13.6 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 2.0 | | | 4.9 | | | 14.7 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.0 | | | | | | HCM Level of Service | B | | | |
| HCM Volume to Capacity ratio | | 0.29 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | 8.0 | | | |
| Intersection Capacity Utilization | | 41.4% | | | | | | ICU Level of Service | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: 21st Street & Broadway

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 18 | 57 | 27 | 78 | 0 | 78 | 0 | 674 | 56 | 40 | 586 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.93 | | | 0.99 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1748 | 1757 | | | 1658 | | | 3475 | | | 3523 | |
| Flt Permitted | 0.71 | 1.00 | | | 0.84 | | | 1.00 | | | 0.86 | |
| Satd. Flow (perm) | 1301 | 1757 | | | 1420 | | | 3475 | | | 3046 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 |
| Adj. Flow (vph) | 20 | 62 | 29 | 85 | 0 | 85 | 0 | 733 | 61 | 43 | 592 | 0 |
| RTOR Reduction (vph) | 0 | 17 | 0 | 0 | 35 | 0 | 0 | 14 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 20 | 74 | 0 | 0 | 135 | 0 | 0 | 780 | 0 | 0 | 635 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 24 | | 24 | 40 | | 40 | 48 | | 48 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | 17 | | | 7 |
| Turn Type | Perm | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 549 | 742 | | | 600 | | | 1313 | | | 1151 | |
| v/s Ratio Prot | | 0.04 | | | | | | c0.22 | | | | |
| v/s Ratio Perm | 0.02 | | | | c0.09 | | | | | | 0.21 | |
| v/c Ratio | 0.04 | 0.10 | | | 0.22 | | | 0.59 | | | 0.55 | |
| Uniform Delay, d1 | 7.6 | 7.8 | | | 8.3 | | | 11.2 | | | 11.0 | |
| Progression Factor | 1.00 | 1.00 | | | 1.06 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.3 | | | 0.9 | | | 2.0 | | | 1.9 | |
| Delay (s) | 7.8 | 8.1 | | | 9.7 | | | 13.2 | | | 12.9 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 8.0 | | | 9.7 | | | 13.2 | | | 12.9 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 12.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 66.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|------|------|------|-------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | ↔ | ↔↔ | |
| Volume (vph) | 35 | 202 | 37 | 14 | 240 | 237 | 32 | 807 | 33 | 49 | 221 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.98 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.93 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3420 | | | 3219 | | | 3506 | | 1769 | 3371 | |
| Flt Permitted | | 0.76 | | | 0.94 | | | 0.93 | | 0.20 | 1.00 | |
| Satd. Flow (perm) | | 2632 | | | 3029 | | | 3278 | | 377 | 3371 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 38 | 220 | 40 | 15 | 261 | 258 | 35 | 877 | 36 | 51 | 240 | 85 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 192 | 0 | 0 | 3 | 0 | 0 | 30 | 0 |
| Lane Group Flow (vph) | 0 | 273 | 0 | 0 | 342 | 0 | 0 | 945 | 0 | 51 | 295 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 3 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 12.3 | | | 12.3 | | 30.2 | | | 38.7 | 38.7 | |
| Effective Green, g (s) | | 12.3 | | | 12.3 | | 30.2 | | | 38.7 | 38.7 | |
| Actuated g/C Ratio | | 0.20 | | | 0.20 | | 0.50 | | | 0.64 | 0.64 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | 4.5 | | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 540 | | | 621 | | 1650 | | | 336 | 2174 | |
| v/s Ratio Prot | | | | | | | | | | 0.01 | c0.09 | |
| v/s Ratio Perm | | 0.10 | | | c0.11 | | c0.29 | | | 0.09 | | |
| v/c Ratio | | 0.50 | | | 0.55 | | 0.57 | | | 0.15 | 0.14 | |
| Uniform Delay, d1 | | 21.1 | | | 21.4 | | 10.4 | | | 5.1 | 4.1 | |
| Progression Factor | | 1.00 | | | 0.72 | | 1.00 | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | 0.8 | | 1.4 | | | 0.2 | 0.1 | |
| Delay (s) | | 21.9 | | | 16.2 | | 11.8 | | | 5.3 | 4.3 | |
| Level of Service | | C | | | B | | B | | | A | A | |
| Approach Delay (s) | | 21.9 | | | 16.2 | | 11.8 | | | | 4.4 | |
| Approach LOS | | C | | | B | | B | | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 13.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 84.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔↔ | |
| Volume (vph) | 26 | 176 | 110 | 70 | 274 | 119 | 127 | 930 | 131 | 51 | 642 | 45 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frbp, ped/bikes | | 0.97 | | | 0.97 | | | 0.99 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | | 0.96 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Satd. Flow (prot) | | 3215 | | | 3230 | | | 3415 | | | 4989 | |
| Flt Permitted | | 0.90 | | | 0.85 | | | 0.66 | | | 0.78 | |
| Satd. Flow (perm) | | 2898 | | | 2763 | | | 2260 | | | 3904 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 28 | 191 | 120 | 76 | 298 | 129 | 138 | 1011 | 138 | 55 | 698 | 49 |
| RTOR Reduction (vph) | 0 | 76 | 0 | 0 | 33 | 0 | 0 | 16 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 263 | 0 | 0 | 470 | 0 | 0 | 1272 | 0 | 0 | 790 | 0 |
| Confl. Peds. (#/hr) | 74 | | 74 | 120 | | 120 | 85 | | 85 | 65 | | 65 |
| Confl. Bikes (#/hr) | | | 30 | | | 13 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1063 | | | 1013 | | | 1227 | | | 1171 | |
| v/s Ratio Prot | | | | | | | | c0.12 | | | | |
| v/s Ratio Perm | | 0.09 | | | c0.17 | | | c0.38 | | | 0.20 | |
| v/c Ratio | | 0.25 | | | 0.46 | | | 1.04 | | | 0.67 | |
| Uniform Delay, d1 | | 13.2 | | | 14.5 | | | 15.5 | | | 18.4 | |
| Progression Factor | | 2.20 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 1.5 | | | 35.6 | | | 3.1 | |
| Delay (s) | | 29.7 | | | 16.0 | | | 51.1 | | | 21.6 | |
| Level of Service | | C | | | B | | | D | | | C | |
| Approach Delay (s) | | 29.7 | | | 16.0 | | | 51.1 | | | 21.6 | |
| Approach LOS | | C | | | B | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 34.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.78 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 95.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: 20th Street & Franklin Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔↔ | ↔ | | | |
| Volume (vph) | 46 | 406 | 0 | 0 | 478 | 119 | 80 | 481 | 315 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3512 | | | 3371 | 1319 | | 5004 | 1459 | | | |
| Flt Permitted | | 0.86 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3047 | | | 3371 | 1319 | | 5004 | 1459 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 50 | 441 | 0 | 0 | 520 | 127 | 87 | 523 | 339 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 36 | 0 | 0 | 167 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 491 | 0 | 0 | 532 | 78 | 0 | 610 | 172 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | 12 | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 54.7 | | | 54.7 | 54.7 | | 18.3 | 18.3 | | | |
| Effective Green, g (s) | | 54.7 | | | 54.7 | 54.7 | | 18.3 | 18.3 | | | |
| Actuated g/C Ratio | | 0.68 | | | 0.68 | 0.68 | | 0.23 | 0.23 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2083 | | | 2305 | 902 | | 1145 | 334 | | | |
| v/s Ratio Prot | | | | | 0.16 | | | | | | | |
| v/s Ratio Perm | | c0.16 | | | | 0.06 | | 0.12 | 0.12 | | | |
| v/c Ratio | | 0.24 | | | 0.23 | 0.09 | | 0.53 | 0.51 | | | |
| Uniform Delay, d1 | | 4.8 | | | 4.7 | 4.3 | | 27.1 | 27.0 | | | |
| Progression Factor | | 1.00 | | | 0.66 | 0.33 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.2 | 0.2 | | 0.5 | 1.3 | | | |
| Delay (s) | | 5.0 | | | 3.3 | 1.5 | | 27.6 | 28.3 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 5.0 | | | 3.0 | | | 27.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.8 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.31 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | 7.0 | | | | |
| Intersection Capacity Utilization | | 57.6% | | | ICU Level of Service | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

23: 20th Street & Webster Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 502 | 218 | 174 | 449 | 0 | 0 | 0 | 0 | 100 | 642 | 146 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.91 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1439 | 1610 | 3377 | | | | | | 4522 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.94 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1439 | 1610 | 3178 | | | | | | 4522 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 546 | 237 | 189 | 488 | 0 | 0 | 0 | 0 | 109 | 698 | 159 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 0 |
| Lane Group Flow (vph) | 0 | 546 | 206 | 170 | 507 | 0 | 0 | 0 | 0 | 0 | 929 | 0 |
| Confl. Peds. (#/hr) | 51 | | 51 | 114 | | 114 | 115 | | 115 | 333 | | 333 |
| Confl. Bikes (#/hr) | | | 8 | | | 3 | | | 17 | | | 6 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Effective Green, g (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | 30.0 | |
| Actuated g/C Ratio | | 0.35 | 0.35 | 0.12 | 0.52 | | | | | | 0.38 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1239 | 504 | 201 | 1693 | | | | | | 1696 | |
| v/s Ratio Prot | | c0.15 | | c0.11 | 0.04 | | | | | | | |
| v/s Ratio Perm | | | 0.14 | | 0.12 | | | | | | 0.21 | |
| v/c Ratio | | 0.44 | 0.41 | 0.85 | 0.30 | | | | | | 0.55 | |
| Uniform Delay, d1 | | 20.0 | 19.7 | 34.2 | 10.7 | | | | | | 19.7 | |
| Progression Factor | | 1.07 | 1.08 | 1.00 | 1.00 | | | | | | 1.36 | |
| Incremental Delay, d2 | | 1.1 | 2.4 | 25.6 | 0.0 | | | | | | 0.2 | |
| Delay (s) | | 22.5 | 23.7 | 59.8 | 10.7 | | | | | | 27.0 | |
| Level of Service | | C | C | E | B | | | | | | C | |
| Approach Delay (s) | | 22.9 | | | 23.1 | | | 0.0 | | | 27.0 | |
| Approach LOS | | C | | | C | | | A | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 24.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 93.3% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Cumulative PM
Kaiser Center Transportation Study

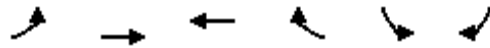









| Movement | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER |
|-----------------------------------|-------|-------|-------|-------|----------------------|--------|--------|------|------|------|
| Lane Configurations | ↑↑↑ | | | | ↑↑ | ↑↑ | ↑ | ↑ | | |
| Volume (vph) | 478 | 127 | 270 | 75 | 1017 | 231 | 370 | 114 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Lane Util. Factor | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | |
| Frpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Frt | 0.97 | | | | 1.00 | 0.93 | 0.85 | 0.85 | | |
| Flt Protected | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (prot) | 4894 | | | | 3495 | 3167 | 1441 | 1583 | | |
| Flt Permitted | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | |
| Satd. Flow (perm) | 4894 | | | | 3495 | 3167 | 1441 | 1583 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 |
| Adj. Flow (vph) | 520 | 138 | 293 | 82 | 1105 | 251 | 402 | 124 | 0 | 0 |
| RTOR Reduction (vph) | 68 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 0 | 0 |
| Lane Group Flow (vph) | 590 | 0 | 0 | 0 | 1480 | 448 | 205 | 60 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | 74 | | |
| Confl. Bikes (#/hr) | | | | | 7 | | | 8 | | |
| Turn Type | | | Split | Split | | custom | custom | | | |
| Protected Phases | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | |
| Permitted Phases | 1 | | | | | | 6 | | | |
| Actuated Green, G (s) | 16.0 | | | | 28.0 | 14.0 | 34.0 | 34.0 | | |
| Effective Green, g (s) | 16.0 | | | | 28.0 | 14.0 | 34.0 | 34.0 | | |
| Actuated g/C Ratio | 0.23 | | | | 0.40 | 0.20 | 0.49 | 0.49 | | |
| Clearance Time (s) | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 1119 | | | | 1398 | 633 | 700 | 769 | | |
| v/s Ratio Prot | c0.12 | | | | c0.42 | c0.14 | 0.14 | 0.04 | | |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.53 | | | | 1.06 | 0.71 | 0.29 | 0.08 | | |
| Uniform Delay, d1 | 23.7 | | | | 21.0 | 26.1 | 10.8 | 9.6 | | |
| Progression Factor | 1.00 | | | | 1.00 | 0.83 | 0.97 | 0.82 | | |
| Incremental Delay, d2 | 1.8 | | | | 41.3 | 2.9 | 1.0 | 0.2 | | |
| Delay (s) | 25.5 | | | | 62.3 | 24.6 | 11.5 | 8.1 | | |
| Level of Service | C | | | | E | C | B | A | | |
| Approach Delay (s) | 25.5 | | | | 62.3 | 18.5 | | | 0.0 | |
| Approach LOS | C | | | | E | B | | | A | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | 42.3 | | | HCM Level of Service | | | | D | |
| HCM Volume to Capacity ratio | | 0.83 | | | | | | | | |
| Actuated Cycle Length (s) | | 70.0 | | | Sum of lost time (s) | | | | 12.0 | |
| Intersection Capacity Utilization | | 73.1% | | | ICU Level of Service | | | | D | |
| Analysis Period (min) | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

25: 20th Street & Access Road Exit

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR | |
|-----------------------------------|---|---|---|------|----------------------|---|------|
| Lane Configurations |  |    |   | | |  | |
| Volume (veh/h) | 0 | 605 | 351 | 0 | 0 | 99 | |
| Sign Control | | Free | Free | | Stop | | |
| Grade | | 0% | 0% | | 0% | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Hourly flow rate (vph) | 0 | 658 | 382 | 0 | 0 | 108 | |
| Pedestrians | | | | | | | |
| Lane Width (ft) | | | | | | | |
| Walking Speed (ft/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | None | None | | | | |
| Median storage veh) | | | | | | | |
| Upstream signal (ft) | | 420 | 110 | | | | |
| pX, platoon unblocked | | | | | 0.96 | | |
| vC, conflicting volume | 382 | | | | 601 | 191 | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 382 | | | | 448 | 191 | |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 | |
| p0 queue free % | 100 | | | | 100 | 87 | |
| cM capacity (veh/h) | 1174 | | | | 519 | 819 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | EB 4 | WB 1 | WB 2 | SB 1 |
| Volume Total | 0 | 219 | 219 | 219 | 191 | 191 | 108 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 108 |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 | 819 |
| Volume to Capacity | 0.00 | 0.13 | 0.13 | 0.13 | 0.11 | 0.11 | 0.13 |
| Queue Length 95th (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.1 |
| Lane LOS | | | | | | | B |
| Approach Delay (s) | 0.0 | | | | 0.0 | | 10.1 |
| Approach LOS | | | | | | | B |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.9 | | | | |
| Intersection Capacity Utilization | | 22.5% | | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | | |
| | | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: Harrison Street & Lakeside Drive

















Cumulative PM
Kaiser Center Transportation Study

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖↗ | ↑↑↑ | ↖↗ | ↗ |
| Volume (vph) | 1246 | 170 | 870 | 512 | 188 | 981 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.98 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 4991 | | 3433 | 5085 | 3178 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 4991 | | 3433 | 5085 | 3178 | 1441 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.99 | 0.92 | 0.92 | 0.93 |
| Adj. Flow (vph) | 1312 | 185 | 879 | 557 | 204 | 1055 |
| RTOR Reduction (vph) | 26 | 0 | 0 | 0 | 370 | 369 |
| Lane Group Flow (vph) | 1471 | 0 | 879 | 557 | 362 | 158 |
| Confl. Bikes (#/hr) | | | | 16 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Effective Green, g (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Actuated g/C Ratio | 0.26 | | 0.27 | 0.59 | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 1283 | | 932 | 2978 | 953 | 432 |
| v/s Ratio Prot | c0.29 | | c0.26 | 0.11 | c0.11 | |
| v/s Ratio Perm | | | | | | 0.11 |
| v/c Ratio | 1.15 | | 0.94 | 0.19 | 0.38 | 0.37 |
| Uniform Delay, d1 | 26.0 | | 25.0 | 6.7 | 19.4 | 19.3 |
| Progression Factor | 0.81 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 70.2 | | 18.6 | 0.1 | 1.2 | 2.4 |
| Delay (s) | 91.3 | | 43.5 | 6.9 | 20.5 | 21.7 |
| Level of Service | F | | D | A | C | C |
| Approach Delay (s) | 91.3 | | | 29.3 | 21.0 | |
| Approach LOS | F | | | C | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 49.0 | | HCM Level of Service | | D |
| HCM Volume to Capacity ratio | | 0.80 | | | | |
| Actuated Cycle Length (s) | | 70.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 78.4% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

28: 18th Street & Brush Street

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | |  |  | | | | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 146 | 151 | 0 | 0 | 0 | 0 | 0 | 1554 | 180 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1766 | 3539 | | | | | | 6292 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1766 | 3539 | | | | | | 6292 | |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 159 | 164 | 0 | 0 | 0 | 0 | 0 | 1602 | 196 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 158 | 164 | 0 | 0 | 0 | 0 | 0 | 1782 | 0 |
| Confl. Peds. (#/hr) | 15 | | 15 | 2 | | 2 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 18.1 | 18.1 | | | | | | 47.9 | |
| Effective Green, g (s) | | | | 18.1 | 18.1 | | | | | | 47.9 | |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | | | | | | 0.64 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 426 | 854 | | | | | | 4018 | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | c0.28 | |
| v/s Ratio Perm | | | | c0.09 | | | | | | | | |
| v/c Ratio | | | | 0.37 | 0.19 | | | | | | 0.44 | |
| Uniform Delay, d1 | | | | 23.7 | 22.6 | | | | | | 6.8 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.79 | |
| Incremental Delay, d2 | | | | 2.5 | 0.5 | | | | | | 0.1 | |
| Delay (s) | | | | 26.2 | 23.1 | | | | | | 5.5 | |
| Level of Service | | | | C | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 24.6 | | | 0.0 | | | 5.5 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.4 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.42 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 50.5% | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Cumulative PM
Kaiser Center Transportation Study



















| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 200 | 396 | 1492 | 93 | 424 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.99 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 5029 | | 3405 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 5029 | | 3405 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 217 | 426 | 1604 | 101 | 461 | 54 |
| RTOR Reduction (vph) | 1 | 0 | 9 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 216 | 426 | 1696 | 0 | 515 | 0 |
| Confl. Peds. (#/hr) | | | | 17 | | |
| Confl. Bikes (#/hr) | | | | 6 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 15.3 | 15.3 | 24.5 | | 23.2 | |
| Effective Green, g (s) | 15.3 | 15.3 | 24.5 | | 23.2 | |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.33 | | 0.31 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 361 | 1037 | 1643 | | 1053 | |
| v/s Ratio Prot | | 0.08 | c0.34 | | c0.15 | |
| v/s Ratio Perm | c0.12 | | | | | |
| v/c Ratio | 0.60 | 0.41 | 1.03 | | 0.49 | |
| Uniform Delay, d1 | 27.1 | 25.9 | 25.2 | | 21.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 7.2 | 1.2 | 30.9 | | 0.4 | |
| Delay (s) | 34.2 | 27.1 | 56.1 | | 21.4 | |
| Level of Service | C | C | E | | C | |
| Approach Delay (s) | | 29.5 | 56.1 | | 21.4 | |
| Approach LOS | | C | E | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 43.9 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | | 0.73 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 66.6% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th Street & Castro Street

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | |  |  |  |  | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 299 | 1000 | 1172 | 605 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.98 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.98 | 0.99 | | | | |
| Frt | | | | | 0.91 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3041 | 1417 | 1403 | 5828 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3041 | 1417 | 1403 | 5828 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 325 | 1087 | 1274 | 651 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 51 | 51 | 295 | 253 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 818 | 492 | 342 | 1035 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 4 | | 4 | 14 | | 14 | | | |
| Confl. Bikes (#/hr) | | | | | | 1 | | | | | | 4 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | | 2 | | | | |
| Actuated Green, G (s) | | | | | 39.5 | 39.5 | 25.5 | 25.5 | | | | |
| Effective Green, g (s) | | | | | 39.5 | 39.5 | 25.5 | 25.5 | | | | |
| Actuated g/C Ratio | | | | | 0.53 | 0.53 | 0.34 | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1602 | 746 | 477 | 1982 | | | | |
| v/s Ratio Prot | | | | | 0.27 | | | | | | | |
| v/s Ratio Perm | | | | | | c0.35 | c0.24 | 0.18 | | | | |
| v/c Ratio | | | | | 0.51 | 0.66 | 0.72 | 0.52 | | | | |
| Uniform Delay, d1 | | | | | 11.5 | 12.9 | 21.6 | 19.9 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 1.2 | 4.5 | 5.1 | 0.2 | | | | |
| Delay (s) | | | | | 12.7 | 17.4 | 26.7 | 20.1 | | | | |
| Level of Service | | | | | B | B | C | C | | | | |
| Approach Delay (s) | | 0.0 | | | 14.5 | | | 22.3 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 19.0 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.68 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | Sum of lost time (s) | | | 10.0 | | | | |
| Intersection Capacity Utilization | | 82.5% | | | ICU Level of Service | | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: 11th Street & Brush Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 283 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 642 | 1040 | 63 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3406 | | | | | | | | 1522 | 4730 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3406 | | | | | | | | 1522 | 4730 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 308 | 89 | 0 | 0 | 0 | 0 | 0 | 0 | 698 | 1130 | 68 |
| RTOR Reduction (vph) | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 260 | 42 | 0 |
| Lane Group Flow (vph) | 0 | 381 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201 | 1393 | 0 |
| Confl. Peds. (#/hr) | 5 | | 5 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Effective Green, g (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Actuated g/C Ratio | | 0.47 | | | | | | | | 0.43 | 0.43 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1589 | | | | | | | | 649 | 2018 | |
| v/s Ratio Prot | | c0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.13 | 0.29 | |
| v/c Ratio | | 0.24 | | | | | | | | 0.31 | 0.69 | |
| Uniform Delay, d1 | | 12.0 | | | | | | | | 14.2 | 17.5 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | | | | | | 1.2 | 2.0 | |
| Delay (s) | | 12.4 | | | | | | | | 15.4 | 19.4 | |
| Level of Service | | B | | | | | | | | B | B | |
| Approach Delay (s) | | 12.4 | | | 0.0 | | | 0.0 | | | 18.5 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 17.4 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.45 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 48.4% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | ↔ | | ↔↔ | ↔ | | | |
| Volume (vph) | 74 | 1070 | 0 | 0 | 495 | 304 | 239 | 737 | 49 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frbp, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.96 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3524 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Flt Permitted | | 0.84 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2959 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.99 | 0.96 | 0.96 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 80 | 1163 | 0 | 0 | 516 | 317 | 260 | 801 | 53 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 2 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1243 | 0 | 0 | 516 | 229 | 0 | 1061 | 51 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 52 | | 52 | 35 | | 35 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 5 | | | 21 | | | | | | 22 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 888 | | | 1062 | 438 | | 1852 | 811 | | | |
| v/s Ratio Prot | | | | | 0.15 | | | | | | | |
| v/s Ratio Perm | | c0.42 | | | | 0.16 | | 0.31 | 0.03 | | | |
| v/c Ratio | | 1.40 | | | 0.49 | 0.52 | | 0.57 | 0.06 | | | |
| Uniform Delay, d1 | | 21.0 | | | 17.2 | 17.4 | | 9.4 | 6.8 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 186.7 | | | 1.6 | 4.4 | | 1.3 | 0.1 | | | |
| Delay (s) | | 207.7 | | | 18.8 | 21.8 | | 10.7 | 6.9 | | | |
| Level of Service | | F | | | B | C | | B | A | | | |
| Approach Delay (s) | | 207.7 | | | 20.0 | | | 10.5 | | | 0.0 | |
| Approach LOS | | F | | | B | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 89.8 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.87 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 94.4% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 751 | 85 | 47 | 653 | 0 | 0 | 0 | 0 | 684 | 699 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3464 | | | 3526 | | | | | 1734 | 3507 | |
| Flt Permitted | | 1.00 | | | 0.87 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3464 | | | 3062 | | | | | 1734 | 3507 | |
| Peak-hour factor, PHF | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 816 | 92 | 51 | 710 | 0 | 0 | 0 | 0 | 728 | 728 | 38 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 889 | 0 | 0 | 761 | 0 | 0 | 0 | 0 | 728 | 758 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 25 | | 25 | 17 | | 17 | 24 | | 24 |
| Confl. Bikes (#/hr) | | | 16 | | | 17 | | | 2 | | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | 6 | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1463 | | | 1293 | | | | | 732 | 1481 | |
| v/s Ratio Prot | | c0.26 | | | | | | | | | 0.22 | |
| v/s Ratio Perm | | | | | 0.25 | | | | | c0.42 | | |
| v/c Ratio | | 0.61 | | | 0.59 | | | | | 0.99 | 0.51 | |
| Uniform Delay, d1 | | 10.1 | | | 10.0 | | | | | 12.9 | 9.6 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.9 | | | 2.0 | | | | | 32.0 | 1.3 | |
| Delay (s) | | 12.0 | | | 12.0 | | | | | 44.9 | 10.8 | |
| Level of Service | | B | | | B | | | | | D | B | |
| Approach Delay (s) | | 12.0 | | | 12.0 | | | 0.0 | | | 27.4 | |
| Approach LOS | | B | | | B | | | A | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 19.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 91.2% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

34: 14th Street & Harrison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| Volume (vph) | 85 | 501 | 10 | 22 | 467 | 52 | 81 | 519 | 29 | 133 | 208 | 59 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 1.00 | | | 0.99 | | | 0.99 | | | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Satd. Flow (prot) | | 3486 | | | 3456 | | | 3474 | | | 3362 | |
| Flt Permitted | | 0.82 | | | 0.92 | | | 0.85 | | | 0.60 | |
| Satd. Flow (perm) | | 2869 | | | 3200 | | | 2956 | | | 2056 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 92 | 545 | 11 | 24 | 508 | 57 | 88 | 564 | 32 | 145 | 214 | 64 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 17 | 0 | 0 | 8 | 0 | 0 | 35 | 0 |
| Lane Group Flow (vph) | 0 | 645 | 0 | 0 | 572 | 0 | 0 | 676 | 0 | 0 | 388 | 0 |
| Confl. Peds. (#/hr) | 80 | | 80 | 58 | | 58 | 44 | | 44 | 41 | | 41 |
| Confl. Bikes (#/hr) | | | 14 | | | 10 | | | 7 | | | 4 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 21.6 | | | 21.6 | | | 15.9 | | | 15.9 | |
| Effective Green, g (s) | | 21.6 | | | 21.6 | | | 15.9 | | | 15.9 | |
| Actuated g/C Ratio | | 0.48 | | | 0.48 | | | 0.35 | | | 0.35 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1377 | | | 1536 | | | 1044 | | | 726 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | c0.22 | | | 0.18 | | | c0.23 | | | 0.19 | |
| v/c Ratio | | 0.47 | | | 0.37 | | | 0.65 | | | 0.53 | |
| Uniform Delay, d1 | | 7.9 | | | 7.4 | | | 12.2 | | | 11.6 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 1.1 | | | 0.7 | | | 1.4 | | | 0.8 | |
| Delay (s) | | 9.0 | | | 8.1 | | | 13.6 | | | 12.4 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 9.0 | | | 8.1 | | | 13.6 | | | 12.4 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 76.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 0 | 0 | 290 | 1096 | 0 | 0 | 0 | 0 | 0 | 812 | 57 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6270 | | | | | | 5021 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6270 | | | | | | 5021 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 315 | 1130 | 0 | 0 | 0 | 0 | 0 | 883 | 62 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1409 | 0 | 0 | 0 | 0 | 0 | 932 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 47 | | 47 | 36 | | 36 | 29 | | 29 |
| Confl. Bikes (#/hr) | | | 3 | | | 13 | | | 9 | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2717 | | | | | | 2218 | |
| v/s Ratio Prot | | | | | | | | | | | c0.19 | |
| v/s Ratio Perm | | | | | 0.22 | | | | | | | |
| v/c Ratio | | | | | 0.52 | | | | | | 0.42 | |
| Uniform Delay, d1 | | | | | 12.4 | | | | | | 11.5 | |
| Progression Factor | | | | | 0.64 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.6 | | | | | | 0.6 | |
| Delay (s) | | | | | 8.6 | | | | | | 12.1 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 8.6 | | | 0.0 | | | 12.1 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.0 | | | HCM Level of Service | | | | | A | |
| HCM Volume to Capacity ratio | | | 0.47 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | 7.5 | | |
| Intersection Capacity Utilization | | | 46.5% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

36: 12th Street & Oak St.

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1183 | 70 | 436 | 1147 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.97 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6330 | | | 6106 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6330 | | | 6106 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1245 | 76 | 474 | 1195 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 16 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1319 | 0 | 0 | 1653 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | 121 | 69 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | | | | 15 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3154 | | | 2096 | | | | |
| v/s Ratio Prot | | | | | c0.21 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.27 | | | | |
| v/c Ratio | | | | | 0.42 | | | 0.79 | | | | |
| Uniform Delay, d1 | | | | | 9.5 | | | 17.7 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.4 | | | 3.1 | | | | |
| Delay (s) | | | | | 9.9 | | | 20.8 | | | | |
| Level of Service | | | | | A | | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 9.9 | | | 20.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 16.0 | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | | 0.57 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | Sum of lost time (s) | | | 9.5 | |
| Intersection Capacity Utilization | | | 58.7% | | | | | ICU Level of Service | | | B | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

37: 11th Street & Oak Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 80 | 0 | 0 | 1257 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.25 | 0.92 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 87 | 0 | 0 | 1366 | 0 | 0 |
| Pedestrians | 6 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 348 | 6 | 6 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 348 | 6 | 6 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 86 | 100 | 100 | | | |
| cM capacity (veh/h) | 620 | 1069 | 1605 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 87 | 342 | 342 | 342 | 342 | |
| Volume Left | 87 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 620 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.14 | 0.20 | 0.20 | 0.20 | 0.20 | |
| Queue Length 95th (ft) | 12 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.7 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.7 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 29.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

38: 11th Street & Madison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 1295 | 226 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1017 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.98 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6225 | | | | | | | | | 5066 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6225 | | | | | | | | | 5066 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 1349 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 1094 | 0 |
| RTOR Reduction (vph) | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 1575 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1155 | 0 |
| Confl. Peds. (#/hr) | 20 | | 20 | 30 | | 30 | 12 | | 12 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 5 | | | 7 | | | 3 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2386 | | | | | | | | | 2195 | |
| v/s Ratio Prot | | c0.25 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.23 | |
| v/c Ratio | | 0.66 | | | | | | | | | 0.53 | |
| Uniform Delay, d1 | | 15.3 | | | | | | | | | 12.5 | |
| Progression Factor | | 0.84 | | | | | | | | | 0.58 | |
| Incremental Delay, d2 | | 1.4 | | | | | | | | | 0.8 | |
| Delay (s) | | 14.3 | | | | | | | | | 8.1 | |
| Level of Service | | B | | | | | | | | | A | |
| Approach Delay (s) | | 14.3 | | | 0.0 | | | 0.0 | | | 8.1 | |
| Approach LOS | | B | | | A | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 11.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.59 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 52.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

39: 11th Street & Franklin Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4TTH | | | | | | 4TTH | | | | |
| Volume (vph) | 28 | 844 | 0 | 0 | 0 | 0 | 0 | 371 | 156 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6389 | | | | | | 6031 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6389 | | | | | | 6031 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 30 | 917 | 0 | 0 | 0 | 0 | 0 | 403 | 161 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 938 | 0 | 0 | 0 | 0 | 0 | 550 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | 17 | 53 | | 53 | 68 | | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | 1 | | | 6 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 15.4 | | | | | | 37.6 | | | | |
| Effective Green, g (s) | | 15.4 | | | | | | 37.6 | | | | |
| Actuated g/C Ratio | | 0.26 | | | | | | 0.63 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1640 | | | | | | 3779 | | | | |
| v/s Ratio Prot | | | | | | | | c0.09 | | | | |
| v/s Ratio Perm | | 0.15 | | | | | | | | | | |
| v/c Ratio | | 0.57 | | | | | | 0.15 | | | | |
| Uniform Delay, d1 | | 19.4 | | | | | | 4.6 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 0.1 | | | | |
| Delay (s) | | 19.7 | | | | | | 4.7 | | | | |
| Level of Service | | B | | | | | | A | | | | |
| Approach Delay (s) | | 19.7 | | | 0.0 | | | 4.7 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.1 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.27 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 40.3% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

40: 7th St. & Oak St.

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|------|-------|------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | ↑↑↑ | | | | |
| Volume (vph) | 208 | 1498 | 0 | 0 | 0 | 0 | 0 | 1095 | 1185 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.92 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6353 | | | | | | 4636 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6353 | | | | | | 4636 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.98 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 226 | 1529 | 0 | 0 | 0 | 0 | 0 | 1165 | 1234 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1744 | 0 | 0 | 0 | 0 | 0 | 2396 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 50 | | 50 | 14 | | 14 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 16 | | | 1 | | | 2 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2541 | | | | | | 1854 | | | | |
| v/s Ratio Prot | | | | | | | | c0.52 | | | | |
| v/s Ratio Perm | | 0.27 | | | | | | | | | | |
| v/c Ratio | | 0.69 | | | | | | 1.93dr | | | | |
| Uniform Delay, d1 | | 11.2 | | | | | | 13.5 | | | | |
| Progression Factor | | 0.75 | | | | | | 1.34 | | | | |
| Incremental Delay, d2 | | 0.6 | | | | | | 135.1 | | | | |
| Delay (s) | | 9.0 | | | | | | 153.3 | | | | |
| Level of Service | | A | | | | | | F | | | | |
| Approach Delay (s) | | 9.0 | | | 0.0 | | | 153.3 | | | 0.0 | |
| Approach LOS | | A | | | A | | | F | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 92.3 | | | | | | HCM Level of Service | | F | | |
| HCM Volume to Capacity ratio | | 0.99 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 9.0 | | |
| Intersection Capacity Utilization | | 82.5% | | | | | | ICU Level of Service | | E | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

41: 7th St. & Madison Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------------------------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 1576 | 481 | 0 | 0 | 0 | 0 | 0 | 0 | 505 | 1713 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6146 | | | | | | | | | 5017 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6146 | | | | | | | | | 5017 | |
| Peak-hour factor, PHF | 0.25 | 0.99 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.95 | 0.25 |
| Adj. Flow (vph) | 0 | 1592 | 523 | 0 | 0 | 0 | 0 | 0 | 0 | 549 | 1803 | 0 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 2113 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2350 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 8 | | 8 | 2 | | 2 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 2 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2458 | | | | | | | | | 2230 | |
| v/s Ratio Prot | | c0.34 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.47 | |
| v/c Ratio | | 0.86 | | | | | | | | | 1.05 | |
| Uniform Delay, d1 | | 12.3 | | | | | | | | | 12.5 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 4.2 | | | | | | | | | 35.1 | |
| Delay (s) | | 16.5 | | | | | | | | | 47.6 | |
| Level of Service | | B | | | | | | | | | D | |
| Approach Delay (s) | | 16.5 | | | 0.0 | | | 0.0 | | | 47.6 | |
| Approach LOS | | B | | | A | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 32.9 | | | | | | | | | HCM Level of Service C |
| HCM Volume to Capacity ratio | | | 0.96 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | | | | | 7.0 | |
| Intersection Capacity Utilization | | | 83.2% | | | | | | | | | ICU Level of Service E |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

42: I-880 NB On-ramp & Jackson Street

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|--------|------|-------|------|------|----------------------|-------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↱ | | ↕ | | | ↱ | ↱ |
| Volume (vph) | 0 | 0 | 0 | 8 | 430 | 66 | 409 | 410 | 0 | 0 | 251 | 1897 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frbp, ped/bikes | | | | 1.00 | 1.00 | 0.93 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1726 | 1863 | 1471 | | 1817 | | | 1863 | 1559 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.71 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1726 | 1863 | 1471 | | 1316 | | | 1863 | 1559 |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 9 | 467 | 72 | 445 | 446 | 0 | 0 | 273 | 1936 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 28 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 9 | 467 | 17 | 0 | 891 | 0 | 0 | 273 | 1908 |
| Confl. Peds. (#/hr) | 4 | | 4 | 20 | | 20 | 1 | | 1 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 10 | | | 7 | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 14.5 | 14.5 | 14.5 | | 34.5 | | | 34.5 | 34.5 |
| Effective Green, g (s) | | | | 14.5 | 14.5 | 14.5 | | 34.5 | | | 34.5 | 34.5 |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | 0.24 | | 0.57 | | | 0.57 | 0.57 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 417 | 450 | 355 | | 757 | | | 1071 | 896 |
| v/s Ratio Prot | | | | c0.25 | | | | | | | 0.15 | |
| v/s Ratio Perm | | | | 0.01 | | 0.01 | | 0.68 | | | | c1.22 |
| v/c Ratio | | | | 0.02 | 1.04 | 0.05 | | 1.18 | | | 0.25 | 2.13 |
| Uniform Delay, d1 | | | | 17.3 | 22.8 | 17.5 | | 12.8 | | | 6.3 | 12.8 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 52.5 | 0.1 | | 93.2 | | | 0.6 | 512.0 |
| Delay (s) | | | | 17.4 | 75.3 | 17.5 | | 105.9 | | | 6.9 | 524.7 |
| Level of Service | | | | B | E | B | | F | | | A | F |
| Approach Delay (s) | | 0.0 | | | 66.8 | | | 105.9 | | | 460.7 | |
| Approach LOS | | A | | | E | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 314.9 | | | | | HCM Level of Service | | F | | | |
| HCM Volume to Capacity ratio | | 1.81 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | Sum of lost time (s) | | 11.0 | | | |
| Intersection Capacity Utilization | | 198.7% | | | | | ICU Level of Service | | H | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Cumulative PM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 215 | 731 | 77 | 66 | 848 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.89 | 0.85 |
| Flt Protected | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (prot) | | | 3499 | | 3170 | 1441 |
| Flt Permitted | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (perm) | | | 3499 | | 3170 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 |
| Adj. Flow (vph) | 0 | 234 | 795 | 84 | 72 | 902 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 1029 | 0 | 607 | 451 |
| Confl. Peds. (#/hr) | 46 | | | | | |
| Confl. Bikes (#/hr) | 3 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1267 | | 1141 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.29 | | 0.19 | 0.31 |
| v/c Ratio | | | 0.81 | | 0.53 | 0.87 |
| Uniform Delay, d1 | | | 13.0 | | 11.4 | 13.4 |
| Progression Factor | | | 0.76 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.5 | | 1.8 | 17.7 |
| Delay (s) | | | 10.3 | | 13.2 | 31.1 |
| Level of Service | | | B | | B | C |
| Approach Delay (s) | | | 10.3 | | 20.8 | |
| Approach LOS | | | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 15.7 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.83 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 75.2% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

44: 5th St. & Oak St.

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 339 | 664 | 96 | 0 | 0 | 0 | 0 | 622 | 86 | 1 | 81 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frbp, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | | | | 0.98 | | | 1.00 | |
| Flt Protected | | 0.98 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4917 | | | | | | 1832 | | | 1862 | |
| Flt Permitted | | 0.98 | | | | | | 1.00 | | | 0.72 | |
| Satd. Flow (perm) | | 1000 | | | | | | 1300 | | | 1300 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 |
| Adj. Flow (vph) | 368 | 714 | 104 | 0 | 0 | 0 | 0 | 676 | 93 | 1 | 88 | 0 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1161 | 0 | 0 | 0 | 0 | 0 | 758 | 0 | 0 | 89 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | 4 | | | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 500 | | | | | | 631 | | | 448 | |
| v/s Ratio Prot | | | | | | | | c0.41 | | | | |
| v/s Ratio Perm | | c1.16 | | | | | | | | | 0.07 | |
| v/c Ratio | | 2.32 | | | | | | 1.20 | | | 0.20 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 14.8 | | | 10.4 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.08 | |
| Incremental Delay, d2 | | 601.2 | | | | | | 105.1 | | | 0.9 | |
| Delay (s) | | 612.4 | | | | | | 119.9 | | | 1.7 | |
| Level of Service | | F | | | | | | F | | | A | |
| Approach Delay (s) | | 612.4 | | | 0.0 | | | 119.9 | | | 1.7 | |
| Approach LOS | | F | | | A | | | F | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 400.5 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.86 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 70.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

45: El Embarcadero (WB) & Grand Avenue

Cumulative PM
Kaiser Center Transportation Study



| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|-------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 207 | 182 | 1326 | 958 | 213 | 1119 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3314 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3314 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 225 | 198 | 1411 | 1041 | 232 | 1216 |
| RTOR Reduction (vph) | 0 | 161 | 143 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 225 | 37 | 2309 | 0 | 232 | 1216 |
| Turn Type | Perm | | | Prot | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 16.8 | 16.8 | 37.7 | | 23.5 | 65.2 |
| Effective Green, g (s) | 16.8 | 16.8 | 37.7 | | 23.5 | 65.2 |
| Actuated g/C Ratio | 0.19 | 0.19 | 0.42 | | 0.26 | 0.72 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 330 | 295 | 1388 | | 462 | 2564 |
| v/s Ratio Prot | c0.13 | | c0.70 | | 0.13 | c0.34 |
| v/s Ratio Perm | | 0.02 | | | | |
| v/c Ratio | 0.68 | 0.13 | 1.66 | | 0.50 | 0.47 |
| Uniform Delay, d1 | 34.1 | 30.5 | 26.2 | | 28.3 | 5.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.72 | 0.84 |
| Incremental Delay, d2 | 5.7 | 0.2 | 301.8 | | 1.6 | 0.3 |
| Delay (s) | 39.8 | 30.7 | 328.0 | | 21.9 | 4.6 |
| Level of Service | D | C | F | | C | A |
| Approach Delay (s) | 35.5 | | 328.0 | | | 7.4 |
| Approach LOS | D | | F | | | A |

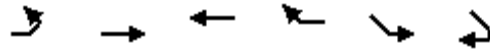
Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 192.0 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.10 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 100.6% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

46: Lakeshore Drive & El Embarcadero (WB)

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | ↰ | ↱↱ | ↰↱ | | ↰ | ↰ |
| Volume (vph) | 273 | 487 | 265 | 151 | 646 | 478 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3347 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3347 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 297 | 529 | 288 | 164 | 702 | 520 |
| RTOR Reduction (vph) | 0 | 0 | 131 | 0 | 0 | 310 |
| Lane Group Flow (vph) | 297 | 529 | 321 | 0 | 702 | 210 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 13.0 | 27.7 | 10.7 | | 24.1 | 24.1 |
| Effective Green, g (s) | 13.0 | 27.7 | 10.7 | | 24.1 | 24.1 |
| Actuated g/C Ratio | 0.22 | 0.46 | 0.18 | | 0.40 | 0.40 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 385 | 1639 | 599 | | 713 | 638 |
| v/s Ratio Prot | c0.17 | 0.15 | c0.10 | | c0.40 | |
| v/s Ratio Perm | | | | | | 0.13 |
| v/c Ratio | 0.77 | 0.32 | 0.54 | | 0.98 | 0.33 |
| Uniform Delay, d1 | 22.0 | 10.1 | 22.3 | | 17.7 | 12.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 9.2 | 0.1 | 0.9 | | 29.6 | 0.3 |
| Delay (s) | 31.2 | 10.2 | 23.2 | | 47.3 | 12.6 |
| Level of Service | C | B | C | | D | B |
| Approach Delay (s) | | 17.8 | 23.2 | | 32.5 | |
| Approach LOS | | B | C | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 26.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.83 | | |
| Actuated Cycle Length (s) | 59.8 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 73.1% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

47: MacArthur Blvd (EB) & Grand Avenue

Cumulative PM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | 3TW | | | 2T | T | T | 2T | |
| Volume (vph) | 0 | 0 | 340 | 2180 | 346 | 0 | 615 | 792 | 738 | 1118 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4940 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4940 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 354 | 2370 | 376 | 0 | 661 | 861 | 802 | 1215 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 16 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 3079 | 0 | 0 | 661 | 845 | 802 | 1215 | 0 |
| Turn Type | | | Split | | | | | Perm | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 1 | 2 |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1647 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.62 | | | 0.19 | | c0.45 | 0.34 | |
| v/s Ratio Perm | | | | | | | | c0.53 | | | |
| v/c Ratio | | | | 1.87 | | | 0.96 | 2.74 | 1.38 | 0.61 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.9 | 36.2 | 30.3 | 12.9 | |
| Progression Factor | | | | 1.00 | | | 1.51 | 1.52 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 393.7 | | | 4.6 | 785.2 | 182.8 | 0.5 | |
| Delay (s) | | | | 423.7 | | | 58.7 | 840.3 | 213.1 | 13.4 | |
| Level of Service | | | | F | | | E | F | F | B | |
| Approach Delay (s) | 0.0 | | | 423.7 | | | 500.8 | | | 92.8 | |
| Approach LOS | A | | | F | | | F | | | F | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 340.8 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.88 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 123.9% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|-------|------|-------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 489 | 2094 | 881 | 183 | 372 | 1030 | 76 | 575 | 26 | 307 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.99 | 0.85 | | 0.89 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3175 | 1441 | | 3142 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3175 | 1441 | | 3142 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 532 | 2228 | 958 | 199 | 404 | 1120 | 83 | 625 | 28 | 334 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 479 | 2406 | 1022 | 0 | 1603 | 0 | 0 | 0 | 653 | 334 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 988 | 448 | | 1292 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.30 | c0.76 | 0.71 | | c0.51 | | | | c0.37 | 0.09 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.96 | 2.44 | 2.28 | | 1.81 | dr | | | 2.77 | 0.16 |
| Uniform Delay, d1 | 30.4 | 31.0 | 31.0 | | 26.5 | | | | 39.0 | 8.4 |
| Progression Factor | 0.62 | 0.63 | 0.61 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.5 | 646.1 | 577.6 | | 115.0 | | | | 806.9 | 0.2 |
| Delay (s) | 24.2 | 665.5 | 596.6 | | 141.5 | | | | 845.9 | 8.6 |
| Level of Service | C | F | F | | F | | | | F | A |
| Approach Delay (s) | | 568.9 | | | 141.5 | | | | | 562.5 |
| Approach LOS | | F | | | F | | | | | F |

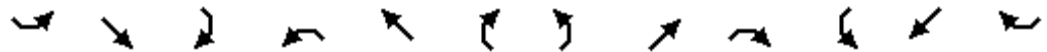
Intersection Summary

| | | | |
|---|--------|----------------------|------|
| HCM Average Control Delay | 462.5 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.91 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 149.3% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

49: Santa Clara Avenue & Oakland Avenue

Cumulative PM
Kaiser Center Transportation Study



| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2086 | 296 | 416 | 1281 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4860 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4860 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.98 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2173 | 322 | 424 | 1363 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2173 | 319 | 0 | 1786 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2543 | 792 | | 1782 | | | | |
| v/s Ratio Prot | | | | | c0.43 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.20 | | 0.37 | | | | |
| v/c Ratio | | | | | 0.85 | 0.40 | | 1.00 | | | | |
| Uniform Delay, d1 | | | | | 13.1 | 9.4 | | 19.0 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.10 | | | | |
| Incremental Delay, d2 | | | | | 3.9 | 1.5 | | 6.9 | | | | |
| Delay (s) | | | | | 17.0 | 10.9 | | 27.7 | | | | |
| Level of Service | | | | | B | B | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 16.2 | | | 27.7 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |

Intersection Summary
















| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 21.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.92 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 80.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

50: Santa Clara Avenue & Harrison Street


















Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | |  |  | | | | | |  | |
| Volume (vph) | 0 | 0 | 0 | 817 | 1734 | 0 | 0 | 0 | 0 | 0 | 905 | 83 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4778 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4778 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 888 | 1788 | 0 | 0 | 0 | 0 | 0 | 984 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 18 | 18 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 630 | 2010 | 0 | 0 | 0 | 0 | 0 | 1070 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2309 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.31 | |
| v/s Ratio Perm | | | | 0.41 | 0.42 | | | | | | | |
| v/c Ratio | | | | 0.86 | 0.87 | | | | | | 0.80 | |
| Uniform Delay, d1 | | | | 13.7 | 13.8 | | | | | | 16.4 | |
| Progression Factor | | | | 1.29 | 1.29 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 6.5 | 2.5 | | | | | | 5.0 | |
| Delay (s) | | | | 24.2 | 20.3 | | | | | | 21.5 | |
| Level of Service | | | | C | C | | | | | | C | |
| Approach Delay (s) | | 0.0 | | | 21.3 | | | 0.0 | | | 21.5 | |
| Approach LOS | | A | | | C | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.3 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.84 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 80.2% | | | ICU Level of Service | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

51: Oakland Avenue & Monte Vista Avenue

Cumulative PM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 291 | 623 | 14 | 22 | 306 | 26 | 21 | 31 | 38 | 86 | 64 | 57 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 316 | 663 | 15 | 24 | 333 | 28 | 23 | 34 | 41 | 93 | 70 | 62 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 316 | 678 | 385 | 98 | 225 | | | | | | | |
| Volume Left (vph) | 316 | 0 | 24 | 23 | 93 | | | | | | | |
| Volume Right (vph) | 0 | 15 | 28 | 41 | 62 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.17 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.9 | 6.4 | 6.3 | 7.3 | 6.9 | | | | | | | |
| Degree Utilization, x | 0.60 | 1.20 | 0.67 | 0.20 | 0.43 | | | | | | | |
| Capacity (veh/h) | 515 | 571 | 555 | 437 | 491 | | | | | | | |
| Control Delay (s) | 18.7 | 126.1 | 21.0 | 12.1 | 15.1 | | | | | | | |
| Approach Delay (s) | 91.9 | | 21.0 | 12.1 | 15.1 | | | | | | | |
| Approach LOS | F | | C | B | C | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 61.2 | | | | | | | | | |
| HCM Level of Service | | | F | | | | | | | | | |
| Intersection Capacity Utilization | | | 80.8% | ICU Level of Service | | | | | | D | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 36.0 Worst Case Level Of Service: F[123.7]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 1463 0 0 0 607 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 1463 0 0 0 607 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 1463 0 0 0 607 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.93 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1590 0 0 0 653 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1590 0 0 0 653 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 6.2 xxxxx xxxxx xxxxx

FollowUpTim:xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 3.3 xxxxx xxxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 530 xxxxx xxxxx xxxxx

Potent Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 553 xxxxx xxxxx xxxxx

Move Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 553 xxxxx xxxxx xxxxx

Volume/Cap: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 1.18 xxxxx xxxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 23.1 xxxxx xxxxx xxxxx

Control Del:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 123.7 xxxxx xxxxx xxxxx

LOS by Move: * * * * * * * * * * F * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 123.7 xxxxxx

ApproachLOS: * * * * F *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis

2: I-580 EB On-Ramp & Oakland Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study
























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|-------|-------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 553 | 195 | 1193 | 549 | 33 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1730 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1730 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 570 | 212 | 1297 | 597 | 36 |
| RTOR Reduction (vph) | 48 | 48 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 340 | 346 | 1297 | 633 | 0 |
| Confl. Peds. (#/hr) | | | | | 2 |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 14.4 | 14.4 | 38.1 | 15.1 | |
| Effective Green, g (s) | 14.4 | 14.4 | 38.1 | 15.1 | |
| Actuated g/C Ratio | 0.24 | 0.24 | 0.64 | 0.25 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 403 | 415 | 2247 | 398 | |
| v/s Ratio Prot | | | c0.37 | c0.40 | |
| v/s Ratio Perm | c0.20 | 0.20 | | | |
| v/c Ratio | 0.84 | 0.83 | 0.58 | 1.59 | |
| Uniform Delay, d1 | 21.7 | 21.7 | 6.3 | 22.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 14.3 | 12.9 | 1.1 | 277.4 | |
| Delay (s) | 36.0 | 34.6 | 7.4 | 299.8 | |
| Level of Service | D | C | A | F | |
| Approach Delay (s) | | 35.3 | 103.3 | | |
| Approach LOS | | D | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 83.7 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 0.93 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 63.1% | | ICU Level of Service | B |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |  |  | | |  |  |  | |  |  |  |
| Volume (vph) | 83 | 141 | 151 | 36 | 84 | 31 | 200 | 177 | 16 | 505 | 676 | 47 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.95 | | | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1497 | | | 1770 | 1863 | 1450 | | 3433 | 3501 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1497 | | | 1770 | 1863 | 1450 | | 3433 | 3501 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 90 | 153 | 164 | 39 | 91 | 34 | 217 | 186 | 17 | 549 | 735 | 51 |
| RTOR Reduction (vph) | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 153 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 90 | 153 | 192 | 0 | 0 | 125 | 217 | 33 | 0 | 566 | 781 | 0 |
| Confl. Peds. (#/hr) | 21 | | 21 | | | | | 27 | | 9 | | 8 |
| Confl. Bikes (#/hr) | | | 8 | | | | | 24 | | | | 1 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 10.6 | 16.6 | 16.6 | | | 10.0 | 16.0 | 16.0 | | 18.6 | 34.5 | |
| Effective Green, g (s) | 10.6 | 16.6 | 16.6 | | | 10.0 | 16.0 | 16.0 | | 18.6 | 34.5 | |
| Actuated g/C Ratio | 0.12 | 0.18 | 0.18 | | | 0.11 | 0.18 | 0.18 | | 0.21 | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 208 | 653 | 276 | | | 197 | 331 | 258 | | 709 | 1342 | |
| v/s Ratio Prot | 0.05 | 0.04 | | | | 0.07 | c0.12 | | | c0.16 | 0.22 | |
| v/s Ratio Perm | | | c0.13 | | | | | 0.02 | | | | |
| v/c Ratio | 0.43 | 0.23 | 0.70 | | | 0.63 | 0.66 | 0.13 | | 0.80 | 0.58 | |
| Uniform Delay, d1 | 36.9 | 31.3 | 34.3 | | | 38.3 | 34.4 | 31.1 | | 33.9 | 22.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.4 | 0.2 | 7.5 | | | 6.5 | 4.6 | 0.2 | | 6.3 | 1.8 | |
| Delay (s) | 38.3 | 31.5 | 41.8 | | | 44.8 | 39.1 | 31.4 | | 40.2 | 23.9 | |
| Level of Service | D | C | D | | | D | D | C | | D | C | |
| Approach Delay (s) | | 37.6 | | | | | 37.7 | | | | 30.7 | |
| Approach LOS | | D | | | | | D | | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 149.1 | | | | HCM Level of Service | | F | | | | |
| HCM Volume to Capacity ratio | | 1.04 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 90.0 | | | | Sum of lost time (s) | | 12.0 | | | | |
| Intersection Capacity Utilization | | 94.7% | | | | ICU Level of Service | | F | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 3: 27th Street & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|------|-------|------|------|
| Lane Configurations | ↰ | ↱↰ | | |
| Volume (vph) | 163 | 1382 | 155 | 108 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.98 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3455 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3455 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 177 | 1502 | 168 | 117 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 |
| Lane Group Flow (vph) | 177 | 1782 | 0 | 0 |
| Confl. Peds. (#/hr) | 18 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 12.9 | 28.8 | | |
| Effective Green, g (s) | 12.9 | 28.8 | | |
| Actuated g/C Ratio | 0.14 | 0.32 | | |
| Clearance Time (s) | 4.0 | 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 254 | 1106 | | |
| v/s Ratio Prot | 0.10 | 0.52 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 0.70 | 1.61 | | |
| Uniform Delay, d1 | 36.7 | 30.6 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 8.1 | 279.1 | | |
| Delay (s) | 44.7 | 309.7 | | |
| Level of Service | D | F | | |
| Approach Delay (s) | | 285.8 | | |
| Approach LOS | | F | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 65 | 203 | 110 | 38 | 335 | 332 | 62 | 532 | 42 | 109 | 663 | 49 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1748 | 3302 | | | 3517 | 1543 | 1762 | 3484 | | 1766 | 3498 | |
| Flt Permitted | 0.51 | 1.00 | | | 0.88 | 1.00 | 0.28 | 1.00 | | 0.38 | 1.00 | |
| Satd. Flow (perm) | 932 | 3302 | | | 3127 | 1543 | 520 | 3484 | | 703 | 3498 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 71 | 218 | 120 | 41 | 353 | 361 | 67 | 548 | 46 | 118 | 721 | 53 |
| RTOR Reduction (vph) | 0 | 69 | 0 | 0 | 0 | 117 | 0 | 7 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 71 | 269 | 0 | 0 | 394 | 244 | 67 | 587 | 0 | 118 | 768 | 0 |
| Confl. Peds. (#/hr) | 25 | | 25 | 18 | | 13 | 19 | | 13 | 6 | | 6 |
| Confl. Bikes (#/hr) | | 16 | 16 | 59 | | 5 | | 5 | 59 | | | 6 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 395 | 1398 | | | 1324 | 654 | 232 | 1558 | | 314 | 1564 | |
| v/s Ratio Prot | | 0.08 | | | | | | 0.17 | | | c0.22 | |
| v/s Ratio Perm | 0.08 | | | | 0.13 | c0.16 | 0.13 | | | 0.17 | | |
| v/c Ratio | 0.18 | 0.19 | | | 0.30 | 0.37 | 0.29 | 0.38 | | 0.38 | 0.49 | |
| Uniform Delay, d1 | 15.3 | 15.4 | | | 16.2 | 16.8 | 14.9 | 15.6 | | 15.6 | 16.6 | |
| Progression Factor | 1.44 | 1.46 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.9 | 0.3 | | | 0.6 | 1.6 | 3.1 | 0.7 | | 3.4 | 1.1 | |
| Delay (s) | 22.9 | 22.8 | | | 16.7 | 18.4 | 18.0 | 16.3 | | 19.0 | 17.8 | |
| Level of Service | C | C | | | B | B | B | B | | B | B | |
| Approach Delay (s) | | 22.8 | | | 17.5 | | | 16.5 | | | 17.9 | |
| Approach LOS | | C | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 18.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.43 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 101.3% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|-----------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 394 | 444 | 164 | 50 | 299 | 122 | 100 | 419 | 26 | 55 | 406 | 154 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1561 | 1766 | 1863 | 1546 | 1762 | 3499 | | 1765 | 3372 | |
| Flt Permitted | 0.39 | 1.00 | 1.00 | 0.49 | 1.00 | 1.00 | 0.25 | 1.00 | | 0.36 | 1.00 | |
| Satd. Flow (perm) | 724 | 1863 | 1561 | 907 | 1863 | 1546 | 462 | 3499 | | 666 | 3372 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 428 | 483 | 178 | 54 | 325 | 133 | 104 | 455 | 28 | 60 | 441 | 167 |
| RTOR Reduction (vph) | 0 | 0 | 79 | 0 | 0 | 79 | 0 | 7 | 0 | 0 | 58 | 0 |
| Lane Group Flow (vph) | 428 | 483 | 99 | 54 | 325 | 54 | 104 | 476 | 0 | 60 | 550 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | Permpm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 55.4 | 47.2 | 47.2 | 38.2 | 34.5 | 34.5 | 20.6 | 20.6 | | 20.6 | 20.6 | |
| Effective Green, g (s) | 55.4 | 47.2 | 47.2 | 38.2 | 34.5 | 34.5 | 20.6 | 20.6 | | 20.6 | 20.6 | |
| Actuated g/C Ratio | 0.65 | 0.56 | 0.56 | 0.45 | 0.41 | 0.41 | 0.24 | 0.24 | | 0.24 | 0.24 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 674 | 1035 | 867 | 445 | 756 | 627 | 112 | 848 | | 161 | 817 | |
| v/s Ratio Prot | c0.12 | 0.26 | | 0.01 | 0.17 | | | 0.14 | | | 0.16 | |
| v/s Ratio Perm | c0.29 | | 0.06 | 0.05 | | 0.03 | c0.22 | | | 0.09 | | |
| v/c Ratio | 0.64 | 0.47 | 0.11 | 0.12 | 0.43 | 0.09 | 0.93 | 0.56 | | 0.37 | 0.67 | |
| Uniform Delay, d1 | 8.3 | 11.3 | 9.0 | 13.3 | 18.2 | 15.5 | 31.5 | 28.2 | | 26.8 | 29.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.65 | 0.64 | 0.24 | 0.94 | 0.91 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.4 | 1.5 | 0.3 | 0.0 | 1.7 | 0.3 | 58.8 | 0.5 | | 0.5 | 1.7 | |
| Delay (s) | 9.7 | 12.9 | 9.2 | 8.7 | 13.4 | 4.0 | 88.2 | 26.1 | | 27.3 | 30.9 | |
| Level of Service | A | B | A | A | B | A | F | C | | C | C | |
| Approach Delay (s) | | 11.0 | | | 10.4 | | | 37.1 | | | 30.6 | |
| Approach LOS | | B | | | B | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 20.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.71 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 79.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 6: 27th Street & I-980 On Ramp

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 177 | 992 | 0 | 0 | 171 | 354 | 5 | 308 | 29 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1608 | 3387 | | | 3539 | 2787 | | 5008 | | | | |
| Flt Permitted | 0.63 | 0.95 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 1074 | 3218 | | | 3539 | 2787 | | 5008 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 192 | 1078 | 0 | 0 | 186 | 385 | 5 | 335 | 32 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 231 | 0 | 17 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 173 | 1097 | 0 | 0 | 186 | 154 | 0 | 355 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 6 | | 6 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 4 | | | 3 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 430 | 1287 | | | 1416 | 1115 | | 2003 | | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | 0.16 | 0.34 | | | | 0.06 | | 0.07 | | | | |
| v/c Ratio | 0.40 | 0.85 | | | 0.13 | 0.14 | | 0.18 | | | | |
| Uniform Delay, d1 | 8.6 | 10.9 | | | 7.6 | 7.6 | | 7.7 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 2.8 | 7.3 | | | 0.2 | 0.3 | | 0.2 | | | | |
| Delay (s) | 11.4 | 18.2 | | | 7.8 | 7.9 | | 7.9 | | | | |
| Level of Service | B | B | | | A | A | | A | | | | |
| Approach Delay (s) | | 17.3 | | | 7.9 | | | 7.9 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.3 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.51 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 63.1% | | | ICU Level of Service | | | B | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 7: 27th Street & I-980 Off Ramp

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 321 | 31 | 12 | 181 | 0 | 0 | 0 | 0 | 835 | 1243 | 405 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1558 | | 3527 | | | | | 1610 | 3370 | 1583 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.99 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1558 | | 3290 | | | | | 1610 | 3370 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 0 | 349 | 34 | 13 | 197 | 0 | 0 | 0 | 0 | 908 | 1337 | 440 |
| RTOR Reduction (vph) | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 213 |
| Lane Group Flow (vph) | 0 | 349 | 13 | 0 | 210 | 0 | 0 | 0 | 0 | 726 | 1519 | 227 |
| Confl. Peds. (#/hr) | 2 | | 2 | 10 | | 10 | 6 | | 6 | | | |
| Confl. Bikes (#/hr) | | | 3 | | | 4 | | | 1 | | | |
| Turn Type | | Perm | | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | | 8 | | | | | | 6 | |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 545 | | 1152 | | | | | 832 | 1741 | 818 |
| v/s Ratio Prot | | c0.10 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.06 | | | | | c0.45 | 0.45 | 0.14 |
| v/c Ratio | | 0.28 | 0.02 | | 0.18 | | | | | 0.87 | 0.87 | 0.28 |
| Uniform Delay, d1 | | 14.1 | 12.8 | | 13.5 | | | | | 12.8 | 12.8 | 8.2 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.6 | 0.1 | | 0.3 | | | | | 12.2 | 6.4 | 0.8 |
| Delay (s) | | 14.6 | 12.9 | | 13.9 | | | | | 25.0 | 19.1 | 9.0 |
| Level of Service | | B | B | | B | | | | | C | B | A |
| Approach Delay (s) | | 14.5 | | | 13.9 | | 0.0 | | | | 19.1 | |
| Approach LOS | | B | | | B | | A | | | | B | |

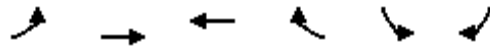
Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 18.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 75.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 8: West Grand Avenue & Northgate Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 225 | 688 | 772 | 151 | 975 | 227 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.98 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3435 | | 3432 | 1414 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3435 | | 3432 | 1414 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 245 | 748 | 839 | 164 | 1060 | 247 |
| RTOR Reduction (vph) | 0 | 0 | 20 | 0 | 2 | 148 |
| Lane Group Flow (vph) | 245 | 748 | 983 | 0 | 1083 | 74 |
| Confl. Peds. (#/hr) | 14 | | | 11 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 10 | | 1 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 5 | 2 | 6 | 4 | | |
| Permitted Phases | | | | | 4 | |
| Actuated Green, G (s) | 13.7 | 45.4 | 27.7 | | 26.6 | 26.6 |
| Effective Green, g (s) | 13.7 | 45.4 | 27.7 | | 26.6 | 26.6 |
| Actuated g/C Ratio | 0.17 | 0.57 | 0.35 | | 0.33 | 0.33 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 303 | 2008 | 1189 | | 1141 | 470 |
| v/s Ratio Prot | c0.14 | 0.21 | c0.29 | | c0.32 | |
| v/s Ratio Perm | | | | | | 0.05 |
| v/c Ratio | 0.81 | 0.37 | 0.83 | | 0.95 | 0.16 |
| Uniform Delay, d1 | 31.9 | 9.5 | 24.0 | | 26.0 | 18.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 13.8 | 0.5 | 6.7 | | 15.6 | 0.1 |
| Delay (s) | 45.7 | 10.0 | 30.6 | | 41.7 | 18.9 |
| Level of Service | D | B | C | | D | B |
| Approach Delay (s) | | 18.8 | 30.6 | | 37.8 | |
| Approach LOS | | B | C | | D | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 29.9 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.87 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 79.0% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: West Grand Avenue & Telegraph Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|-------|-------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 125 | 1019 | 410 | 79 | 494 | 78 | 232 | 302 | 35 | 132 | 423 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1767 | 3427 | 1553 | 1770 | 3347 | | 1769 | 3474 | | 1757 | 3433 | |
| Flt Permitted | 0.26 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.35 | 1.00 | | 0.54 | 1.00 | |
| Satd. Flow (perm) | 476 | 3427 | 1553 | 297 | 3347 | | 653 | 3474 | | 997 | 3433 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 136 | 1061 | 446 | 86 | 537 | 85 | 252 | 318 | 38 | 143 | 460 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 314 | 0 | 14 | 0 | 0 | 3 | 0 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 136 | 1061 | 132 | 86 | 608 | 0 | 252 | 353 | 0 | 143 | 537 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | 5 | 2 | | | | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | 49.4 | 49.4 | | | 34.9 | 34.9 | |
| Effective Green, g (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | 49.4 | 49.4 | | | 34.9 | 34.9 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.58 | 0.58 | | | 0.41 | 0.41 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 6.0 | | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 141 | 1012 | 459 | 88 | 988 | 511 | 2019 | | | 409 | 1410 | |
| v/s Ratio Prot | | c0.31 | | | 0.18 | c0.06 | 0.10 | | | | 0.16 | |
| v/s Ratio Perm | 0.29 | | 0.08 | 0.29 | | c0.23 | | | | 0.14 | | |
| v/c Ratio | 0.96 | 1.05 | 0.29 | 0.98 | 0.62 | 0.49 | 0.17 | | | 0.35 | 0.38 | |
| Uniform Delay, d1 | 29.5 | 30.0 | 23.1 | 29.7 | 25.8 | 9.3 | 8.3 | | | 17.2 | 17.5 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.11 | 1.13 | |
| Incremental Delay, d2 | 66.9 | 41.8 | 1.6 | 89.9 | 2.9 | 0.3 | 0.2 | | | 2.2 | 0.8 | |
| Delay (s) | 96.4 | 71.8 | 24.6 | 119.5 | 28.7 | 9.5 | 8.5 | | | 21.4 | 20.5 | |
| Level of Service | F | E | C | F | C | A | A | | | C | C | |
| Approach Delay (s) | | 61.0 | | | 39.7 | | 8.9 | | | | 20.7 | |
| Approach LOS | | E | | | D | | A | | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 40.5 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 82.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

10: Grand Avenue & Broadway

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|--------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 105 | 877 | 100 | 108 | 559 | 83 | 129 | 499 | 111 | 105 | 452 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1755 | 3358 | | | 3326 | | 1764 | 3539 | 1526 | 1763 | 3437 | |
| Flt Permitted | 0.24 | 1.00 | | | 0.57 | | 0.37 | 1.00 | 1.00 | 0.40 | 1.00 | |
| Satd. Flow (perm) | 435 | 3358 | | | 1909 | | 688 | 3539 | 1526 | 739 | 3437 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 114 | 953 | 109 | 117 | 608 | 90 | 140 | 542 | 121 | 114 | 491 | 98 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 12 | 0 | 0 | 0 | 31 | 0 | 20 | 0 |
| Lane Group Flow (vph) | 114 | 1051 | 0 | 0 | 803 | 0 | 140 | 542 | 90 | 114 | 569 | 0 |
| Confl. Peds. (#/hr) | 34 | | 34 | 37 | | 37 | 8 | | 8 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 11 | | | 8 | | | 35 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 35.4 | 35.4 | | | 35.4 | | 36.6 | 36.6 | 36.6 | 36.6 | 36.6 | |
| Effective Green, g (s) | 35.4 | 35.4 | | | 35.4 | | 36.6 | 36.6 | 36.6 | 36.6 | 36.6 | |
| Actuated g/C Ratio | 0.44 | 0.44 | | | 0.44 | | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 192 | 1486 | | | 845 | | 315 | 1619 | 698 | 338 | 1572 | |
| v/s Ratio Prot | | 0.31 | | | | | | 0.15 | | | 0.17 | |
| v/s Ratio Perm | 0.26 | | | | c0.42 | | c0.20 | | 0.06 | 0.15 | | |
| v/c Ratio | 0.59 | 0.71 | | | 1.03dl | | 0.44 | 0.33 | 0.13 | 0.34 | 0.36 | |
| Uniform Delay, d1 | 16.9 | 18.1 | | | 21.5 | | 14.8 | 13.9 | 12.5 | 13.9 | 14.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.35 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.3 | 1.3 | | | 19.6 | | 4.5 | 0.6 | 0.4 | 2.7 | 0.6 | |
| Delay (s) | 20.1 | 19.4 | | | 48.6 | | 19.3 | 14.5 | 12.9 | 16.6 | 14.8 | |
| Level of Service | C | B | | | D | | B | B | B | B | B | |
| Approach Delay (s) | | 19.4 | | | 48.6 | | | 15.1 | | | 15.1 | |
| Approach LOS | | B | | | D | | | B | | | B | |

Intersection Summary

| | | | |
|---|-------|----------------------|-----|
| HCM Average Control Delay | 24.4 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.69 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 91.5% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 11: Grand Avenue & Webster Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|-------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | ↕ | ↕↕ | | | | | | ↕↕ | |
| Volume (vph) | 0 | 472 | 500 | 137 | 507 | 0 | 0 | 0 | 0 | 14 | 189 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frbp, ped/bikes | | 0.97 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Frt | | 0.92 | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | 3067 | | 1770 | 3427 | | | | | | 3413 | |
| Flt Permitted | | 1.00 | | 0.11 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | 3067 | | 212 | 3427 | | | | | | 3413 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 508 | 543 | 149 | 551 | 0 | 0 | 0 | 0 | 15 | 205 | 25 |
| RTOR Reduction (vph) | 0 | 175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 876 | 0 | 149 | 551 | 0 | 0 | 0 | 0 | 0 | 234 | 0 |
| Confl. Peds. (#/hr) | 26 | | 26 | 28 | | 28 | 21 | | 21 | 101 | | 101 |
| Confl. Bikes (#/hr) | | | 4 | | | 4 | | | 3 | | | 6 |
| Turn Type | Perm | | pm+pt | | pm+pt | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | | | | 4 | | |
| Actuated Green, G (s) | | 30.2 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | | 30.2 | | 43.0 | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | | 0.38 | | 0.54 | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 1158 | | 266 | 1842 | | | | | | 1237 | |
| v/s Ratio Prot | | c0.29 | | c0.05 | 0.16 | | | | | | | |
| v/s Ratio Perm | | | | 0.25 | | | | | | | 0.07 | |
| v/c Ratio | | 0.76 | | 0.56 | 0.30 | | | | | | 0.19 | |
| Uniform Delay, d1 | | 21.7 | | 13.8 | 10.2 | | | | | | 17.5 | |
| Progression Factor | | 2.05 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | | 3.8 | | 1.6 | 0.4 | | | | | | 0.3 | |
| Delay (s) | | 48.2 | | 15.4 | 10.6 | | | | | | 17.8 | |
| Level of Service | | D | | B | B | | | | | | B | |
| Approach Delay (s) | | 48.2 | | | 11.6 | | | 0.0 | | | 17.8 | |
| Approach LOS | | D | | | B | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 31.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.49 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 76.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

12: Grand Avenue & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|------|--------|------|------|-------|------|
| Lane Configurations | ↔↔ | ↑↑ | ↗ | ↔↔ | ↑↑ | ↗ | | ↔↔↔ | ↗ | | ↔↔↔ | |
| Volume (vph) | 118 | 259 | 101 | 846 | 834 | 137 | 265 | 1094 | 394 | 48 | 1387 | 310 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 1.00 | 0.94 | | 1.00 | 0.90 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1479 | 3433 | 3539 | 1484 | | 5036 | 1419 | | 4897 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.69 | 1.00 | | 0.73 | |
| Satd. Flow (perm) | 3433 | 3539 | 1479 | 3433 | 3539 | 1484 | | 3500 | 1419 | | 3564 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 |
| Adj. Flow (vph) | 128 | 282 | 110 | 920 | 907 | 149 | 288 | 1189 | 428 | 52 | 1491 | 337 |
| RTOR Reduction (vph) | 0 | 0 | 1 | 0 | 0 | 72 | 0 | 0 | 274 | 0 | 35 | 0 |
| Lane Group Flow (vph) | 128 | 282 | 109 | 920 | 907 | 77 | 0 | 1477 | 154 | 0 | 1845 | 0 |
| Confl. Peds. (#/hr) | 38 | | 38 | 34 | | 34 | 60 | | 60 | 28 | | 28 |
| Confl. Bikes (#/hr) | | | 12 | | | 18 | | | 39 | | | 9 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 8.1 | 33.0 | 33.0 | 16.0 | 41.9 | 41.9 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 8.1 | 33.0 | 33.0 | 16.0 | 41.9 | 41.9 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.08 | 0.33 | 0.33 | 0.16 | 0.42 | 0.42 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 278 | 1168 | 488 | 549 | 1483 | 622 | | 1260 | 511 | | 1283 | |
| v/s Ratio Prot | 0.04 | 0.08 | | c0.27 | c0.26 | | | | | | | |
| v/s Ratio Perm | | | 0.07 | | | 0.05 | | 0.42 | 0.11 | | c0.52 | |
| v/c Ratio | 0.46 | 0.24 | 0.22 | 1.68 | 0.61 | 0.12 | | 3.84dl | 0.30 | | 1.44 | |
| Uniform Delay, d1 | 43.9 | 24.4 | 24.2 | 42.0 | 22.7 | 17.8 | | 32.0 | 23.0 | | 32.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.5 | 1.1 | 312.0 | 1.9 | 0.4 | | 86.2 | 1.5 | | 201.8 | |
| Delay (s) | 44.3 | 24.9 | 25.3 | 354.0 | 24.6 | 18.2 | | 118.2 | 24.5 | | 233.8 | |
| Level of Service | D | C | C | F | C | B | | F | C | | F | |
| Approach Delay (s) | | 29.7 | | | 177.5 | | | 97.2 | | | 233.8 | |
| Approach LOS | | C | | | F | | | F | | | F | |

Intersection Summary

| | | | |
|---|--------|----------------------|------|
| HCM Average Control Delay | 157.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.11 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 122.5% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 13: 21st Street & Harrison Street

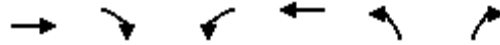
Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study






| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|-------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 130 | 54 | 128 | 1100 | 1303 | 743 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.98 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.96 | | 1.00 | 1.00 | 0.95 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3270 | | 1769 | 3725 | 6056 | |
| Flt Permitted | 0.97 | | 0.08 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3270 | | 150 | 3725 | 6056 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.93 | 0.92 |
| Adj. Flow (vph) | 141 | 59 | 139 | 1146 | 1401 | 808 |
| RTOR Reduction (vph) | 52 | 0 | 0 | 0 | 70 | 0 |
| Lane Group Flow (vph) | 148 | 0 | 139 | 1146 | 2139 | 0 |
| Confl. Peds. (#/hr) | 36 | 36 | 109 | | | |
| Confl. Bikes (#/hr) | | 14 | | | | |
| Turn Type | pm+pt | | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 8.9 | | 57.6 | 49.6 | 49.6 | |
| Effective Green, g (s) | 8.9 | | 57.6 | 49.6 | 49.6 | |
| Actuated g/C Ratio | 0.11 | | 0.72 | 0.62 | 0.62 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 364 | | 270 | 2310 | 3755 | |
| v/s Ratio Prot | c0.05 | | c0.05 | 0.31 | c0.35 | |
| v/s Ratio Perm | | | 0.32 | | | |
| v/c Ratio | 0.41 | | 0.51 | 0.50 | 0.57 | |
| Uniform Delay, d1 | 33.1 | | 6.5 | 8.3 | 8.9 | |
| Progression Factor | 1.00 | | 1.07 | 1.33 | 1.00 | |
| Incremental Delay, d2 | 0.7 | | 1.3 | 0.6 | 0.6 | |
| Delay (s) | 33.8 | | 8.3 | 11.7 | 9.6 | |
| Level of Service | C | | A | B | A | |
| Approach Delay (s) | 33.8 | | | 11.3 | 9.6 | |
| Approach LOS | C | | | B | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 11.5 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.54 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | | | 69.1% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 14: 21st Street & Access Road

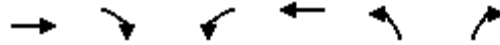
Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study






| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 175 | 30 | 115 | 759 | 1 | 19 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 190 | 33 | 125 | 825 | 1 | 21 |
| Pedestrians | 7 | | | 7 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 225 | | 1291 | 216 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 225 | | 1291 | 216 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 91 | | 99 | 97 |
| cM capacity (veh/h) | | | 1342 | | 162 | 818 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 223 | 950 | 22 | | | |
| Volume Left | 0 | 125 | 1 | | | |
| Volume Right | 33 | 0 | 21 | | | |
| cSH | 1700 | 1342 | 681 | | | |
| Volume to Capacity | 0.13 | 0.09 | 0.03 | | | |
| Queue Length 95th (ft) | 0 | 8 | 2 | | | |
| Control Delay (s) | 0.0 | 2.3 | 10.5 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 2.3 | 10.5 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.0 | | | |
| Intersection Capacity Utilization | | | 72.9% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

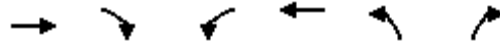
Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study







| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|------|
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 170 | 258 | 424 | 337 | 2 | 34 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 185 | 280 | 461 | 366 | 2 | 37 |
| Pedestrians | 24 | | | 24 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 2 | | | 2 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 467 | | 1639 | 351 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 467 | | 1639 | 351 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 58 | | 97 | 95 |
| cM capacity (veh/h) | | | 1092 | | 62 | 677 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 465 | 827 | 39 | | | |
| Volume Left | 0 | 461 | 2 | | | |
| Volume Right | 280 | 0 | 37 | | | |
| cSH | 1700 | 1092 | 438 | | | |
| Volume to Capacity | 0.27 | 0.42 | 0.09 | | | |
| Queue Length 95th (ft) | 0 | 53 | 7 | | | |
| Control Delay (s) | 0.0 | 8.5 | 14.0 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 8.5 | 14.0 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.7 | | | |
| Intersection Capacity Utilization | | | 85.4% | ICU Level of Service | E | |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West



















Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|---|------|-------|---|---|---|
| Lane Configurations |  | | |  |  |  |
| Volume (veh/h) | 264 | 149 | 132 | 477 | 34 | 43 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 1.00 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 287 | 149 | 143 | 518 | 37 | 47 |
| Pedestrians | 16 | | | 16 | 2 | |
| Lane Width (ft) | 12.0 | | | 12.0 | 12.0 | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | 4.0 | |
| Percent Blockage | 1 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.84 | | 0.84 | 0.84 |
| vC, conflicting volume | | | 438 | | 1185 | 379 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 232 | | 1124 | 163 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 87 | | 77 | 94 |
| cM capacity (veh/h) | | | 1117 | | 163 | 728 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 436 | 662 | 18 | 18 | 23 | 23 |
| Volume Left | 0 | 143 | 18 | 18 | 0 | 0 |
| Volume Right | 149 | 0 | 0 | 0 | 23 | 23 |
| cSH | 1700 | 1117 | 163 | 163 | 728 | 728 |
| Volume to Capacity | 0.26 | 0.13 | 0.11 | 0.11 | 0.03 | 0.03 |
| Queue Length 95th (ft) | 0 | 11 | 9 | 9 | 2 | 2 |
| Control Delay (s) | 0.0 | 3.1 | 29.8 | 29.8 | 10.1 | 10.1 |
| Lane LOS | | A | D | D | B | B |
| Approach Delay (s) | 0.0 | 3.1 | 18.8 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.1 | | | |
| Intersection Capacity Utilization | | | 72.9% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |


















HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | | | | | |    | |
| Volume (vph) | 0 | 391 | 76 | 59 | 74 | 0 | 0 | 0 | 0 | 315 | 489 | 36 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.97 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | | 0.98 | |
| Satd. Flow (prot) | | 1863 | 1343 | | 1770 | | | | | | 4718 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.53 | | | | | | 0.98 | |
| Satd. Flow (perm) | | 1863 | 1343 | | 956 | | | | | | 4718 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 425 | 83 | 64 | 80 | 0 | 0 | 0 | 0 | 342 | 532 | 39 |
| RTOR Reduction (vph) | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 425 | 50 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 910 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | 2 | |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 26.0 | 26.0 | | 26.0 | | | | | | 46.0 | |
| Effective Green, g (s) | | 26.0 | 26.0 | | 26.0 | | | | | | 46.0 | |
| Actuated g/C Ratio | | 0.32 | 0.32 | | 0.32 | | | | | | 0.57 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 605 | 436 | | 311 | | | | | | 2713 | |
| v/s Ratio Prot | | c0.23 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.04 | | 0.15 | | | | | | 0.19 | |
| v/c Ratio | | 0.70 | 0.11 | | 0.46 | | | | | | 0.34 | |
| Uniform Delay, d1 | | 23.6 | 18.9 | | 21.5 | | | | | | 9.0 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.94 | |
| Incremental Delay, d2 | | 3.7 | 0.1 | | 1.1 | | | | | | 0.3 | |
| Delay (s) | | 27.3 | 19.0 | | 22.5 | | | | | | 8.7 | |
| Level of Service | | C | B | | C | | | | | | A | |
| Approach Delay (s) | | 26.0 | | | 22.5 | | | 0.0 | | | 8.7 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 15.6 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.47 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 69.6% | | | ICU Level of Service | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  |  | |  | |
| Volume (vph) | 8 | 279 | 4 | 0 | 49 | 48 | 12 | 253 | 188 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 1.00 | 0.87 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 0.93 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1852 | | | 1631 | | | 3515 | 1378 | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1846 | | | 1631 | | | 3515 | 1378 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 9 | 303 | 4 | 0 | 53 | 52 | 13 | 275 | 204 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 19 | 0 | 0 | 0 | 166 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 315 | 0 | 0 | 86 | 0 | 0 | 288 | 38 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 28.7 | | | 28.7 | | | 8.3 | 8.3 | | | |
| Effective Green, g (s) | | 28.7 | | | 28.7 | | | 8.3 | 8.3 | | | |
| Actuated g/C Ratio | | 0.64 | | | 0.64 | | | 0.18 | 0.18 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1177 | | | 1040 | | | 648 | 254 | | | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | | |
| v/s Ratio Perm | | 0.17 | | | | | | 0.08 | 0.03 | | | |
| v/c Ratio | | 0.27 | | | 0.08 | | | 0.44 | 0.15 | | | |
| Uniform Delay, d1 | | 3.6 | | | 3.1 | | | 16.3 | 15.4 | | | |
| Progression Factor | | 0.50 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.5 | | | 0.2 | | | 0.2 | 0.1 | | | |
| Delay (s) | | 2.3 | | | 3.3 | | | 16.5 | 15.5 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 2.3 | | | 3.3 | | | 16.1 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 9.8 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.31 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 41.2% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 19: 21st Street & Broadway

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 13 | 157 | 21 | 30 | 0 | 43 | 0 | 393 | 46 | 110 | 427 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | | 1.00 | | | 0.99 | |
| Frt | 1.00 | 0.98 | | | 0.92 | | | 0.98 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | 1752 | 1824 | | | 1651 | | | 3455 | | | 3482 | |
| Flt Permitted | 0.70 | 1.00 | | | 0.87 | | | 1.00 | | | 0.76 | |
| Satd. Flow (perm) | 1300 | 1824 | | | 1461 | | | 3455 | | | 2672 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 14 | 171 | 23 | 33 | 0 | 47 | 0 | 427 | 50 | 120 | 464 | 0 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 27 | 0 | 0 | 20 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 14 | 183 | 0 | 0 | 53 | 0 | 0 | 457 | 0 | 0 | 584 | 0 |
| Confl. Peds. (#/hr) | 16 | | 16 | 17 | | 17 | 43 | | 43 | 44 | | 44 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | 16 |
| Turn Type | Perm | | | Perm | | | | Perm | | | | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 549 | 770 | | | 617 | | | 1305 | | | 1009 | |
| v/s Ratio Prot | c0.10 | | | | | | | 0.13 | | | | |
| v/s Ratio Perm | 0.01 | | | | 0.04 | | | | | | c0.22 | |
| v/c Ratio | 0.03 | 0.24 | | | 0.09 | | | 0.35 | | | 0.58 | |
| Uniform Delay, d1 | 7.6 | 8.3 | | | 7.8 | | | 10.0 | | | 11.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.19 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.7 | | | 0.3 | | | 0.7 | | | 2.4 | |
| Delay (s) | 7.7 | 9.1 | | | 9.5 | | | 10.8 | | | 13.6 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 9.0 | | | 9.5 | | | 10.8 | | | 13.6 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 73.6% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 20: 20th Street & Telegraph Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | | | ↕↕ | | ↕ | ↕↕ | |
| Volume (vph) | 22 | 116 | 24 | 15 | 237 | 125 | 40 | 547 | 51 | 193 | 194 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.95 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3422 | | | 3319 | | | 3477 | | 1769 | 3381 | |
| Flt Permitted | | 0.86 | | | 0.94 | | | 0.92 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | | 2971 | | | 3120 | | | 3200 | | 564 | 3381 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 24 | 126 | 26 | 16 | 252 | 136 | 43 | 558 | 55 | 210 | 211 | 76 |
| RTOR Reduction (vph) | 0 | 21 | 0 | 0 | 111 | 0 | 0 | 9 | 0 | 0 | 25 | 0 |
| Lane Group Flow (vph) | 0 | 155 | 0 | 0 | 293 | 0 | 0 | 647 | 0 | 210 | 262 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 11.0 | | | 11.0 | | | 27.1 | | 40.0 | 40.0 | |
| Effective Green, g (s) | | 11.0 | | | 11.0 | | | 27.1 | | 40.0 | 40.0 | |
| Actuated g/C Ratio | | 0.18 | | | 0.18 | | | 0.45 | | 0.67 | 0.67 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 545 | | | 572 | | | 1445 | | 545 | 2254 | |
| v/s Ratio Prot | | | | | | | | | | c0.05 | 0.08 | |
| v/s Ratio Perm | | 0.05 | | | c0.09 | | | c0.20 | | 0.20 | | |
| v/c Ratio | | 0.28 | | | 0.51 | | | 0.45 | | 0.39 | 0.12 | |
| Uniform Delay, d1 | | 21.1 | | | 22.1 | | | 11.3 | | 4.5 | 3.6 | |
| Progression Factor | | 1.00 | | | 1.03 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.7 | | | 1.0 | | 0.5 | 0.1 | |
| Delay (s) | | 21.4 | | | 23.6 | | | 12.3 | | 4.9 | 3.7 | |
| Level of Service | | C | | | C | | | B | | A | A | |
| Approach Delay (s) | | 21.4 | | | 23.6 | | | 12.3 | | | 4.2 | |
| Approach LOS | | C | | | C | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 13.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.46 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 66.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 21: 20th Street & Broadway

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔↔ | |
| Volume (vph) | 10 | 226 | 71 | 56 | 185 | 131 | 69 | 561 | 97 | 76 | 479 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.98 | | | 0.96 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.97 | | | 0.95 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Satd. Flow (prot) | | 3353 | | | 3158 | | | 3397 | | | 4981 | |
| Flt Permitted | | 0.94 | | | 0.86 | | | 0.84 | | | 0.77 | |
| Satd. Flow (perm) | | 3159 | | | 2733 | | | 2879 | | | 3836 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 11 | 246 | 77 | 61 | 201 | 142 | 75 | 603 | 105 | 83 | 521 | 33 |
| RTOR Reduction (vph) | 0 | 47 | 0 | 0 | 90 | 0 | 0 | 21 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 287 | 0 | 0 | 314 | 0 | 0 | 762 | 0 | 0 | 627 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 99 | | 99 | 72 | | 72 | 49 | | 49 |
| Confl. Bikes (#/hr) | | | 7 | | | 33 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | Perm | | Perm | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1158 | | | 1002 | | | 1452 | | | 1151 | |
| v/s Ratio Prot | | | | | | | | c0.06 | | | | |
| v/s Ratio Perm | | 0.09 | | | c0.11 | | | c0.19 | | | 0.16 | |
| v/c Ratio | | 0.25 | | | 0.31 | | | 0.53 | | | 0.54 | |
| Uniform Delay, d1 | | 13.2 | | | 13.6 | | | 10.7 | | | 17.6 | |
| Progression Factor | | 0.90 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 0.8 | | | 1.4 | | | 1.9 | |
| Delay (s) | | 12.5 | | | 14.4 | | | 12.1 | | | 19.4 | |
| Level of Service | | B | | | B | | | B | | | B | |
| Approach Delay (s) | | 12.5 | | | 14.4 | | | 12.1 | | | 19.4 | |
| Approach LOS | | B | | | B | | | B | | | B | |


















Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.43 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 80.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  |  | |  |  | | | |
| Volume (vph) | 34 | 403 | 0 | 0 | 310 | 106 | 42 | 326 | 132 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.99 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3518 | | | 3364 | 1337 | | 5024 | 1461 | | | |
| Flt Permitted | | 0.91 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3220 | | | 3364 | 1337 | | 5024 | 1461 | | | |
| Peak-hour factor, PHF | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 35 | 438 | 0 | 0 | 337 | 115 | 46 | 354 | 143 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 25 | 0 | 0 | 121 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 473 | 0 | 0 | 348 | 78 | 0 | 400 | 22 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | Perm | | | Perm | Perm | | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 60.8 | | | 60.8 | 60.8 | | 12.2 | 12.2 | | | |
| Effective Green, g (s) | | 60.8 | | | 60.8 | 60.8 | | 12.2 | 12.2 | | | |
| Actuated g/C Ratio | | 0.76 | | | 0.76 | 0.76 | | 0.15 | 0.15 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 2447 | | | 2557 | 1016 | | 766 | 223 | | | |
| v/s Ratio Prot | | | | | 0.10 | | | | | | | |
| v/s Ratio Perm | | c0.15 | | | | 0.06 | | 0.08 | 0.01 | | | |
| v/c Ratio | | 0.19 | | | 0.14 | 0.08 | | 0.52 | 0.10 | | | |
| Uniform Delay, d1 | | 2.7 | | | 2.6 | 2.4 | | 31.2 | 29.2 | | | |
| Progression Factor | | 1.00 | | | 1.67 | 3.37 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.2 | | | 0.1 | 0.1 | | 0.6 | 0.2 | | | |
| Delay (s) | | 2.9 | | | 4.4 | 8.4 | | 31.9 | 29.4 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 2.9 | | | 5.3 | | | 31.2 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.1 | | | | | HCM Level of Service | | B | | | |
| HCM Volume to Capacity ratio | | 0.25 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | | Sum of lost time (s) | | 7.0 | | | |
| Intersection Capacity Utilization | | 56.7% | | | | | ICU Level of Service | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 23: 20th Street & Webster Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 345 | 196 | 224 | 308 | 0 | 0 | 0 | 0 | 80 | 427 | 107 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.90 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 0.99 | | | | | | 0.96 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 0.99 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1422 | 1610 | 3341 | | | | | | 4472 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.88 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1422 | 1610 | 2974 | | | | | | 4472 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 375 | 206 | 243 | 335 | 0 | 0 | 0 | 0 | 87 | 464 | 116 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 0 |
| Lane Group Flow (vph) | 0 | 375 | 130 | 187 | 391 | 0 | 0 | 0 | 0 | 0 | 626 | 0 |
| Confl. Peds. (#/hr) | 53 | | 53 | 86 | | 86 | 105 | | 105 | 331 | | 331 |
| Confl. Bikes (#/hr) | | | 16 | | | 2 | | | 1 | | | 14 |
| Turn Type | | | Perm | Prot | | | | | | Perm | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | |
| Actuated Green, G (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Effective Green, g (s) | | 21.0 | 21.0 | 16.0 | 41.0 | | | | | | 31.0 | |
| Actuated g/C Ratio | | 0.26 | 0.26 | 0.20 | 0.51 | | | | | | 0.39 | |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 929 | 373 | 322 | 1598 | | | | | | 1733 | |
| v/s Ratio Prot | | c0.11 | | c0.12 | 0.05 | | | | | | | |
| v/s Ratio Perm | | | 0.09 | | 0.08 | | | | | | 0.14 | |
| v/c Ratio | | 0.40 | 0.35 | 0.58 | 0.24 | | | | | | 0.36 | |
| Uniform Delay, d1 | | 24.3 | 23.9 | 29.0 | 10.9 | | | | | | 17.4 | |
| Progression Factor | | 1.00 | 1.09 | 1.52 | 0.56 | | | | | | 1.07 | |
| Incremental Delay, d2 | | 1.3 | 2.5 | 0.9 | 0.0 | | | | | | 0.0 | |
| Delay (s) | | 25.6 | 28.6 | 45.0 | 6.2 | | | | | | 18.7 | |
| Level of Service | | C | C | D | A | | | | | | B | |
| Approach Delay (s) | | 26.7 | | | 18.7 | | | 0.0 | | | 18.7 | |
| Approach LOS | | C | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 21.3 | | | | HCM Level of Service | | C | | | | |
| HCM Volume to Capacity ratio | | 0.43 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | Sum of lost time (s) | | 12.0 | | | | |
| Intersection Capacity Utilization | | 87.5% | | | | ICU Level of Service | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 24: 20th Street & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|-------|------|------|-------|-------|-------|--------|--------|------|--------|--------|------|
| Lane Configurations | ↰ | ↰↰↰ | | | | ↰↰ | ↰↰ | ↰ | ↰ | | ↰ | ↰ |
| Volume (vph) | 109 | 181 | 204 | 102 | 108 | 451 | 531 | 589 | 116 | 0 | 32 | 29 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.94 |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.92 | | | | 1.00 | 0.96 | 0.85 | 0.85 | | 0.85 | 0.85 |
| Flt Protected | 0.95 | 0.98 | | | | 0.98 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 1770 | 4724 | | | | 3483 | 3238 | 1441 | 1583 | | 1583 | 1490 |
| Flt Permitted | 0.95 | 0.98 | | | | 0.98 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 1770 | 4724 | | | | 3483 | 3238 | 1441 | 1583 | | 1583 | 1490 |
| Peak-hour factor, PHF | 0.98 | 0.92 | 0.92 | 0.94 | 0.94 | 0.96 | 0.92 | 0.96 | 0.96 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 111 | 197 | 222 | 109 | 115 | 470 | 577 | 614 | 121 | 0 | 33 | 30 |
| RTOR Reduction (vph) | 0 | 166 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 24 |
| Lane Group Flow (vph) | 111 | 253 | 0 | 0 | 0 | 694 | 823 | 368 | 60 | 0 | 33 | 6 |
| Confl. Peds. (#/hr) | 16 | | | | | | | | 102 | | | 32 |
| Confl. Bikes (#/hr) | | | | | | 6 | | | 10 | | | 2 |
| Turn Type | Prot | | | Split | Split | | custom | custom | | custom | custom | |
| Protected Phases | 5 | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | | |
| Permitted Phases | | 1 | | | | | | 6 | | | 9 | 2 |
| Actuated Green, G (s) | 7.3 | 20.2 | | | | 24.0 | 16.8 | 29.7 | 29.7 | | 3.0 | 16.8 |
| Effective Green, g (s) | 7.3 | 20.2 | | | | 24.0 | 16.8 | 29.7 | 29.7 | | 3.0 | 16.8 |
| Actuated g/C Ratio | 0.09 | 0.25 | | | | 0.30 | 0.21 | 0.37 | 0.37 | | 0.04 | 0.21 |
| Clearance Time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 162 | 1193 | | | | 1045 | 680 | 535 | 588 | | 59 | 313 |
| v/s Ratio Prot | c0.06 | 0.05 | | | | c0.20 | c0.25 | c0.26 | 0.04 | | | |
| v/s Ratio Perm | | | | | | | | | | | c0.02 | 0.00 |
| v/c Ratio | 0.69 | 0.21 | | | | 0.66 | 1.21 | 0.69 | 0.10 | | 0.56 | 0.02 |
| Uniform Delay, d1 | 35.2 | 23.6 | | | | 24.5 | 31.6 | 21.2 | 16.4 | | 37.9 | 25.1 |
| Progression Factor | 0.89 | 1.85 | | | | 1.00 | 1.49 | 1.73 | 3.16 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 10.9 | 0.4 | | | | 1.2 | 107.2 | 6.6 | 0.3 | | 6.4 | 0.0 |
| Delay (s) | 42.1 | 44.1 | | | | 25.7 | 154.3 | 43.3 | 52.2 | | 44.2 | 25.1 |
| Level of Service | D | D | | | | C | F | D | D | | D | C |
| Approach Delay (s) | | 43.7 | | | | 25.7 | 113.7 | | | 35.1 | | |
| Approach LOS | | D | | | | C | F | | | D | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 74.0 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.84 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 72.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 26: Harrison Street & Lakeside Drive

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|---|------|------|-------|-------|----------------------|-------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖↗ | ↑↑↑ | ↖↗ | ↗ |
| Volume (vph) | 577 | 56 | 544 | 1044 | 192 | 1148 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.99 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 5018 | | 3433 | 5085 | 3172 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 5018 | | 3433 | 5085 | 3172 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.97 |
| Adj. Flow (vph) | 627 | 61 | 567 | 1135 | 209 | 1184 |
| RTOR Reduction (vph) | 14 | 0 | 0 | 0 | 344 | 344 |
| Lane Group Flow (vph) | 674 | 0 | 567 | 1135 | 457 | 248 |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 33.0 | | 16.3 | 54.3 | 17.7 | 17.7 |
| Effective Green, g (s) | 33.0 | | 16.3 | 54.3 | 17.7 | 17.7 |
| Actuated g/C Ratio | 0.41 | | 0.20 | 0.68 | 0.22 | 0.22 |
| Clearance Time (s) | 5.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 2070 | | 699 | 3451 | 702 | 319 |
| v/s Ratio Prot | 0.13 | | c0.17 | c0.22 | 0.14 | |
| v/s Ratio Perm | | | | | | c0.17 |
| v/c Ratio | 0.33 | | 0.81 | 0.33 | 0.85 | 0.78 |
| Uniform Delay, d1 | 15.9 | | 30.4 | 5.3 | 28.3 | 29.3 |
| Progression Factor | 0.48 | | 0.79 | 1.04 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.4 | | 8.9 | 0.2 | 2.2 | 11.3 |
| Delay (s) | 7.9 | | 33.0 | 5.7 | 30.5 | 40.6 |
| Level of Service | A | | C | A | C | D |
| Approach Delay (s) | 7.9 | | | 14.8 | 34.8 | |
| Approach LOS | A | | | B | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 20.9 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.54 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | | | 67.3% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 28: 18th Street & Brush Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 82 | 113 | 0 | 0 | 0 | 0 | 0 | 3650 | 14 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1770 | 3539 | | | | | | 6403 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1770 | 3539 | | | | | | 6403 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 88 | 123 | 0 | 0 | 0 | 0 | 0 | 3802 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 88 | 123 | 0 | 0 | 0 | 0 | 0 | 3817 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | | | | 14 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Effective Green, g (s) | | | | 9.2 | 9.2 | | | | | | 56.8 | |
| Actuated g/C Ratio | | | | 0.12 | 0.12 | | | | | | 0.76 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 217 | 434 | | | | | | 4849 | |
| v/s Ratio Prot | | | | | 0.03 | | | | | | c0.60 | |
| v/s Ratio Perm | | | | c0.05 | | | | | | | | |
| v/c Ratio | | | | 0.41 | 0.28 | | | | | | 0.79 | |
| Uniform Delay, d1 | | | | 30.4 | 29.9 | | | | | | 5.5 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.97 | |
| Incremental Delay, d2 | | | | 5.5 | 1.6 | | | | | | 0.9 | |
| Delay (s) | | | | 35.9 | 31.5 | | | | | | 6.2 | |
| Level of Service | | | | D | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 33.4 | | | 0.0 | | | 6.2 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.6 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.73 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 66.5% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



















| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|------|-------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 219 | 1178 | 646 | 96 | 594 | 131 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.98 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 4956 | | 3376 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 4956 | | 3376 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.95 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 238 | 1227 | 680 | 104 | 632 | 142 |
| RTOR Reduction (vph) | 30 | 0 | 24 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 208 | 1227 | 760 | 0 | 774 | 0 |
| Confl. Peds. (#/hr) | | | | 22 | | |
| Confl. Bikes (#/hr) | | | | 2 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 32.0 | 32.0 | 17.8 | | 13.2 | |
| Effective Green, g (s) | 32.0 | 32.0 | 17.8 | | 13.2 | |
| Actuated g/C Ratio | 0.43 | 0.43 | 0.24 | | 0.18 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 755 | 2170 | 1176 | | 594 | |
| v/s Ratio Prot | | c0.24 | c0.15 | | c0.23 | |
| v/s Ratio Perm | 0.12 | | | | | |
| v/c Ratio | 0.27 | 0.57 | 0.65 | | 1.30 | |
| Uniform Delay, d1 | 14.0 | 16.2 | 25.8 | | 30.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.9 | 1.1 | 1.2 | | 148.3 | |
| Delay (s) | 14.9 | 17.3 | 27.0 | | 179.2 | |
| Level of Service | B | B | C | | F | |
| Approach Delay (s) | | 16.9 | 27.0 | | 179.2 | |
| Approach LOS | | B | C | | F | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 61.1 | | HCM Level of Service | E |
| HCM Volume to Capacity ratio | | | 0.74 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 69.5% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: 12th St. & Castro Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | |  |  |  |  | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 182 | 281 | 357 | 358 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.99 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.99 | 1.00 | | | | |
| Frt | | | | | 0.93 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3152 | 1423 | 1425 | 5925 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3152 | 1423 | 1425 | 5925 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 194 | 305 | 388 | 389 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 56 | 59 | 154 | 154 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 287 | 98 | 40 | 429 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 5 | | 5 | | | |
| Confl. Bikes (#/hr) | | | 6 | | | 2 | | | 5 | | | |
| Turn Type | | | | | | Perm | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | 2 | | | | | |
| Actuated Green, G (s) | | | | | 37.5 | 37.5 | 12.5 | 12.5 | | | | |
| Effective Green, g (s) | | | | | 37.5 | 37.5 | 12.5 | 12.5 | | | | |
| Actuated g/C Ratio | | | | | 0.62 | 0.62 | 0.21 | 0.21 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1970 | 889 | 297 | 1234 | | | | |
| v/s Ratio Prot | | | | | c0.09 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.07 | 0.03 | 0.07 | | | | |
| v/c Ratio | | | | | 0.15 | 0.11 | 0.14 | 0.35 | | | | |
| Uniform Delay, d1 | | | | | 4.6 | 4.5 | 19.4 | 20.3 | | | | |
| Progression Factor | | | | | 3.80 | 6.85 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.1 | 0.1 | 0.2 | 0.2 | | | | |
| Delay (s) | | | | | 17.7 | 31.2 | 19.6 | 20.4 | | | | |
| Level of Service | | | | | B | C | B | C | | | | |
| Approach Delay (s) | | 0.0 | | | 21.9 | | | 20.2 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 20.9 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.20 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 30.3% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 31: 11th Street & Brush Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study




















| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 210 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 1216 | 1366 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3432 | | | | | | | | 1522 | 4723 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3432 | | | | | | | | 1522 | 4723 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 226 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 1322 | 1485 | 41 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 345 | 63 | 0 |
| Lane Group Flow (vph) | 0 | 270 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 356 | 2084 | 0 |
| Confl. Peds. (#/hr) | 6 | | 6 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | 1 | | 1 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Effective Green, g (s) | | 62.0 | | | | | | | | 50.0 | 50.0 | |
| Actuated g/C Ratio | | 0.52 | | | | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1773 | | | | | | | | 634 | 1968 | |
| v/s Ratio Prot | | c0.08 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.23 | 0.44 | |
| v/c Ratio | | 0.15 | | | | | | | | 0.56 | 1.06 | |
| Uniform Delay, d1 | | 15.2 | | | | | | | | 26.7 | 35.0 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | | | | | | 3.6 | 38.0 | |
| Delay (s) | | 15.4 | | | | | | | | 30.2 | 73.0 | |
| Level of Service | | B | | | | | | | | C | E | |
| Approach Delay (s) | | 15.4 | | | 0.0 | | | 0.0 | | | 62.5 | |
| Approach LOS | | B | | | A | | | A | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 58.3 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.56 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | 61.5% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

32: 14th Street & Lakeside Dr.

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  |  | |  |  | | | |
| Volume (vph) | 46 | 353 | 0 | 0 | 740 | 649 | 157 | 711 | 31 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | | 1.00 | 0.97 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3515 | | | 3539 | 1548 | | 3492 | 1531 | | | |
| Flt Permitted | | 0.71 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2520 | | | 3539 | 1548 | | 3492 | 1531 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 50 | 384 | 0 | 0 | 804 | 676 | 171 | 741 | 34 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 108 | 0 | 0 | 16 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 434 | 0 | 0 | 804 | 568 | 0 | 912 | 18 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 35 | | 35 | 6 | | 6 | 26 | | 26 | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 33 | | | 6 | | 10 | | | | 5 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 756 | | | 1062 | 464 | | 1862 | 817 | | | |
| v/s Ratio Prot | | | | | 0.23 | | | | | | | |
| v/s Ratio Perm | | 0.17 | | | | 0.37 | | 0.26 | 0.01 | | | |
| v/c Ratio | | 0.57 | | | 0.76 | 1.22 | | 0.49 | 0.02 | | | |
| Uniform Delay, d1 | | 17.8 | | | 19.0 | 21.0 | | 8.8 | 6.6 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 3.2 | | | 5.0 | 119.0 | | 0.9 | 0.1 | | | |
| Delay (s) | | 20.9 | | | 24.1 | 140.0 | | 9.8 | 6.7 | | | |
| Level of Service | | C | | | C | F | | A | A | | | |
| Approach Delay (s) | | 20.9 | | | 77.0 | | | 9.7 | | | 0.0 | |
| Approach LOS | | C | | | E | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 46.2 | | | HCM Level of Service | | | | D | | | |
| HCM Volume to Capacity ratio | | 0.75 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | Sum of lost time (s) | | | | 10.0 | | | |
| Intersection Capacity Utilization | | 92.5% | | | ICU Level of Service | | | | F | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 315 | 135 | 156 | 930 | 0 | 0 | 0 | 0 | 212 | 429 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.99 | 1.00 | |
| Frt | | 0.95 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3335 | | | 3507 | | | | | 1746 | 3506 | |
| Flt Permitted | | 1.00 | | | 0.80 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3335 | | | 2819 | | | | | 1746 | 3506 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 342 | 147 | 170 | 969 | 0 | 0 | 0 | 0 | 230 | 447 | 25 |
| RTOR Reduction (vph) | 0 | 85 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 0 | 404 | 0 | 0 | 1139 | 0 | 0 | 0 | 0 | 230 | 463 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 28 | | 28 | 18 | | 18 | 16 | | 16 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 3 | | | 1 |
| Turn Type | | | Perm | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1408 | | | 1190 | | | | | 737 | 1480 | |
| v/s Ratio Prot | | 0.12 | | | | | | | | | c0.13 | |
| v/s Ratio Perm | | | | | c0.40 | | | | | 0.13 | | |
| v/c Ratio | | 0.29 | | | 0.96 | | | | | 0.31 | 0.31 | |
| Uniform Delay, d1 | | 8.5 | | | 12.6 | | | | | 8.7 | 8.7 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 17.6 | | | | | 1.1 | 0.6 | |
| Delay (s) | | 9.1 | | | 30.2 | | | | | 9.8 | 9.2 | |
| Level of Service | | A | | | C | | | | | A | A | |
| Approach Delay (s) | | 9.1 | | | 30.2 | | | 0.0 | | | 9.4 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 19.5 | | | HCM Level of Service | | | | | B | | |
| HCM Volume to Capacity ratio | | 0.63 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | Sum of lost time (s) | | | | | 7.0 | | |
| Intersection Capacity Utilization | | 67.5% | | | ICU Level of Service | | | | | C | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 34: 14th Street & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔ | |
| Volume (vph) | 51 | 191 | 14 | 9 | 460 | 114 | 76 | 500 | 31 | 34 | 87 | 32 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | 0.97 | | | 0.99 | | | 0.97 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | | 3462 | | | 3387 | | | 3469 | | | 3348 | |
| Flt Permitted | | 0.81 | | | 0.95 | | | 0.89 | | | 0.80 | |
| Satd. Flow (perm) | | 2843 | | | 3222 | | | 3117 | | | 2723 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 55 | 208 | 15 | 10 | 500 | 124 | 83 | 543 | 34 | 37 | 95 | 35 |
| RTOR Reduction (vph) | 0 | 8 | 0 | 0 | 43 | 0 | 0 | 9 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 0 | 270 | 0 | 0 | 591 | 0 | 0 | 651 | 0 | 0 | 144 | 0 |
| Confl. Peds. (#/hr) | 30 | | 30 | 55 | | 55 | 41 | | 41 | 40 | | 40 |
| Confl. Bikes (#/hr) | | | 7 | | | 19 | | | 6 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 21.7 | | | 21.7 | | | 15.8 | | | 15.8 | |
| Effective Green, g (s) | | 21.7 | | | 21.7 | | | 15.8 | | | 15.8 | |
| Actuated g/C Ratio | | 0.48 | | | 0.48 | | | 0.35 | | | 0.35 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1371 | | | 1554 | | | 1094 | | | 956 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | 0.10 | | | 0.18 | | | 0.21 | | | 0.05 | |
| v/c Ratio | | 0.20 | | | 0.38 | | | 0.59 | | | 0.15 | |
| Uniform Delay, d1 | | 6.7 | | | 7.4 | | | 12.0 | | | 10.0 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 0.7 | | | 0.9 | | | 0.1 | |
| Delay (s) | | 7.0 | | | 8.1 | | | 12.9 | | | 10.1 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 7.0 | | | 8.1 | | | 12.9 | | | 10.1 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 9.9 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.47 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 70.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←← | | | | | | →→→ | |
| Volume (vph) | 0 | 0 | 0 | 478 | 1728 | 0 | 0 | 0 | 0 | 0 | 603 | 104 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6291 | | | | | | 4935 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6291 | | | | | | 4935 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 520 | 1781 | 0 | 0 | 0 | 0 | 0 | 615 | 113 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 84 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2217 | 0 | 0 | 0 | 0 | 0 | 726 | 0 |
| Confl. Peds. (#/hr) | 48 | | 48 | 30 | | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | 9 | | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2726 | | | | | | 2180 | |
| v/s Ratio Prot | | | | | | | | | | | c0.15 | |
| v/s Ratio Perm | | | | | 0.35 | | | | | | | |
| v/c Ratio | | | | | 0.81 | | | | | | 0.33 | |
| Uniform Delay, d1 | | | | | 14.9 | | | | | | 11.0 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 2.1 | | | | | | 0.4 | |
| Delay (s) | | | | | 9.2 | | | | | | 11.4 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 9.2 | | | 0.0 | | | 11.4 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.7 | | | | | | | | | |
| HCM Volume to Capacity ratio | | | 0.57 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | 54.9% | | | | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 36: 12th St. & Oak St.

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1936 | 89 | 374 | 932 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frbp, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.98 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6342 | | | 6167 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6342 | | | 6167 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1996 | 97 | 402 | 1013 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2088 | 0 | 0 | 1414 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | 1 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3160 | | | 2117 | | | | |
| v/s Ratio Prot | | | | | c0.33 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.23 | | | | |
| v/c Ratio | | | | | 0.66 | | | 0.67 | | | | |
| Uniform Delay, d1 | | | | | 11.3 | | | 16.8 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 1.1 | | | 1.7 | | | | |
| Delay (s) | | | | | 12.4 | | | 18.5 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 12.4 | | | 18.5 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 14.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.5 |
| Intersection Capacity Utilization | 65.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 37: 11th Street & Oak Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 76 | 0 | 0 | 1252 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 83 | 0 | 0 | 1265 | 0 | 0 |
| Pedestrians | 12 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 1 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 328 | 12 | 12 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 328 | 12 | 12 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 87 | 100 | 100 | | | |
| cM capacity (veh/h) | 634 | 1055 | 1589 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 83 | 316 | 316 | 316 | 316 | |
| Volume Left | 83 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 634 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.13 | 0.19 | 0.19 | 0.19 | 0.19 | |
| Queue Length 95th (ft) | 11 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.5 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.5 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 29.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street















Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 457 | 174 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 961 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6057 | | | | | | | | | 5063 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6057 | | | | | | | | | 5063 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 497 | 189 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 1012 | 0 |
| RTOR Reduction (vph) | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 660 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1069 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2322 | | | | | | | | | 2194 | |
| v/s Ratio Prot | | c0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.21 | |
| v/c Ratio | | 0.28 | | | | | | | | | 0.49 | |
| Uniform Delay, d1 | | 12.8 | | | | | | | | | 12.2 | |
| Progression Factor | | 0.76 | | | | | | | | | 0.96 | |
| Incremental Delay, d2 | | 0.3 | | | | | | | | | 0.7 | |
| Delay (s) | | 10.1 | | | | | | | | | 12.3 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 10.1 | | | 0.0 | | | 0.0 | | | 12.3 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.4 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.39 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | | | | | |
| Intersection Capacity Utilization | | 43.2% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | | | | |  | | | | |
| Volume (vph) | 133 | 463 | 0 | 0 | 0 | 0 | 0 | 460 | 68 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6277 | | | | | | 6259 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6277 | | | | | | 6259 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 145 | 498 | 0 | 0 | 0 | 0 | 0 | 500 | 74 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 121 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 522 | 0 | 0 | 0 | 0 | 0 | 553 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | 56 | 21 | | 21 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 5 | | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 10.0 | | | | | | 43.0 | | | | |
| Effective Green, g (s) | | 10.0 | | | | | | 43.0 | | | | |
| Actuated g/C Ratio | | 0.17 | | | | | | 0.72 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1046 | | | | | | 4486 | | | | |
| v/s Ratio Prot | | | | | | | | c0.09 | | | | |
| v/s Ratio Perm | | 0.08 | | | | | | | | | | |
| v/c Ratio | | 0.50 | | | | | | 0.12 | | | | |
| Uniform Delay, d1 | | 22.7 | | | | | | 2.6 | | | | |
| Progression Factor | | 1.05 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.1 | | | | |
| Delay (s) | | 23.9 | | | | | | 2.7 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 23.9 | | | 0.0 | | | 2.7 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.9 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.19 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 40.3% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 40: 7th St. & Oak St.

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | 4↑↑↑ | | | | |
| Volume (vph) | 156 | 746 | 0 | 0 | 0 | 0 | 0 | 1310 | 334 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.97 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6335 | | | | | | 4908 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6335 | | | | | | 4908 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 168 | 811 | 0 | 0 | 0 | 0 | 0 | 1424 | 363 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 975 | 0 | 0 | 0 | 0 | 0 | 1749 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 59 | | 59 | 12 | | 12 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 2 | | | 1 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2534 | | | | | | 1963 | | | | |
| v/s Ratio Prot | | | | | | | | c0.36 | | | | |
| v/s Ratio Perm | | 0.15 | | | | | | | | | | |
| v/c Ratio | | 0.38 | | | | | | 0.89 | | | | |
| Uniform Delay, d1 | | 9.6 | | | | | | 12.6 | | | | |
| Progression Factor | | 0.85 | | | | | | 0.76 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 4.2 | | | | |
| Delay (s) | | 8.5 | | | | | | 13.8 | | | | |
| Level of Service | | A | | | | | | B | | | | |
| Approach Delay (s) | | 8.5 | | | 0.0 | | | 13.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 11.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 55.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 41: 7th St. & Madison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|--------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 648 | 565 | 0 | 0 | 0 | 0 | 0 | 0 | 276 | 1584 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frbp, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.93 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 5917 | | | | | | | | | 5040 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 5917 | | | | | | | | | 5040 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 704 | 614 | 0 | 0 | 0 | 0 | 0 | 0 | 300 | 1616 | 0 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 0 |
| Lane Group Flow (vph) | 0 | 1314 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1859 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 10 | | 10 | 8 | | 8 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 7 | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2367 | | | | | | | | | 2240 | |
| v/s Ratio Prot | | c0.22 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.37 | |
| v/c Ratio | | 0.95dr | | | | | | | | | 0.83 | |
| Uniform Delay, d1 | | 10.4 | | | | | | | | | 11.0 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 0.9 | | | | | | | | | 3.7 | |
| Delay (s) | | 11.4 | | | | | | | | | 14.7 | |
| Level of Service | | B | | | | | | | | | B | |
| Approach Delay (s) | | 11.4 | | | 0.0 | | | 0.0 | | | 14.7 | |
| Approach LOS | | B | | | A | | | A | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 13.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 64.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 42: I-880 NB On-ramp & Jackson Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|--------|-------|------|------|----------------------|------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↱ | | ↕ | | | ↱ | ↱ |
| Volume (vph) | 0 | 0 | 0 | 27 | 401 | 61 | 260 | 325 | 0 | 0 | 192 | 2045 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frbp, ped/bikes | | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1736 | 1863 | 1503 | | 1821 | | | 1863 | 1558 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.76 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1736 | 1863 | 1503 | | 1413 | | | 1863 | 1558 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 29 | 418 | 66 | 283 | 353 | 0 | 0 | 209 | 2153 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 75 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 29 | 418 | 19 | 0 | 636 | 0 | 0 | 209 | 2078 |
| Confl. Peds. (#/hr) | 1 | | 1 | 23 | | 23 | 2 | | 2 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 12.8 | 12.8 | 12.8 | | 21.2 | | | 21.2 | 21.2 |
| Effective Green, g (s) | | | | 12.8 | 12.8 | 12.8 | | 21.2 | | | 21.2 | 21.2 |
| Actuated g/C Ratio | | | | 0.28 | 0.28 | 0.28 | | 0.47 | | | 0.47 | 0.47 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 494 | 530 | 428 | | 666 | | | 878 | 734 |
| v/s Ratio Prot | | | | c0.22 | | | | | | | 0.11 | |
| v/s Ratio Perm | | | | 0.02 | | 0.01 | | 0.45 | | | | c1.33 |
| v/c Ratio | | | | 0.06 | 0.79 | 0.04 | | 0.95 | | | 0.24 | 2.83 |
| Uniform Delay, d1 | | | | 11.7 | 14.9 | 11.7 | | 11.4 | | | 7.1 | 11.9 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 7.6 | 0.0 | | 25.4 | | | 0.6 | 827.7 |
| Delay (s) | | | | 11.8 | 22.5 | 11.7 | | 36.9 | | | 7.7 | 839.6 |
| Level of Service | | | | B | C | B | | D | | | A | F |
| Approach Delay (s) | | 0.0 | | | 20.5 | | | 36.9 | | | 766.0 | |
| Approach LOS | | A | | | C | | | D | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 525.0 | | | | HCM Level of Service | | | | F | |
| HCM Volume to Capacity ratio | | | 2.06 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | Sum of lost time (s) | | | 11.0 | | |
| Intersection Capacity Utilization | | | 193.5% | | | | ICU Level of Service | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 43: 6th St. & Oak St.

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|---|--------|------|-------|------|----------------------|-------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 166 | 580 | 162 | 66 | 1038 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.90 | 0.85 |
| Flt Protected | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (prot) | | | 3497 | | 3189 | 1441 |
| Flt Permitted | | | 0.99 | | 0.98 | 1.00 |
| Satd. Flow (perm) | | | 3497 | | 3189 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 180 | 604 | 176 | 72 | 1128 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 784 | 0 | 812 | 564 |
| Confl. Peds. (#/hr) | 51 | 2 | | | | |
| Confl. Bikes (#/hr) | 2 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1267 | | 1148 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.22 | | 0.25 | c0.39 |
| v/c Ratio | | | 0.62 | | 0.99dr | 1.09 |
| Uniform Delay, d1 | | | 11.8 | | 12.4 | 14.4 |
| Progression Factor | | | 0.85 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.2 | | 3.7 | 65.1 |
| Delay (s) | | | 10.2 | | 16.1 | 79.5 |
| Level of Service | | | B | | B | E |
| Approach Delay (s) | | | 10.2 | | 42.0 | |
| Approach LOS | | | B | | D | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 30.5 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.84 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 77.7% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 44: 5th St. & Oak St.

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 410 | 753 | 206 | 0 | 0 | 0 | 0 | 311 | 92 | 4 | 158 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.98 | | | | | | 0.97 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4858 | | | | | | 1800 | | | 1861 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.99 | |
| Satd. Flow (perm) | | 1850 | | | | | | 1500 | | | 1600 | |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 432 | 818 | 224 | 0 | 0 | 0 | 0 | 338 | 100 | 4 | 172 | 0 |
| RTOR Reduction (vph) | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1418 | 0 | 0 | 0 | 0 | 0 | 414 | 0 | 0 | 176 | 0 |
| Confl. Peds. (#/hr) | 14 | | 14 | 52 | | 52 | 1 | | 1 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 5 | | | 2 | | | | | | |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 925 | | | | | | 620 | | | 551 | |
| v/s Ratio Prot | | | | | | | | c0.23 | | | | |
| v/s Ratio Perm | | c0.77 | | | | | | | | | 0.11 | |
| v/c Ratio | | 1.53 | | | | | | 0.67 | | | 0.32 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 12.6 | | | 10.9 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.89 | |
| Incremental Delay, d2 | | 245.1 | | | | | | 5.6 | | | 1.1 | |
| Delay (s) | | 256.3 | | | | | | 18.2 | | | 10.7 | |
| Level of Service | | F | | | | | | B | | | B | |
| Approach Delay (s) | | 256.3 | | | 0.0 | | | 18.2 | | | 10.7 | |
| Approach LOS | | F | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 185.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.18 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 58.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 45: El Embarcadero (WB) & Grand Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



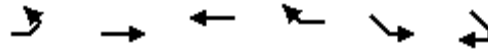
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 418 | 267 | 631 | 309 | 154 | 1592 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.95 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3365 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3365 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 454 | 290 | 686 | 336 | 167 | 1730 |
| RTOR Reduction (vph) | 0 | 209 | 63 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 454 | 81 | 959 | 0 | 167 | 1730 |
| Turn Type | Perm | | | | Prot | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 25.1 | 25.1 | 38.9 | | 14.0 | 56.9 |
| Effective Green, g (s) | 25.1 | 25.1 | 38.9 | | 14.0 | 56.9 |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.43 | | 0.16 | 0.63 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 494 | 441 | 1454 | | 275 | 2237 |
| v/s Ratio Prot | c0.26 | | 0.29 | | 0.09 | c0.49 |
| v/s Ratio Perm | | 0.05 | | | | |
| v/c Ratio | 0.92 | 0.18 | 0.66 | | 0.61 | 0.77 |
| Uniform Delay, d1 | 31.5 | 24.7 | 20.3 | | 35.4 | 11.9 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 22.1 | 0.2 | 2.4 | | 9.6 | 2.7 |
| Delay (s) | 53.5 | 24.9 | 22.7 | | 45.0 | 14.6 |
| Level of Service | D | C | C | | D | B |
| Approach Delay (s) | 42.3 | | 22.7 | | | 17.3 |
| Approach LOS | D | | C | | | B |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 23.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.82 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 73.8% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 46: Lakeshore Drive & El Embarcadero (WB)

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 427 | 437 | 466 | 220 | 223 | 219 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3369 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3369 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.94 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 454 | 455 | 507 | 239 | 242 | 238 |
| RTOR Reduction (vph) | 0 | 0 | 82 | 0 | 0 | 181 |
| Lane Group Flow (vph) | 454 | 455 | 664 | 0 | 242 | 57 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.1 | 32.4 | 14.3 | | 12.7 | 12.7 |
| Effective Green, g (s) | 14.1 | 32.4 | 14.3 | | 12.7 | 12.7 |
| Actuated g/C Ratio | 0.27 | 0.61 | 0.27 | | 0.24 | 0.24 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 470 | 2159 | 907 | | 423 | 379 |
| v/s Ratio Prot | c0.26 | 0.13 | c0.20 | | c0.14 | |
| v/s Ratio Perm | | | | | | 0.04 |
| v/c Ratio | 0.97 | 0.21 | 0.73 | | 0.57 | 0.15 |
| Uniform Delay, d1 | 19.3 | 4.6 | 17.7 | | 17.8 | 15.9 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 32.6 | 0.0 | 3.1 | | 1.9 | 0.2 |
| Delay (s) | 51.8 | 4.7 | 20.7 | | 19.7 | 16.1 |
| Level of Service | D | A | C | | B | B |
| Approach Delay (s) | | 28.2 | 20.7 | | 17.9 | |
| Approach LOS | | C | C | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 23.3 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.76 | | |
| Actuated Cycle Length (s) | 53.1 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 65.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|--------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | 333 | | | ↑↑ | ↑ | ↑ | ↑↑ | |
| Volume (vph) | 0 | 0 | 722 | 760 | 349 | 0 | 490 | 276 | 374 | 1595 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4904 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4904 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 785 | 826 | 379 | 0 | 527 | 300 | 407 | 1734 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 129 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1978 | 0 | 0 | 527 | 171 | 407 | 1734 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1689 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.40 | | | 0.15 | | 0.23 | c0.49 | |
| v/s Ratio Perm | | | | | | | | 0.11 | | | |
| v/c Ratio | | | | 1.26dl | | | 0.90 | 0.66 | 0.63 | 0.86 | |
| Uniform Delay, d1 | | | | 34.8 | | | 43.4 | 41.4 | 27.5 | 19.1 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 83.8 | | | 19.7 | 12.2 | 4.5 | 5.0 | |
| Delay (s) | | | | 118.5 | | | 63.1 | 53.7 | 32.0 | 24.2 | |
| Level of Service | | | | F | | | E | D | C | C | |
| Approach Delay (s) | 0.0 | | | 118.5 | | | 59.7 | | | 25.6 | |
| Approach LOS | A | | | F | | | E | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 68.6 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.97 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 8.5 |
| Intersection Capacity Utilization | 91.2% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 291 | 591 | 239 | 228 | 398 | 323 | 26 | 739 | 50 | 516 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.97 | 0.85 | | 0.93 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3111 | 1441 | | 3288 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3111 | 1441 | | 3288 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 316 | 642 | 260 | 248 | 423 | 351 | 28 | 803 | 54 | 561 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 284 | 822 | 284 | 0 | 800 | 0 | 0 | 0 | 857 | 561 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 32.0 | 32.0 | 32.0 | | 29.0 | | | | 32.5 | 65.0 |
| Effective Green, g (s) | 32.0 | 32.0 | 32.0 | | 29.0 | | | | 32.5 | 65.0 |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | | 0.27 | | | | 0.31 | 0.61 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 486 | 939 | 435 | | 900 | | | | 543 | 2170 |
| v/s Ratio Prot | 0.18 | c0.26 | 0.20 | | c0.24 | | | | c0.48 | 0.16 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.58 | 0.88 | 0.65 | | 0.89 | | | | 1.58 | 0.26 |
| Uniform Delay, d1 | 31.4 | 35.1 | 32.2 | | 37.0 | | | | 36.8 | 9.4 |
| Progression Factor | 0.77 | 0.78 | 0.69 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.6 | 3.3 | 1.2 | | 12.7 | | | | 269.0 | 0.3 |
| Delay (s) | 24.7 | 30.7 | 23.5 | | 49.7 | | | | 305.7 | 9.7 |
| Level of Service | C | C | C | | D | | | | F | A |
| Approach Delay (s) | | 27.8 | | | 49.7 | | | | | 188.6 |
| Approach LOS | | C | | | D | | | | | F |













Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 94.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.12 | | |
| Actuated Cycle Length (s) | 106.0 | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | 98.3% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

















49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 3209 | 149 | 551 | 488 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4789 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4789 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.93 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 3343 | 162 | 592 | 514 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 66 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 3343 | 96 | 0 | 1106 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | 38.0 | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | 0.48 | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2415 | 752 | | 2035 | | | | |
| v/s Ratio Prot | | | | | c0.66 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.06 | | 0.23 | | | | |
| v/c Ratio | | | | | 1.38 | 0.13 | | 0.89dl | | | | |
| Uniform Delay, d1 | | | | | 21.0 | 11.7 | | 17.2 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 175.6 | 0.4 | | 1.0 | | | | |
| Delay (s) | | | | | 196.6 | 12.1 | | 18.2 | | | | |
| Level of Service | | | | | F | B | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 188.0 | | | 18.2 | | | 0.0 | |
| Approach LOS | | A | | | F | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 147.3 | | | | | HCM Level of Service | | F | | | |
| HCM Volume to Capacity ratio | | 0.99 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | | Sum of lost time (s) | | 8.0 | | | |
| Intersection Capacity Utilization | | 132.1% | | | | | ICU Level of Service | | H | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |


















HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | |  |  | | | | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 1575 | 2049 | 0 | 0 | 0 | 0 | 0 | 1473 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4750 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4750 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1624 | 2227 | 0 | 0 | 0 | 0 | 0 | 1567 | 46 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 942 | 2909 | 0 | 0 | 0 | 0 | 0 | 1610 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2731 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.46 | |
| v/s Ratio Perm | | | | c0.62 | 0.61 | | | | | | | |
| v/c Ratio | | | | 1.08 | 1.07 | | | | | | 1.41 | |
| Uniform Delay, d1 | | | | 17.0 | 17.0 | | | | | | 27.0 | |
| Progression Factor | | | | 1.36 | 1.35 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 36.7 | 30.2 | | | | | | 188.2 | |
| Delay (s) | | | | 59.8 | 53.1 | | | | | | 215.2 | |
| Level of Service | | | | E | D | | | | | | F | |
| Approach Delay (s) | | 0.0 | | | 54.7 | | | 0.0 | | | 215.2 | |
| Approach LOS | | A | | | D | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 102.1 | | | | HCM Level of Service | | F | | | | |
| HCM Volume to Capacity ratio | | 1.20 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | Sum of lost time (s) | | 8.0 | | | | |
| Intersection Capacity Utilization | | 142.4% | | | | ICU Level of Service | | H | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 107 | 280 | 9 | 13 | 607 | 19 | 13 | 9 | 12 | 26 | 20 | 19 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 116 | 298 | 10 | 14 | 660 | 21 | 14 | 10 | 13 | 28 | 22 | 21 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 116 | 308 | 695 | 37 | 71 | | | | | | | |
| Volume Left (vph) | 116 | 0 | 14 | 14 | 28 | | | | | | | |
| Volume Right (vph) | 0 | 10 | 21 | 13 | 21 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 6.1 | 5.5 | 4.9 | 6.6 | 6.5 | | | | | | | |
| Degree Utilization, x | 0.20 | 0.47 | 0.95 | 0.07 | 0.13 | | | | | | | |
| Capacity (veh/h) | 590 | 643 | 721 | 513 | 520 | | | | | | | |
| Control Delay (s) | 9.3 | 12.2 | 43.2 | 10.1 | 10.5 | | | | | | | |
| Approach Delay (s) | 11.4 | | 43.2 | 10.1 | 10.5 | | | | | | | |
| Approach LOS | B | | E | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 29.3 | | | | | | | | | |
| HCM Level of Service | | | D | | | | | | | | | |
| Intersection Capacity Utilization | | | 63.9% | ICU Level of Service | | | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Level Of Service Computation Report

2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp

Average Delay (sec/veh): 6.5 Worst Case Level Of Service: C[21.8]

Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp

Approach: North Bound South Bound East Bound West Bound

Movement: L - T - R L - T - R L - T - R L - T - R

-----|-----|-----|-----|-----|

Control: Uncontrolled Uncontrolled Yield Sign Yield Sign

Rights: Include Include Include Include

Lanes: 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0

-----|-----|-----|-----|-----|

Volume Module:

Base Vol: 0 0 0 0 1022 0 0 0 439 0 0 0

Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse: 0 0 0 0 1022 0 0 0 439 0 0 0

Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0

PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0

Initial Fut: 0 0 0 0 1022 0 0 0 439 0 0 0

User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.92 1.00 1.00 1.00

PHF Volume: 0 0 0 0 1111 0 0 0 477 0 0 0

Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0

FinalVolume: 0 0 0 0 1111 0 0 0 477 0 0 0

-----|-----|-----|-----|-----|

Critical Gap Module:

Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 6.2 xxxxx xxxx xxxxx

FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 3.3 xxxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Capacity Module:

Cnflct Vol: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 370 xxxx xxxx xxxxx

Potent Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 680 xxxx xxxx xxxxx

Move Cap.: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 680 xxxx xxxx xxxxx

Volume/Cap: xxxx xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx 0.70 xxxx xxxx xxxxx

-----|-----|-----|-----|-----|

Level Of Service Module:

2Way95thQ: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 5.8 xxxxx xxxx xxxxx

Control Del:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 21.8 xxxxx xxxx xxxxx

LOS by Move: * * * * * * * * * * C * * * *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

SharedQueue:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shrd ConDel:xxxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxxx

Shared LOS: * * * * * * * * * * * * * *

ApproachDel: xxxxxx xxxxxx 21.8 xxxxxx

ApproachLOS: * * C *

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis 2: Oakland Avenue & I-580 Off-ramp

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study
























| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|-------|--------|--------|----------------------|------|
| Lane Configurations | | | | | |
| Volume (vph) | 934 | 442 | 1649 | 841 | 124 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1738 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1738 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 1015 | 480 | 1792 | 914 | 135 |
| RTOR Reduction (vph) | 14 | 14 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 727 | 740 | 1792 | 1049 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | custom | | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | 1 | |
| Actuated Green, G (s) | 17.1 | 17.1 | 35.4 | 13.5 | |
| Effective Green, g (s) | 17.1 | 17.1 | 35.4 | 13.5 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.59 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 479 | 495 | 2088 | 356 | |
| v/s Ratio Prot | | | c0.51 | c0.66 | |
| v/s Ratio Perm | c0.43 | 0.43 | | | |
| v/c Ratio | 1.52 | 1.49 | 0.86 | 2.95 | |
| Uniform Delay, d1 | 21.4 | 21.4 | 10.2 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 243.3 | 233.0 | 3.6 | 883.6 | |
| Delay (s) | 264.7 | 254.4 | 13.8 | 906.8 | |
| Level of Service | F | F | B | F | |
| Approach Delay (s) | | 259.5 | 343.5 | | |
| Approach LOS | | F | F | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | | 314.6 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 1.59 | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | | 104.1% | | ICU Level of Service | G |
| Analysis Period (min) | | 15 | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis

3: 27th Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations |  |  |  | | |  |  |  | |  |  |  |
| Volume (vph) | 252 | 485 | 158 | 23 | 60 | 19 | 206 | 235 | 11 | 497 | 1331 | 120 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1525 | | 3433 | 3485 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | 1770 | 1863 | 1525 | | 3433 | 3485 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 268 | 516 | 168 | 24 | 65 | 21 | 224 | 255 | 12 | 540 | 1447 | 130 |
| RTOR Reduction (vph) | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 209 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 268 | 516 | 186 | 0 | 0 | 86 | 224 | 46 | 0 | 552 | 1569 | 0 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | 20 | | | | 9 |
| Turn Type | Prot | | Perm | | Prot | Prot | | Perm | Prot | Prot | | |
| Protected Phases | 3 | 8 | | | 7 | 7 | 4 | | 1 | 1 | 6 | |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 17.6 | 25.8 | 25.8 | | | 8.0 | 16.2 | 16.2 | | 15.0 | 27.2 | |
| Effective Green, g (s) | 17.6 | 25.8 | 25.8 | | | 8.0 | 16.2 | 16.2 | | 15.0 | 27.2 | |
| Actuated g/C Ratio | 0.20 | 0.29 | 0.29 | | | 0.09 | 0.18 | 0.18 | | 0.17 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 346 | 1015 | 454 | | | 157 | 335 | 275 | | 572 | 1053 | |
| v/s Ratio Prot | c0.15 | 0.15 | | | | 0.05 | c0.12 | | | 0.16 | c0.45 | |
| v/s Ratio Perm | | | 0.12 | | | | | 0.03 | | | | |
| v/c Ratio | 0.77 | 0.51 | 0.41 | | | 0.55 | 0.67 | 0.17 | | 0.97 | 1.49 | |
| Uniform Delay, d1 | 34.3 | 26.8 | 26.0 | | | 39.3 | 34.4 | 31.2 | | 37.2 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.3 | 0.4 | 0.6 | | | 3.9 | 5.0 | 0.3 | | 28.8 | 225.7 | |
| Delay (s) | 44.7 | 27.2 | 26.6 | | | 43.1 | 39.4 | 31.5 | | 66.0 | 257.1 | |
| Level of Service | D | C | C | | | D | D | C | | E | F | |
| Approach Delay (s) | | 31.9 | | | | | 36.4 | | | | 207.6 | |
| Approach LOS | | C | | | | | D | | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 124.6 | | | | HCM Level of Service | | F | | | | |
| HCM Volume to Capacity ratio | | 1.10 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 90.0 | | | | Sum of lost time (s) | | 18.0 | | | | |
| Intersection Capacity Utilization | | 94.9% | | | | ICU Level of Service | | F | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 3: 27th Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study























| Movement | SBL | SBT | SBR | SBR2 |
|------------------------|-------|------|------|------|
| Lane Configurations | ↰ | ↑↑ | | |
| Volume (vph) | 258 | 624 | 54 | 91 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | | |
| Frbp, ped/bikes | 1.00 | 1.00 | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | |
| Frt | 1.00 | 0.97 | | |
| Flt Protected | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1770 | 3439 | | |
| Flt Permitted | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1770 | 3439 | | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 277 | 671 | 58 | 98 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 |
| Lane Group Flow (vph) | 277 | 815 | 0 | 0 |
| Confl. Peds. (#/hr) | 26 | | | |
| Confl. Bikes (#/hr) | | | | |
| Turn Type | Prot | | | |
| Protected Phases | 5 | 2 | | |
| Permitted Phases | | | | |
| Actuated Green, G (s) | 11.0 | 22.2 | | |
| Effective Green, g (s) | 11.0 | 22.2 | | |
| Actuated g/C Ratio | 0.12 | 0.25 | | |
| Clearance Time (s) | 4.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 216 | 848 | | |
| v/s Ratio Prot | c0.16 | 0.24 | | |
| v/s Ratio Perm | | | | |
| v/c Ratio | 1.28 | 0.96 | | |
| Uniform Delay, d1 | 39.5 | 33.5 | | |
| Progression Factor | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 157.6 | 22.8 | | |
| Delay (s) | 197.1 | 56.2 | | |
| Level of Service | F | E | | |
| Approach Delay (s) | | 91.6 | | |
| Approach LOS | | F | | |
| Intersection Summary | | | | |

HCM Signalized Intersection Capacity Analysis

4: 27th Street & Broadway

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  |  |  |  | |  |  | |
| Volume (vph) | 104 | 287 | 83 | 54 | 486 | 307 | 198 | 783 | 39 | 234 | 729 | 110 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1749 | 3383 | | | 3519 | 1536 | 1768 | 3510 | | 1768 | 3447 | |
| Flt Permitted | 0.39 | 1.00 | | | 0.86 | 1.00 | 0.22 | 1.00 | | 0.23 | 1.00 | |
| Satd. Flow (perm) | 716 | 3383 | | | 3048 | 1536 | 404 | 3510 | | 420 | 3447 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 113 | 312 | 90 | 59 | 506 | 334 | 215 | 851 | 42 | 254 | 792 | 120 |
| RTOR Reduction (vph) | 0 | 31 | 0 | 0 | 0 | 48 | 0 | 4 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 113 | 371 | 0 | 0 | 565 | 286 | 215 | 889 | 0 | 254 | 898 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 10 | | 10 | 6 | | 6 | 5 | | 5 |
| Confl. Bikes (#/hr) | | | 20 | | | 18 | | | 17 | | | 66 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 2 | | |
| Actuated Green, G (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Effective Green, g (s) | 36.0 | 36.0 | | | 36.0 | 36.0 | 38.0 | 38.0 | | 38.0 | 38.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | 0.42 | 0.45 | 0.45 | | 0.45 | 0.45 | |
| Clearance Time (s) | 5.5 | 5.5 | | | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Grp Cap (vph) | 303 | 1433 | | | 1291 | 651 | 181 | 1569 | | 188 | 1541 | |
| v/s Ratio Prot | | 0.11 | | | | | | 0.25 | | | 0.26 | |
| v/s Ratio Perm | 0.16 | | | | 0.19 | c0.19 | 0.53 | | | c0.61 | | |
| v/c Ratio | 0.37 | 0.26 | | | 0.44 | 0.44 | 1.19 | 0.57 | | 1.35 | 0.58 | |
| Uniform Delay, d1 | 16.8 | 15.9 | | | 17.3 | 17.3 | 23.5 | 17.4 | | 23.5 | 17.6 | |
| Progression Factor | 0.90 | 0.90 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.5 | 0.3 | | | 1.1 | 2.1 | 126.5 | 1.5 | | 188.8 | 1.6 | |
| Delay (s) | 17.6 | 14.6 | | | 18.4 | 19.5 | 150.0 | 18.9 | | 212.3 | 19.2 | |
| Level of Service | B | B | | | B | B | F | B | | F | B | |
| Approach Delay (s) | | 15.3 | | | 18.8 | | | 44.3 | | | 61.3 | |
| Approach LOS | | B | | | B | | | D | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 39.4 | | | HCM Level of Service | | | D | | | | |
| HCM Volume to Capacity ratio | | 0.91 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 85.0 | | | Sum of lost time (s) | | | 11.0 | | | | |
| Intersection Capacity Utilization | 108.8% | | | | ICU Level of Service | | | G | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: 27th Street & Telegraph Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



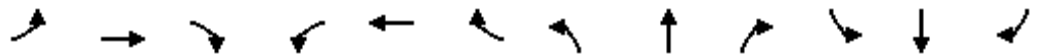
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|-----------|------|-------|------|-------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 239 | 465 | 156 | 73 | 734 | 131 | 238 | 582 | 54 | 154 | 537 | 405 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1554 | 1769 | 1863 | 1552 | 1765 | 3483 | | 1764 | 3258 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.28 | 1.00 | 1.00 | 0.14 | 1.00 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | 230 | 1863 | 1554 | 513 | 1863 | 1552 | 256 | 3483 | | 553 | 3258 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 260 | 505 | 170 | 79 | 798 | 142 | 259 | 633 | 59 | 167 | 584 | 440 |
| RTOR Reduction (vph) | 0 | 0 | 104 | 0 | 0 | 81 | 0 | 8 | 0 | 0 | 161 | 0 |
| Lane Group Flow (vph) | 260 | 505 | 66 | 79 | 798 | 61 | 259 | 684 | 0 | 167 | 863 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 4 | | | 10 | | | 17 | | | 28 |
| Turn Type | pm+pt | | Permpm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.39 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 308 | 721 | 601 | 285 | 612 | 509 | 99 | 1352 | | 215 | 1265 | |
| v/s Ratio Prot | c0.11 | 0.27 | | 0.02 | c0.43 | | | 0.20 | | | 0.26 | |
| v/s Ratio Perm | 0.32 | | 0.04 | 0.09 | | 0.04 | c1.01 | | | 0.30 | | |
| v/c Ratio | 0.84 | 0.70 | 0.11 | 0.28 | 1.30 | 0.12 | 2.62 | 0.51 | | 0.78 | 0.68 | |
| Uniform Delay, d1 | 19.8 | 21.9 | 16.7 | 17.2 | 28.6 | 20.0 | 26.0 | 19.8 | | 22.8 | 21.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.53 | 1.38 | 2.24 | 0.74 | 0.65 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 17.9 | 5.6 | 0.4 | 0.2 | 146.8 | 0.4 | 752.0 | 0.1 | | 14.7 | 1.2 | |
| Delay (s) | 37.8 | 27.5 | 17.0 | 26.5 | 186.1 | 45.1 | 771.3 | 13.0 | | 37.5 | 22.9 | |
| Level of Service | D | C | B | C | F | D | F | B | | D | C | |
| Approach Delay (s) | | 28.5 | | | 154.1 | | | 219.5 | | | 24.9 | |
| Approach LOS | | C | | | F | | | F | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 103.0 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.84 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 109.6% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 6: 27th Street & Northgate Avenue (NB)

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 280 | 753 | 0 | 0 | 293 | 1197 | 25 | 1005 | 87 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | 0.91 | 0.91 | | | 0.95 | 0.88 | | 0.91 | | | | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.99 | | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (prot) | 1609 | 3384 | | | 3539 | 2787 | | 5013 | | | | |
| Flt Permitted | 0.56 | 0.93 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Satd. Flow (perm) | 947 | 3167 | | | 3539 | 2787 | | 5013 | | | | |
| Peak-hour factor, PHF | 0.93 | 0.92 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 301 | 818 | 0 | 0 | 318 | 1234 | 27 | 1092 | 95 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 28 | 0 | 25 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 268 | 851 | 0 | 0 | 318 | 1206 | 0 | 1189 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 2 | | 2 | | | | 4 | | 4 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | 5 | | | 7 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | | | 8 | 2 | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | 16.0 | | 16.0 | | | | |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | 0.40 | | 0.40 | | | | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | 379 | 1267 | | | 1416 | 1115 | | 2005 | | | | |
| v/s Ratio Prot | | | | | 0.09 | | | | | | | |
| v/s Ratio Perm | 0.28 | 0.27 | | | | c0.43 | | 0.24 | | | | |
| v/c Ratio | 0.71 | 0.67 | | | 0.22 | 1.08 | | 0.59 | | | | |
| Uniform Delay, d1 | 10.0 | 9.8 | | | 7.9 | 12.0 | | 9.4 | | | | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | 10.6 | 2.9 | | | 0.4 | 52.0 | | 1.3 | | | | |
| Delay (s) | 20.7 | 12.7 | | | 8.3 | 64.0 | | 10.7 | | | | |
| Level of Service | C | B | | | A | E | | B | | | | |
| Approach Delay (s) | | 14.6 | | | 52.6 | | | 10.7 | | | 0.0 | |
| Approach LOS | | B | | | D | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 28.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.84 | | |
| Actuated Cycle Length (s) | 40.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 94.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 7: 27th Street & I-980 Off Ramp

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

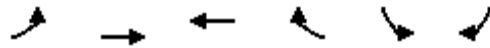


| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | ↑ | | ↑↑ | | | | | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 562 | 44 | 13 | 278 | 0 | 0 | 0 | 0 | 477 | 352 | 237 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | 0.95 | 1.00 | | 0.95 | | | | | 0.91 | 0.91 | 1.00 |
| Frbp, ped/bikes | | 1.00 | 0.98 | | 1.00 | | | | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (prot) | | 3539 | 1552 | | 3531 | | | | | 1605 | 3325 | 1558 |
| Flt Permitted | | 1.00 | 1.00 | | 0.93 | | | | | 0.95 | 0.98 | 1.00 |
| Satd. Flow (perm) | | 3539 | 1552 | | 3276 | | | | | 1605 | 3325 | 1558 |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 592 | 48 | 14 | 302 | 0 | 0 | 0 | 0 | 518 | 383 | 258 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 125 |
| Lane Group Flow (vph) | 0 | 592 | 17 | 0 | 316 | 0 | 0 | 0 | 0 | 295 | 606 | 133 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 1 | | 1 | 3 | | 3 |
| Confl. Bikes (#/hr) | | | 5 | | | 9 | | | 1 | | | 1 |
| Turn Type | | | Perm | Perm | | | | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | | | | 6 | |
| Permitted Phases | | | 4 | 8 | | | | | | 6 | | 6 |
| Actuated Green, G (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Effective Green, g (s) | | 21.0 | 21.0 | | 21.0 | | | | | 31.0 | 31.0 | 31.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | | 0.35 | | | | | 0.52 | 0.52 | 0.52 |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | | 1239 | 543 | | 1147 | | | | | 829 | 1718 | 805 |
| v/s Ratio Prot | | c0.17 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.10 | | | | | c0.18 | 0.18 | 0.09 |
| v/c Ratio | | 0.48 | 0.03 | | 0.28 | | | | | 0.36 | 0.35 | 0.17 |
| Uniform Delay, d1 | | 15.2 | 12.8 | | 14.0 | | | | | 8.6 | 8.6 | 7.7 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 1.3 | 0.1 | | 0.6 | | | | | 1.2 | 0.6 | 0.4 |
| Delay (s) | | 16.5 | 12.9 | | 14.6 | | | | | 9.8 | 9.1 | 8.1 |
| Level of Service | | B | B | | B | | | | | A | A | A |
| Approach Delay (s) | | 16.3 | | | 14.6 | | | 0.0 | | | 9.1 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 12.1 | | HCM Level of Service | | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.41 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 52.4% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

8: West Grand Avenue & Northgate Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 313 | 656 | 724 | 555 | 236 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.94 | | 0.99 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3265 | | 3422 | 1421 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3265 | | 3422 | 1421 |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 340 | 705 | 787 | 572 | 257 | 134 |
| RTOR Reduction (vph) | 0 | 0 | 138 | 0 | 6 | 105 |
| Lane Group Flow (vph) | 340 | 705 | 1221 | 0 | 264 | 16 |
| Confl. Peds. (#/hr) | 14 | | | 18 | | |
| Confl. Bikes (#/hr) | | | | 7 | | 1 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 5 | 2 | 6 | | 4 | |
| Permitted Phases | | | | | | 4 |
| Actuated Green, G (s) | 22.8 | 61.4 | 34.6 | | 10.6 | 10.6 |
| Effective Green, g (s) | 22.8 | 61.4 | 34.6 | | 10.6 | 10.6 |
| Actuated g/C Ratio | 0.29 | 0.77 | 0.43 | | 0.13 | 0.13 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 504 | 2716 | 1412 | | 453 | 188 |
| v/s Ratio Prot | c0.19 | 0.20 | c0.37 | | c0.08 | |
| v/s Ratio Perm | | | | | | 0.01 |
| v/c Ratio | 0.67 | 0.26 | 0.86 | | 0.58 | 0.09 |
| Uniform Delay, d1 | 25.3 | 2.7 | 20.6 | | 32.6 | 30.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.8 | 0.2 | 7.3 | | 1.2 | 0.1 |
| Delay (s) | 28.1 | 2.9 | 27.9 | | 33.9 | 30.5 |
| Level of Service | C | A | C | | C | C |
| Approach Delay (s) | | 11.1 | 27.9 | | 32.8 | |
| Approach LOS | | B | C | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 22.3 | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.76 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 73.9% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 9: West Grand Avenue & Telegraph Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|-------|-------|-------|------|-------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 31 | 800 | 36 | 21 | 1010 | 157 | 110 | 651 | 39 | 164 | 499 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1763 | 3341 | | 1769 | 3506 | | 1762 | 3405 | |
| Flt Permitted | 0.16 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.32 | 1.00 | | 0.37 | 1.00 | |
| Satd. Flow (perm) | 303 | 3427 | 1532 | 302 | 3341 | | 588 | 3506 | | 681 | 3405 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 34 | 870 | 39 | 23 | 1098 | 171 | 120 | 708 | 42 | 178 | 525 | 134 |
| RTOR Reduction (vph) | 0 | 0 | 28 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 23 | 0 |
| Lane Group Flow (vph) | 34 | 870 | 11 | 23 | 1255 | 0 | 120 | 745 | 0 | 178 | 636 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | Perm | | pm+pt | | | Perm | | | |
| Protected Phases | | 4 | | | 4 | 5 | 2 | | | 6 | | |
| Permitted Phases | 4 | | 4 | 4 | | 2 | | | 6 | | | |
| Actuated Green, G (s) | 24.6 | 24.6 | 24.6 | 24.6 | 24.6 | 49.9 | 49.9 | | 39.4 | 39.4 | | |
| Effective Green, g (s) | 24.6 | 24.6 | 24.6 | 24.6 | 24.6 | 49.9 | 49.9 | | 39.4 | 39.4 | | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.59 | 0.59 | | 0.46 | 0.46 | | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 6.0 | | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 88 | 992 | 443 | 87 | 967 | 429 | 2058 | | 316 | 1578 | | |
| v/s Ratio Prot | | 0.25 | | | c0.38 | 0.02 | c0.21 | | | 0.19 | | |
| v/s Ratio Perm | 0.11 | | 0.01 | 0.08 | | 0.14 | | | c0.26 | | | |
| v/c Ratio | 0.39 | 0.88 | 0.03 | 0.26 | 1.30 | 0.28 | 0.36 | | 0.56 | 0.40 | | |
| Uniform Delay, d1 | 24.2 | 28.8 | 21.6 | 23.2 | 30.2 | 8.4 | 9.2 | | 16.6 | 15.0 | | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.25 | 1.27 | | |
| Incremental Delay, d2 | 12.3 | 10.8 | 0.1 | 7.3 | 141.6 | 0.1 | 0.5 | | 5.9 | 0.6 | | |
| Delay (s) | 36.5 | 39.6 | 21.7 | 30.5 | 171.8 | 8.5 | 9.7 | | 26.6 | 19.7 | | |
| Level of Service | D | D | C | C | F | A | A | | C | B | | |
| Approach Delay (s) | | 38.7 | | | 169.3 | | 9.5 | | | 21.2 | | |
| Approach LOS | | D | | | F | | A | | | C | | |





















Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 71.4 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 0.83 | | |
| Actuated Cycle Length (s) | 85.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 76.8% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

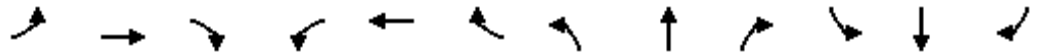
10: Grand Avenue & Broadway

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | |  |  |  |  |  | |
| Volume (vph) | 93 | 546 | 47 | 120 | 405 | 40 | 382 | 778 | 201 | 66 | 586 | 125 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | *0.92 | | | *0.92 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frbp, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 0.99 | | | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1765 | 3381 | | | 3351 | | 1766 | 3539 | 1550 | 1755 | 3415 | |
| Flt Permitted | 0.29 | 1.00 | | | 0.60 | | 0.31 | 1.00 | 1.00 | 0.29 | 1.00 | |
| Satd. Flow (perm) | 540 | 3381 | | | 2042 | | 573 | 3539 | 1550 | 533 | 3415 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 101 | 593 | 51 | 130 | 440 | 43 | 415 | 819 | 218 | 72 | 637 | 136 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 8 | 0 | 0 | 0 | 78 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 101 | 635 | 0 | 0 | 605 | 0 | 415 | 819 | 140 | 72 | 755 | 0 |
| Confl. Peds. (#/hr) | 8 | | 8 | 2 | | 2 | 8 | | 8 | 32 | | 32 |
| Confl. Bikes (#/hr) | | | 6 | | | 6 | | | 4 | | | 28 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | Perm | Perm | |
| Protected Phases | 4 | | 8 | | 8 | | 2 | | 2 | 6 | 6 | |
| Permitted Phases | 4 | | 8 | | 8 | | 2 | | 2 | 6 | 6 | |
| Actuated Green, G (s) | 27.2 | 27.2 | | | 27.2 | | 44.8 | 44.8 | 44.8 | 44.8 | 44.8 | |
| Effective Green, g (s) | 27.2 | 27.2 | | | 27.2 | | 44.8 | 44.8 | 44.8 | 44.8 | 44.8 | |
| Actuated g/C Ratio | 0.34 | 0.34 | | | 0.34 | | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 184 | 1150 | | | 694 | | 321 | 1982 | 868 | 298 | 1912 | |
| v/s Ratio Prot | 0.19 | | | | | | 0.23 | | | | 0.22 | |
| v/s Ratio Perm | 0.19 | | c0.30 | | c0.72 | | 0.09 | | 0.14 | | | |
| v/c Ratio | 0.55 | 0.55 | | | 0.87 | | 1.29 | 0.41 | 0.16 | 0.24 | 0.40 | |
| Uniform Delay, d1 | 21.4 | 21.4 | | | 24.8 | | 17.6 | 10.1 | 8.5 | 9.0 | 9.9 | |
| Progression Factor | 1.00 | 1.00 | | | 1.16 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.8 | 0.3 | | | 11.1 | | 153.1 | 0.6 | 0.4 | 1.9 | 0.6 | |
| Delay (s) | 23.2 | 21.8 | | | 39.8 | | 170.7 | 10.7 | 8.9 | 10.9 | 10.6 | |
| Level of Service | C | C | | | D | | F | B | A | B | B | |
| Approach Delay (s) | 22.0 | | 39.8 | | 56.2 | | 10.6 | | | | | |
| Approach LOS | C | | D | | E | | B | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 35.9 | | HCM Level of Service | | D | | | | | | | |
| HCM Volume to Capacity ratio | 1.13 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | Sum of lost time (s) | | 8.0 | | | | | | | |
| Intersection Capacity Utilization | 90.3% | | ICU Level of Service | | E | | | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 11: Grand Avenue & Webster Street























Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|-------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | ↔ | ↔↔ | | | | | | ↔↔ | |
| Volume (vph) | 7 | 767 | 247 | 136 | 436 | 3 | 0 | 0 | 0 | 107 | 311 | 92 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | | | | | 3.0 | |
| Lane Util. Factor | | *0.92 | | 1.00 | *0.92 | | | | | | 0.95 | |
| Frpb, ped/bikes | | 0.95 | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | 0.96 | | 1.00 | 1.00 | | | | | | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3125 | | 1770 | 3423 | | | | | | 3381 | |
| Flt Permitted | | 0.95 | | 0.11 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 2973 | | 211 | 3423 | | | | | | 3381 | |
| Peak-hour factor, PHF | 0.92 | 0.99 | 0.92 | 0.93 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.94 | 0.92 |
| Adj. Flow (vph) | 8 | 775 | 268 | 146 | 474 | 3 | 0 | 0 | 0 | 116 | 331 | 100 |
| RTOR Reduction (vph) | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 0 | 1013 | 0 | 146 | 477 | 0 | 0 | 0 | 0 | 0 | 523 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 8 | | 8 | 36 | | 36 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 18 | | | 14 | | | 2 | | | 8 |
| Turn Type | Perm | | pm+pt | | | | | | | | Perm | |
| Protected Phases | 2 | | 1 | | 6 | | | | | | 4 | |
| Permitted Phases | 2 | | 6 | | | | | | 4 | | | |
| Actuated Green, G (s) | 30.3 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Effective Green, g (s) | 30.3 | | 43.0 | | 43.0 | | | | | | 29.0 | |
| Actuated g/C Ratio | 0.38 | | 0.54 | | 0.54 | | | | | | 0.36 | |
| Clearance Time (s) | 5.0 | | 5.0 | | 5.0 | | | | | | 3.0 | |
| Vehicle Extension (s) | 2.0 | | 2.0 | | 2.0 | | | | | | 2.0 | |
| Lane Grp Cap (vph) | 1126 | | 263 | | 1840 | | | | | | 1226 | |
| v/s Ratio Prot | | | c0.05 | | 0.14 | | | | | | | |
| v/s Ratio Perm | c0.34 | | 0.24 | | | | | | | | 0.15 | |
| v/c Ratio | 0.90 | | 0.56 | | 0.26 | | | | | | 0.43 | |
| Uniform Delay, d1 | 23.4 | | 13.7 | | 9.9 | | | | | | 19.2 | |
| Progression Factor | 1.57 | | 1.00 | | 1.00 | | | | | | 1.00 | |
| Incremental Delay, d2 | 11.2 | | 1.4 | | 0.3 | | | | | | 1.1 | |
| Delay (s) | 47.9 | | 15.2 | | 10.3 | | | | | | 20.3 | |
| Level of Service | D | | B | | B | | | | | | C | |
| Approach Delay (s) | 47.9 | | | | 11.4 | | 0.0 | | | | 20.3 | |
| Approach LOS | D | | | | B | | A | | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 30.9 | | HCM Level of Service | | | | C | | | |
| HCM Volume to Capacity ratio | | | 0.66 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | | | | 13.0 | | | |
| Intersection Capacity Utilization | | | 74.6% | | ICU Level of Service | | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 12: Grand Avenue & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  | |  |  | |  |  |
| Volume (vph) | 392 | 731 | 166 | 420 | 969 | 52 | 13 | 1560 | 1418 | 3 | 744 | 220 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1483 | 3433 | 3539 | 1458 | | 5083 | 1466 | | 4832 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.93 | 1.00 | | 0.91 | |
| Satd. Flow (perm) | 3433 | 3539 | 1483 | 3433 | 3539 | 1458 | | 4705 | 1466 | | 4382 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 426 | 795 | 180 | 429 | 1042 | 57 | 14 | 1696 | 1541 | 3 | 775 | 239 |
| RTOR Reduction (vph) | 0 | 0 | 28 | 0 | 0 | 7 | 0 | 0 | 242 | 0 | 56 | 0 |
| Lane Group Flow (vph) | 426 | 795 | 152 | 429 | 1042 | 50 | 0 | 1710 | 1299 | 0 | 961 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | | Perm | Prot | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | | 4 | |
| Permitted Phases | | | 6 | | | 2 | 4 | | 4 | | 4 | |
| Actuated Green, G (s) | 15.1 | 33.9 | 33.9 | 15.1 | 34.9 | 34.9 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 15.1 | 33.9 | 33.9 | 15.1 | 34.9 | 34.9 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.15 | 0.34 | 0.34 | 0.15 | 0.35 | 0.35 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 518 | 1200 | 503 | 518 | 1235 | 509 | | 1694 | 528 | | 1578 | |
| v/s Ratio Prot | 0.12 | 0.22 | | c0.12 | c0.29 | | | | | | | |
| v/s Ratio Perm | | | 0.10 | | | 0.03 | | 0.36 | c0.89 | | 0.22 | |
| v/c Ratio | 0.82 | 0.66 | 0.30 | 0.83 | 0.84 | 0.10 | | 1.01 | 2.46 | | 0.61 | |
| Uniform Delay, d1 | 41.2 | 28.2 | 24.3 | 41.2 | 30.0 | 21.9 | | 32.0 | 32.0 | | 26.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 9.7 | 2.9 | 1.5 | 10.0 | 7.1 | 0.4 | | 24.2 | 662.9 | | 1.8 | |
| Delay (s) | 50.8 | 31.1 | 25.9 | 51.2 | 37.2 | 22.3 | | 56.2 | 694.9 | | 28.0 | |
| Level of Service | D | C | C | D | D | C | | E | F | | C | |
| Approach Delay (s) | | 36.4 | | | 40.6 | | | 358.9 | | | 28.0 | |
| Approach LOS | | D | | | D | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 181.8 | | | | HCM Level of Service | | | | F | |
| HCM Volume to Capacity ratio | | | 1.45 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | | Sum of lost time (s) | | | 10.0 | | |
| Intersection Capacity Utilization | | | 144.8% | | | | ICU Level of Service | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 13: 21st Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



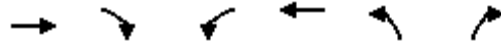
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|-------|-------|-------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 807 | 172 | 119 | 1792 | 1082 | 182 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Lane Util. Factor | 0.97 | | 1.00 | *0.50 | 0.86 | |
| Frpb, ped/bikes | 0.99 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.97 | | 1.00 | 1.00 | 0.98 | |
| Flt Protected | 0.96 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3357 | | 1766 | 3725 | 6269 | |
| Flt Permitted | 0.96 | | 0.14 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3357 | | 256 | 3725 | 6269 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 |
| Adj. Flow (vph) | 877 | 187 | 129 | 1867 | 1176 | 198 |
| RTOR Reduction (vph) | 25 | 0 | 0 | 0 | 34 | 0 |
| Lane Group Flow (vph) | 1039 | 0 | 129 | 1867 | 1340 | 0 |
| Confl. Peds. (#/hr) | 30 | 30 | 106 | | | |
| Confl. Bikes (#/hr) | | 2 | | | | |
| Turn Type | | pm+pt | | | | |
| Protected Phases | 4 | | 1 | 2 | 2 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 30.6 | | 35.9 | 29.0 | 29.0 | |
| Effective Green, g (s) | 30.6 | | 35.9 | 29.0 | 29.0 | |
| Actuated g/C Ratio | 0.38 | | 0.45 | 0.36 | 0.36 | |
| Clearance Time (s) | 5.0 | | 4.0 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 1284 | | 245 | 1350 | 2273 | |
| v/s Ratio Prot | c0.31 | | c0.05 | c0.50 | 0.21 | |
| v/s Ratio Perm | | | 0.19 | | | |
| v/c Ratio | 0.81 | | 0.53 | 1.38 | 0.59 | |
| Uniform Delay, d1 | 22.1 | | 14.1 | 25.5 | 20.7 | |
| Progression Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.9 | | 2.0 | 177.0 | 1.1 | |
| Delay (s) | 25.9 | | 16.1 | 202.5 | 21.8 | |
| Level of Service | C | | B | F | C | |
| Approach Delay (s) | 25.9 | | | 190.5 | 21.8 | |
| Approach LOS | C | | | F | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 98.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.03 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 65.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis 14: 21st Street & Access Road

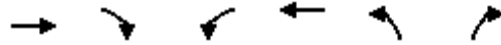
Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|------|-------|----------------------|-------|------|
| Lane Configurations | 👉 | | | 👈 | 👈 | |
| Volume (veh/h) | 612 | 11 | 28 | 297 | 12 | 337 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 651 | 12 | 30 | 323 | 13 | 366 |
| Pedestrians | 18 | | | 18 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 533 | | | 360 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 663 | | 1059 | 675 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 663 | | 1059 | 675 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 97 | | 94 | 18 |
| cM capacity (veh/h) | | | 926 | | 237 | 447 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 663 | 353 | 379 | | | |
| Volume Left | 0 | 30 | 13 | | | |
| Volume Right | 12 | 0 | 366 | | | |
| cSH | 1700 | 926 | 434 | | | |
| Volume to Capacity | 0.39 | 0.03 | 0.87 | | | |
| Queue Length 95th (ft) | 0 | 3 | 225 | | | |
| Control Delay (s) | 0.0 | 1.1 | 48.8 | | | |
| Lane LOS | | A | E | | | |
| Approach Delay (s) | 0.0 | 1.1 | 48.8 | | | |
| Approach LOS | | | E | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 13.5 | | | |
| Intersection Capacity Utilization | | | 68.7% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |
| | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 15: 21st Street & Garage Entrance East

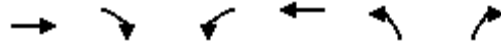
Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|
| Lane Configurations | ↩ | | | ↩ | ↩ | ↩ |
| Volume (veh/h) | 401 | 41 | 66 | 244 | 30 | 222 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 436 | 45 | 72 | 265 | 33 | 241 |
| Pedestrians | 27 | | | 27 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 470 | | | 423 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 480 | | 894 | 485 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 480 | | 894 | 485 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 93 | | 89 | 58 |
| cM capacity (veh/h) | | | 1082 | | 284 | 569 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 480 | 337 | 274 | | | |
| Volume Left | 0 | 72 | 33 | | | |
| Volume Right | 45 | 0 | 241 | | | |
| cSH | 1700 | 1082 | 508 | | | |
| Volume to Capacity | 0.28 | 0.07 | 0.54 | | | |
| Queue Length 95th (ft) | 0 | 5 | 79 | | | |
| Control Delay (s) | 0.0 | 2.4 | 20.1 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 2.4 | 20.1 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.8 | | | |
| Intersection Capacity Utilization | | 67.6% | | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis 16: 21st Street & Garage Entrance West

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | EB | EB | WB | WB | NB | NB |
| Volume (veh/h) | 481 | 32 | 35 | 186 | 115 | 209 |
| Sign Control | Free | | | Free | Yield | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 496 | 35 | 38 | 198 | 125 | 227 |
| Pedestrians | 20 | | | 20 | | |
| Lane Width (ft) | 12.0 | | | 12.0 | | |
| Walking Speed (ft/s) | 4.0 | | | 4.0 | | |
| Percent Blockage | 2 | | | 2 | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | 80 | | | 813 | | |
| pX, platoon unblocked | | | 0.87 | | 0.87 | 0.87 |
| vC, conflicting volume | | | 531 | | 807 | 533 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 391 | | 708 | 394 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 96 | | 62 | 60 |
| cM capacity (veh/h) | | | 1021 | | 332 | 563 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | NB 4 |
| Volume Total | 531 | 236 | 62 | 62 | 114 | 114 |
| Volume Left | 0 | 38 | 62 | 62 | 0 | 0 |
| Volume Right | 35 | 0 | 0 | 0 | 114 | 114 |
| cSH | 1700 | 1021 | 332 | 332 | 563 | 563 |
| Volume to Capacity | 0.31 | 0.04 | 0.19 | 0.19 | 0.20 | 0.20 |
| Queue Length 95th (ft) | 0 | 3 | 17 | 17 | 19 | 19 |
| Control Delay (s) | 0.0 | 1.7 | 18.3 | 18.3 | 13.0 | 13.0 |
| Lane LOS | | A | C | C | B | B |
| Approach Delay (s) | 0.0 | 1.7 | 14.9 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.0 | | | |
| Intersection Capacity Utilization | | | 54.5% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street


















Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | ↗ | | ↖ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 284 | 127 | 92 | 277 | 0 | 0 | 0 | 0 | 89 | 648 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.98 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | 1.00 | 1.00 | | 0.99 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 1863 | 1438 | | 1807 | | | | | | 4818 | |
| Flt Permitted | | 1.00 | 1.00 | | 0.75 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 1863 | 1438 | | 1367 | | | | | | 4818 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 309 | 138 | 100 | 301 | 0 | 0 | 0 | 0 | 97 | 668 | 38 |
| RTOR Reduction (vph) | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 309 | 129 | 0 | 401 | 0 | 0 | 0 | 0 | 0 | 799 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | | Perm | | Perm | | | | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | | | | 2 |
| Permitted Phases | | | 4 | 4 | | | | | | 2 | | |
| Actuated Green, G (s) | | 29.7 | 29.7 | | 29.7 | | | | | | 42.3 | |
| Effective Green, g (s) | | 29.7 | 29.7 | | 29.7 | | | | | | 42.3 | |
| Actuated g/C Ratio | | 0.37 | 0.37 | | 0.37 | | | | | | 0.53 | |
| Clearance Time (s) | | 4.0 | 4.0 | | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | | 692 | 534 | | 507 | | | | | | 2548 | |
| v/s Ratio Prot | | 0.17 | | | | | | | | | | |
| v/s Ratio Perm | | | 0.09 | | 0.29 | | | | | | 0.17 | |
| v/c Ratio | | 0.45 | 0.24 | | 0.79 | | | | | | 0.31 | |
| Uniform Delay, d1 | | 19.0 | 17.4 | | 22.4 | | | | | | 10.6 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | | | | | 1.22 | |
| Incremental Delay, d2 | | 0.5 | 0.2 | | 8.2 | | | | | | 0.3 | |
| Delay (s) | | 19.4 | 17.6 | | 30.6 | | | | | | 13.2 | |
| Level of Service | | B | B | | C | | | | | | B | |
| Approach Delay (s) | | 18.9 | | | 30.6 | | | 0.0 | | | 13.2 | |
| Approach LOS | | B | | | C | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 19.0 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.51 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 62.2% | | | ICU Level of Service | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |




















HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |   |  | | | |
| Volume (vph) | 15 | 137 | 1 | 0 | 148 | 119 | 25 | 458 | 242 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 1.00 | 0.82 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 0.94 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (prot) | | 1845 | | | 1694 | | | 3510 | 1299 | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Satd. Flow (perm) | | 1793 | | | 1694 | | | 3510 | 1299 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 16 | 149 | 1 | 0 | 161 | 129 | 27 | 492 | 263 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 196 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 166 | 0 | 0 | 244 | 0 | 0 | 519 | 67 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | | 40 | | | 1 |
| Turn Type | Perm | | | | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | 1 | | 1 | | | |
| Actuated Green, G (s) | | 25.5 | | | 25.5 | | | 11.5 | 11.5 | | | |
| Effective Green, g (s) | | 25.5 | | | 25.5 | | | 11.5 | 11.5 | | | |
| Actuated g/C Ratio | | 0.57 | | | 0.57 | | | 0.26 | 0.26 | | | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | 2.0 | 2.0 | | | |
| Lane Grp Cap (vph) | | 1016 | | | 960 | | | 897 | 332 | | | |
| v/s Ratio Prot | | | | | c0.14 | | | | | | | |
| v/s Ratio Perm | | 0.09 | | | | | | 0.15 | 0.05 | | | |
| v/c Ratio | | 0.16 | | | 0.25 | | | 0.58 | 0.20 | | | |
| Uniform Delay, d1 | | 4.7 | | | 4.9 | | | 14.6 | 13.1 | | | |
| Progression Factor | | 0.47 | | | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.6 | | | 0.6 | 0.1 | | | |
| Delay (s) | | 2.5 | | | 5.6 | | | 15.2 | 13.3 | | | |
| Level of Service | | A | | | A | | | B | B | | | |
| Approach Delay (s) | | 2.5 | | | 5.6 | | | 14.5 | | | 0.0 | |
| Approach LOS | | A | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 10.8 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.35 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 45.0 | | | | | | Sum of lost time (s) | | 8.0 | | |
| Intersection Capacity Utilization | | 43.2% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 19: 21st Street & Broadway

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  |  | |  |  |
| Volume (vph) | 18 | 60 | 27 | 92 | 0 | 96 | 0 | 697 | 56 | 52 | 587 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.93 | | | 0.99 | | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | 0.98 | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1750 | 1761 | | | 1656 | | | 3477 | | | 3518 | |
| Flt Permitted | 0.68 | 1.00 | | | 0.83 | | | 1.00 | | | 0.82 | |
| Satd. Flow (perm) | 1244 | 1761 | | | 1407 | | | 3477 | | | 2895 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.99 | 0.92 |
| Adj. Flow (vph) | 20 | 65 | 29 | 100 | 0 | 104 | 0 | 758 | 61 | 57 | 593 | 0 |
| RTOR Reduction (vph) | 0 | 17 | 0 | 0 | 32 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 20 | 77 | 0 | 0 | 172 | 0 | 0 | 806 | 0 | 0 | 650 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 24 | | 24 | 40 | | 40 | 48 | | 48 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | 17 | | | 7 |
| Turn Type | Perm | | | Perm | | | | Perm | | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 4 | | | 4 | |
| Permitted Phases | 2 | | | 2 | | | | | | 4 | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 17.0 | | | 17.0 | |
| Actuated g/C Ratio | 0.42 | 0.42 | | | 0.42 | | | 0.38 | | | 0.38 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | |
| Lane Grp Cap (vph) | 525 | 744 | | | 594 | | | 1314 | | | 1094 | |
| v/s Ratio Prot | | 0.04 | | | | | | c0.23 | | | | |
| v/s Ratio Perm | 0.02 | | | | c0.12 | | | | | | 0.22 | |
| v/c Ratio | 0.04 | 0.10 | | | 0.29 | | | 0.61 | | | 0.59 | |
| Uniform Delay, d1 | 7.6 | 7.9 | | | 8.6 | | | 11.3 | | | 11.2 | |
| Progression Factor | 1.00 | 1.00 | | | 0.91 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.3 | | | 1.2 | | | 2.1 | | | 2.4 | |
| Delay (s) | 7.8 | 8.1 | | | 9.0 | | | 13.5 | | | 13.6 | |
| Level of Service | A | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 8.1 | | | 9.0 | | | 13.5 | | | 13.6 | |
| Approach LOS | | A | | | A | | | B | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.7 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.44 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | Sum of lost time (s) | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 69.5% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

20: 20th Street & Telegraph Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|-------|------|------|-------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | ↔ | ↔↔ | |
| Volume (vph) | 35 | 206 | 37 | 14 | 262 | 271 | 32 | 807 | 37 | 50 | 221 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.98 | | | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 0.93 | | | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3422 | | | 3213 | | | 3503 | | 1769 | 3371 | |
| Flt Permitted | | 0.77 | | | 0.94 | | | 0.93 | | 0.19 | 1.00 | |
| Satd. Flow (perm) | | 2654 | | | 3029 | | | 3275 | | 357 | 3371 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 38 | 224 | 40 | 15 | 285 | 295 | 35 | 877 | 40 | 52 | 240 | 85 |
| RTOR Reduction (vph) | 0 | 24 | 0 | 0 | 186 | 0 | 0 | 4 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 0 | 278 | 0 | 0 | 409 | 0 | 0 | 948 | 0 | 52 | 293 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 3 |
| Turn Type | Perm | | Perm | | Perm | | pm+pt | | | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 2 | | | | 6 | | |
| Actuated Green, G (s) | | 13.9 | | | 13.9 | | | 28.8 | | 37.1 | 37.1 | |
| Effective Green, g (s) | | 13.9 | | | 13.9 | | | 28.8 | | 37.1 | 37.1 | |
| Actuated g/C Ratio | | 0.23 | | | 0.23 | | | 0.48 | | 0.62 | 0.62 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | | | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 615 | | | 702 | | | 1572 | | 310 | 2084 | |
| v/s Ratio Prot | | | | | | | | | | 0.01 | c0.09 | |
| v/s Ratio Perm | | 0.10 | | | c0.14 | | | c0.29 | | 0.09 | | |
| v/c Ratio | | 0.45 | | | 0.58 | | | 0.60 | | 0.17 | 0.14 | |
| Uniform Delay, d1 | | 19.8 | | | 20.5 | | | 11.4 | | 5.8 | 4.8 | |
| Progression Factor | | 1.00 | | | 0.66 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.5 | | | 0.9 | | | 1.7 | | 0.3 | 0.1 | |
| Delay (s) | | 20.3 | | | 14.3 | | | 13.1 | | 6.1 | 4.9 | |
| Level of Service | | C | | | B | | | B | | A | A | |
| Approach Delay (s) | | 20.3 | | | 14.3 | | | 13.1 | | | 5.1 | |
| Approach LOS | | C | | | B | | | B | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 13.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 85.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

21: 20th Street & Broadway

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔↔ | | | ↔↔↔ | |
| Volume (vph) | 26 | 186 | 110 | 70 | 331 | 141 | 127 | 931 | 135 | 52 | 656 | 45 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.91 | |
| Frpb, ped/bikes | | 0.97 | | | 0.97 | | | 0.99 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | | 0.96 | | | 0.98 | | | 0.99 | |
| Flt Protected | | 1.00 | | | 0.99 | | | 0.99 | | | 1.00 | |
| Satd. Flow (prot) | | 3226 | | | 3236 | | | 3413 | | | 4990 | |
| Flt Permitted | | 0.89 | | | 0.86 | | | 0.65 | | | 0.77 | |
| Satd. Flow (perm) | | 2887 | | | 2798 | | | 2240 | | | 3879 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 28 | 202 | 120 | 76 | 360 | 153 | 138 | 1012 | 142 | 57 | 713 | 49 |
| RTOR Reduction (vph) | 0 | 76 | 0 | 0 | 33 | 0 | 0 | 16 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 274 | 0 | 0 | 556 | 0 | 0 | 1276 | 0 | 0 | 807 | 0 |
| Confl. Peds. (#/hr) | 74 | | 74 | 120 | | 120 | 85 | | 85 | 65 | | 65 |
| Confl. Bikes (#/hr) | | | 30 | | | 13 | | | 10 | | | 6 |
| Turn Type | Perm | | Perm | | Prot | | Perm | | | | | |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Effective Green, g (s) | | 22.0 | | | 22.0 | | | 29.0 | | | 18.0 | |
| Actuated g/C Ratio | | 0.37 | | | 0.37 | | | 0.48 | | | 0.30 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | | | 5.0 | | | 5.0 | |
| Lane Grp Cap (vph) | | 1059 | | | 1026 | | | 1220 | | | 1164 | |
| v/s Ratio Prot | | | | | | | | c0.12 | | | | |
| v/s Ratio Perm | | 0.09 | | | c0.20 | | | c0.38 | | | 0.21 | |
| v/c Ratio | | 0.26 | | | 0.54 | | | 1.05 | | | 0.69 | |
| Uniform Delay, d1 | | 13.3 | | | 15.0 | | | 15.5 | | | 18.6 | |
| Progression Factor | | 2.12 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | 2.1 | | | 38.6 | | | 3.4 | |
| Delay (s) | | 28.7 | | | 17.1 | | | 54.1 | | | 22.0 | |
| Level of Service | | C | | | B | | | D | | | C | |
| Approach Delay (s) | | 28.7 | | | 17.1 | | | 54.1 | | | 22.0 | |
| Approach LOS | | C | | | B | | | D | | | C | |


















Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 35.4 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.82 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 97.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  |  | |  |  | | | |
| Volume (vph) | 46 | 421 | 0 | 0 | 542 | 151 | 95 | 507 | 356 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.91 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3514 | | | 3369 | 1319 | | 4995 | 1460 | | | |
| Flt Permitted | | 0.86 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3021 | | | 3369 | 1319 | | 4995 | 1460 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 50 | 458 | 0 | 0 | 589 | 161 | 103 | 551 | 383 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 51 | 0 | 0 | 152 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 508 | 0 | 0 | 604 | 94 | 0 | 654 | 231 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | 12 | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | Perm | | | Perm | | Perm | Perm | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 52.0 | | | 52.0 | 52.0 | | 21.0 | 21.0 | | | |
| Effective Green, g (s) | | 52.0 | | | 52.0 | 52.0 | | 21.0 | 21.0 | | | |
| Actuated g/C Ratio | | 0.65 | | | 0.65 | 0.65 | | 0.26 | 0.26 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | | 1964 | | | 2190 | 857 | | 1311 | 383 | | | |
| v/s Ratio Prot | | | | | c0.18 | | | | | | | |
| v/s Ratio Perm | | 0.17 | | | | 0.07 | | 0.13 | c0.16 | | | |
| v/c Ratio | | 0.26 | | | 0.28 | 0.11 | | 0.50 | 0.60 | | | |
| Uniform Delay, d1 | | 5.9 | | | 6.0 | 5.3 | | 25.0 | 25.9 | | | |
| Progression Factor | | 1.00 | | | 0.62 | 0.15 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 0.3 | | | 0.3 | 0.2 | | 0.3 | 2.7 | | | |
| Delay (s) | | 6.2 | | | 4.0 | 1.0 | | 25.3 | 28.5 | | | |
| Level of Service | | A | | | A | A | | C | C | | | |
| Approach Delay (s) | | 6.2 | | | 3.4 | | | 26.5 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.5 | | | | | HCM Level of Service | | B | | | |
| HCM Volume to Capacity ratio | | 0.37 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | | Sum of lost time (s) | | 7.0 | | | |
| Intersection Capacity Utilization | | 59.6% | | | | | ICU Level of Service | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 23: 20th Street & Webster Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | ↑ | ↑ | ↑↑ | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 544 | 232 | 190 | 545 | 0 | 0 | 0 | 0 | 100 | 651 | 146 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | 0.95 | 1.00 | 0.91 | 0.91 | | | | | | 0.91 | |
| Frbp, ped/bikes | | 1.00 | 0.91 | 1.00 | 1.00 | | | | | | 0.95 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | 0.97 | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | | | | | 0.99 | |
| Satd. Flow (prot) | | 3539 | 1439 | 1610 | 3379 | | | | | | 4527 | |
| Flt Permitted | | 1.00 | 1.00 | 0.95 | 0.94 | | | | | | 0.99 | |
| Satd. Flow (perm) | | 3539 | 1439 | 1610 | 3174 | | | | | | 4527 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 591 | 252 | 207 | 592 | 0 | 0 | 0 | 0 | 109 | 708 | 159 |
| RTOR Reduction (vph) | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 0 |
| Lane Group Flow (vph) | 0 | 591 | 226 | 186 | 613 | 0 | 0 | 0 | 0 | 0 | 940 | 0 |
| Confl. Peds. (#/hr) | 51 | | 51 | 114 | | 114 | 115 | | 115 | 333 | | 333 |
| Confl. Bikes (#/hr) | | | 8 | | | 3 | | | 17 | | | 6 |
| Turn Type | | Perm | | Prot | | Perm | | | | | | |
| Protected Phases | | 2 | | 1 | 6 | | | | | | | 4 |
| Permitted Phases | | | 2 | | | | | | | | 4 | |
| Actuated Green, G (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | | 30.0 |
| Effective Green, g (s) | | 28.0 | 28.0 | 10.0 | 42.0 | | | | | | | 30.0 |
| Actuated g/C Ratio | | 0.35 | 0.35 | 0.12 | 0.52 | | | | | | | 0.38 |
| Clearance Time (s) | | 4.0 | 4.0 | 4.0 | 4.0 | | | | | | | 4.0 |
| Vehicle Extension (s) | | 2.0 | 2.0 | 2.0 | 2.0 | | | | | | | 2.0 |
| Lane Grp Cap (vph) | | 1239 | 504 | 201 | 1692 | | | | | | | 1698 |
| v/s Ratio Prot | | c0.17 | | c0.12 | 0.05 | | | | | | | |
| v/s Ratio Perm | | | 0.16 | | 0.14 | | | | | | | 0.21 |
| v/c Ratio | | 0.48 | 0.45 | 0.93 | 0.36 | | | | | | | 0.55 |
| Uniform Delay, d1 | | 20.3 | 20.0 | 34.6 | 11.1 | | | | | | | 19.7 |
| Progression Factor | | 1.05 | 1.05 | 1.00 | 1.00 | | | | | | | 1.29 |
| Incremental Delay, d2 | | 1.3 | 2.7 | 42.2 | 0.0 | | | | | | | 0.2 |
| Delay (s) | | 22.6 | 23.8 | 76.8 | 11.2 | | | | | | | 25.6 |
| Level of Service | | C | C | E | B | | | | | | | C |
| Approach Delay (s) | | 22.9 | | | 26.5 | 0.0 | | | | | 25.6 | |
| Approach LOS | | C | | | C | A | | | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 25.0 | | HCM Level of Service | | | | C | | | | |
| HCM Volume to Capacity ratio | | 0.58 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | Sum of lost time (s) | | | | 12.0 | | | | |
| Intersection Capacity Utilization | | 93.3% | | ICU Level of Service | | | | F | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: 20th Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL2 | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER | SER2 |
|------------------------|-------|-------|------|-------|-------|-------|--------|--------|------|--------|--------|------|
| Lane Configurations | ↰ | ↰↰↰ | | | | ↱↱ | ↱↱ | ↰ | ↰ | | ↰ | ↰ |
| Volume (vph) | 14 | 505 | 127 | 270 | 85 | 1018 | 233 | 374 | 114 | 0 | 163 | 208 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 0.48 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | | | 1.00 | 0.93 | 0.85 | 0.85 | | 0.85 | 0.85 |
| Flt Protected | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 841 | 4899 | | | | 3494 | 3166 | 1441 | 1583 | | 1583 | 1554 |
| Flt Permitted | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 841 | 4899 | | | | 3494 | 3166 | 1441 | 1583 | | 1583 | 1554 |
| Peak-hour factor, PHF | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 14 | 549 | 138 | 293 | 92 | 1107 | 253 | 407 | 124 | 0 | 166 | 212 |
| RTOR Reduction (vph) | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 72 | 0 | 0 | 160 |
| Lane Group Flow (vph) | 14 | 618 | 0 | 0 | 0 | 1492 | 452 | 208 | 52 | 0 | 166 | 52 |
| Confl. Peds. (#/hr) | 22 | | | | | | | | 74 | | | |
| Confl. Bikes (#/hr) | | | | | | 7 | | | 8 | | | 7 |
| Turn Type | Prot | | | Split | Split | | custom | custom | | custom | custom | |
| Protected Phases | 5 | 1 | | 8 | 8 | 8 | 2 | 6 | 6 | | | |
| Permitted Phases | | 1 | | | | | | 6 | | | 9 | 2 |
| Actuated Green, G (s) | 0.8 | 12.8 | | | | 16.0 | 17.2 | 29.2 | 29.2 | | 8.0 | 17.2 |
| Effective Green, g (s) | 0.8 | 12.8 | | | | 16.0 | 17.2 | 29.2 | 29.2 | | 8.0 | 17.2 |
| Actuated g/C Ratio | 0.01 | 0.18 | | | | 0.23 | 0.25 | 0.42 | 0.42 | | 0.11 | 0.25 |
| Clearance Time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 10 | 896 | | | | 799 | 778 | 601 | 660 | | 181 | 382 |
| v/s Ratio Prot | 0.02 | c0.13 | | | | c0.43 | c0.14 | 0.14 | 0.03 | | | |
| v/s Ratio Perm | | | | | | | | | | | c0.10 | 0.03 |
| v/c Ratio | 1.40 | 0.69 | | | | 1.87 | 0.58 | 0.35 | 0.08 | | 0.92 | 0.14 |
| Uniform Delay, d1 | 34.6 | 26.7 | | | | 27.0 | 23.2 | 13.9 | 12.3 | | 30.7 | 20.6 |
| Progression Factor | 1.00 | 1.00 | | | | 1.00 | 1.45 | 1.72 | 3.68 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 438.6 | 4.3 | | | | 395.1 | 0.7 | 1.5 | 0.2 | | 42.9 | 0.1 |
| Delay (s) | 473.2 | 31.1 | | | | 422.1 | 34.5 | 25.4 | 45.5 | | 73.6 | 20.7 |
| Level of Service | F | C | | | | F | C | C | D | | E | C |
| Approach Delay (s) | | 39.9 | | | | 422.1 | 33.8 | | | 43.9 | | |
| Approach LOS | | D | | | | F | C | | | D | | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 208.9 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.04 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 80.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

















HCM Signalized Intersection Capacity Analysis 26: Harrison Street & Lakeside Drive

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖↗ | ↑↑↑ | ↖↗ | ↗ |
| Volume (vph) | 1276 | 170 | 953 | 518 | 188 | 984 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | | 0.97 | 0.91 | 0.97 | 0.91 |
| Frpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.98 | | 1.00 | 1.00 | 0.89 | 0.85 |
| Flt Protected | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 4993 | | 3433 | 5085 | 3178 | 1441 |
| Flt Permitted | 1.00 | | 0.95 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (perm) | 4993 | | 3433 | 5085 | 3178 | 1441 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.99 | 0.92 | 0.92 | 0.93 |
| Adj. Flow (vph) | 1343 | 185 | 963 | 563 | 204 | 1058 |
| RTOR Reduction (vph) | 25 | 0 | 0 | 0 | 370 | 370 |
| Lane Group Flow (vph) | 1503 | 0 | 963 | 563 | 363 | 159 |
| Confl. Bikes (#/hr) | | | | 16 | | |
| Turn Type | | | Prot | | Perm | |
| Protected Phases | 8 | | 7 | 4 | 6 | |
| Permitted Phases | | | | | 6 | |
| Actuated Green, G (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Effective Green, g (s) | 18.0 | | 19.0 | 41.0 | 21.0 | 21.0 |
| Actuated g/C Ratio | 0.26 | | 0.27 | 0.59 | 0.30 | 0.30 |
| Clearance Time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 1284 | | 932 | 2978 | 953 | 432 |
| v/s Ratio Prot | c0.30 | | c0.28 | 0.11 | c0.11 | |
| v/s Ratio Perm | | | | | 0.11 | |
| v/c Ratio | 1.17 | | 1.03 | 0.19 | 0.38 | 0.37 |
| Uniform Delay, d1 | 26.0 | | 25.5 | 6.8 | 19.4 | 19.3 |
| Progression Factor | 1.05 | | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 77.5 | | 38.4 | 0.1 | 1.2 | 2.4 |
| Delay (s) | 104.7 | | 63.9 | 6.9 | 20.5 | 21.7 |
| Level of Service | F | | E | A | C | C |
| Approach Delay (s) | 104.7 | | | 42.9 | 21.0 | |
| Approach LOS | F | | | D | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 58.4 | | HCM Level of Service | | E |
| HCM Volume to Capacity ratio | | 0.84 | | | | |
| Actuated Cycle Length (s) | | 70.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 81.4% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis 28: 18th Street & Brush Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | |  |  | | | | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 150 | 168 | 0 | 0 | 0 | 0 | 0 | 1554 | 180 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Lane Util. Factor | | | | 1.00 | 0.95 | | | | | | 0.86 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.98 | |
| Flt Protected | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1766 | 3539 | | | | | | 6292 | |
| Flt Permitted | | | | 0.95 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1766 | 3539 | | | | | | 6292 | |
| Peak-hour factor, PHF | 0.25 | 0.95 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 163 | 183 | 0 | 0 | 0 | 0 | 0 | 1602 | 196 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 162 | 183 | 0 | 0 | 0 | 0 | 0 | 1782 | 0 |
| Confl. Peds. (#/hr) | 15 | | 15 | 2 | | 2 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 4 | | | | | | | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | | | |
| Actuated Green, G (s) | | | | 18.2 | 18.2 | | | | | | 47.8 | |
| Effective Green, g (s) | | | | 18.2 | 18.2 | | | | | | 47.8 | |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | | | | | | 0.64 | |
| Clearance Time (s) | | | | 3.0 | 3.0 | | | | | | 6.0 | |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 429 | 859 | | | | | | 4010 | |
| v/s Ratio Prot | | | | | 0.05 | | | | | | c0.28 | |
| v/s Ratio Perm | | | | c0.09 | | | | | | | | |
| v/c Ratio | | | | 0.38 | 0.21 | | | | | | 0.44 | |
| Uniform Delay, d1 | | | | 23.7 | 22.7 | | | | | | 6.9 | |
| Progression Factor | | | | 1.00 | 1.00 | | | | | | 0.79 | |
| Incremental Delay, d2 | | | | 2.5 | 0.6 | | | | | | 0.1 | |
| Delay (s) | | | | 26.2 | 23.2 | | | | | | 5.6 | |
| Level of Service | | | | C | C | | | | | | A | |
| Approach Delay (s) | | 0.0 | | | 24.6 | | | 0.0 | | | 5.6 | |
| Approach LOS | | A | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.6 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.43 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 75.0 | | | Sum of lost time (s) | | | | 9.0 | | |
| Intersection Capacity Utilization | | | 50.5% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

29: 17th Street & Castro Street

















Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | NBT | NBR | NEL | NER |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 200 | 397 | 1492 | 95 | 424 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | 0.91 | | 0.97 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.99 | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (prot) | 1770 | 5085 | 5028 | | 3405 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.96 | |
| Satd. Flow (perm) | 1770 | 5085 | 5028 | | 3405 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 217 | 427 | 1604 | 103 | 461 | 54 |
| RTOR Reduction (vph) | 1 | 0 | 9 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 216 | 427 | 1698 | 0 | 515 | 0 |
| Confl. Peds. (#/hr) | | | | 17 | | |
| Confl. Bikes (#/hr) | | | | 6 | | |
| Turn Type | Perm | | | | | |
| Protected Phases | | 4 | 2 | | 1 | |
| Permitted Phases | 4 | | | | | |
| Actuated Green, G (s) | 15.3 | 15.3 | 24.5 | | 23.2 | |
| Effective Green, g (s) | 15.3 | 15.3 | 24.5 | | 23.2 | |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.33 | | 0.31 | |
| Clearance Time (s) | 3.0 | 3.0 | 4.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 361 | 1037 | 1642 | | 1053 | |
| v/s Ratio Prot | | 0.08 | c0.34 | | c0.15 | |
| v/s Ratio Perm | c0.12 | | | | | |
| v/c Ratio | 0.60 | 0.41 | 1.03 | | 0.49 | |
| Uniform Delay, d1 | 27.1 | 25.9 | 25.2 | | 21.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 7.2 | 1.2 | 31.4 | | 0.4 | |
| Delay (s) | 34.2 | 27.1 | 56.7 | | 21.4 | |
| Level of Service | C | C | E | | C | |
| Approach Delay (s) | | 29.5 | 56.7 | | 21.4 | |
| Approach LOS | | C | E | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 44.3 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | | 0.73 | | | |
| Actuated Cycle Length (s) | | | 75.0 | | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | | 66.6% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |













HCM Signalized Intersection Capacity Analysis 30: 12th Street & Castro Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | |  |  |  |  | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 311 | 1000 | 1172 | 605 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 0.91 | 0.81 | 0.81 | | | | |
| Frbp, ped/bikes | | | | | 0.99 | 0.98 | 1.00 | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 0.98 | 0.99 | | | | |
| Frt | | | | | 0.91 | 0.85 | 1.00 | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (prot) | | | | | 3046 | 1417 | 1403 | 5828 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | 0.95 | 0.98 | | | | |
| Satd. Flow (perm) | | | | | 3046 | 1417 | 1403 | 5828 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 338 | 1087 | 1274 | 651 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 51 | 51 | 284 | 253 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 831 | 492 | 353 | 1035 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 4 | | 4 | 14 | | 14 | | | |
| Confl. Bikes (#/hr) | | | | | | 1 | | | | | | 4 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | 4 | | 2 | | | | |
| Actuated Green, G (s) | | | | | 39.5 | 39.5 | 25.5 | 25.5 | | | | |
| Effective Green, g (s) | | | | | 39.5 | 39.5 | 25.5 | 25.5 | | | | |
| Actuated g/C Ratio | | | | | 0.53 | 0.53 | 0.34 | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.0 | 5.0 | 5.0 | 5.0 | | | | |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | | | | |
| Lane Grp Cap (vph) | | | | | 1604 | 746 | 477 | 1982 | | | | |
| v/s Ratio Prot | | | | | 0.27 | | | | | | | |
| v/s Ratio Perm | | | | | | c0.35 | c0.25 | 0.18 | | | | |
| v/c Ratio | | | | | 0.52 | 0.66 | 0.74 | 0.52 | | | | |
| Uniform Delay, d1 | | | | | 11.6 | 12.9 | 21.8 | 19.9 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 1.2 | 4.5 | 5.9 | 0.2 | | | | |
| Delay (s) | | | | | 12.8 | 17.4 | 27.7 | 20.1 | | | | |
| Level of Service | | | | | B | B | C | C | | | | |
| Approach Delay (s) | | 0.0 | | | 14.5 | | | 22.6 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 19.2 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.69 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | Sum of lost time (s) | | | 10.0 | | | | |
| Intersection Capacity Utilization | | 82.5% | | | ICU Level of Service | | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

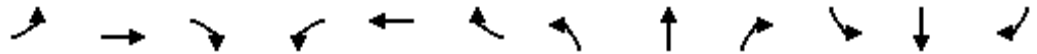
HCM Signalized Intersection Capacity Analysis 31: 11th Street & Brush Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↑↑ | | | | | | | | ↘ | ↑↑↑ | |
| Volume (vph) | 0 | 285 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 642 | 1040 | 63 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | | | | | | 0.86 | 0.86 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Frt | | 0.97 | | | | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (prot) | | 3406 | | | | | | | | 1522 | 4730 | |
| Flt Permitted | | 1.00 | | | | | | | | 0.95 | 0.99 | |
| Satd. Flow (perm) | | 3406 | | | | | | | | 1522 | 4730 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 310 | 89 | 0 | 0 | 0 | 0 | 0 | 0 | 698 | 1130 | 68 |
| RTOR Reduction (vph) | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 259 | 42 | 0 |
| Lane Group Flow (vph) | 0 | 383 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 202 | 1393 | 0 |
| Confl. Peds. (#/hr) | 5 | | 5 | | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | | | | 2 |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Effective Green, g (s) | | 35.0 | | | | | | | | 32.0 | 32.0 | |
| Actuated g/C Ratio | | 0.47 | | | | | | | | 0.43 | 0.43 | |
| Clearance Time (s) | | 4.0 | | | | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 1589 | | | | | | | | 649 | 2018 | |
| v/s Ratio Prot | | c0.11 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.13 | 0.29 | |
| v/c Ratio | | 0.24 | | | | | | | | 0.31 | 0.69 | |
| Uniform Delay, d1 | | 12.0 | | | | | | | | 14.2 | 17.5 | |
| Progression Factor | | 1.00 | | | | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | | | | | | 1.3 | 2.0 | |
| Delay (s) | | 12.4 | | | | | | | | 15.5 | 19.4 | |
| Level of Service | | B | | | | | | | | B | B | |
| Approach Delay (s) | | 12.4 | | | 0.0 | | | 0.0 | | | 18.5 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 17.4 | | | | | | | | HCM Level of Service | B | |
| HCM Volume to Capacity ratio | | 0.46 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 75.0 | | | | | | | | Sum of lost time (s) | 8.0 | |
| Intersection Capacity Utilization | | 48.4% | | | | | | | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 32: 14th Street & Lakeside Dr.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | | | ↕↕ | ↗ | | ↕↕ | ↗ | | | |
| Volume (vph) | 74 | 1070 | 0 | 0 | 495 | 304 | 239 | 742 | 49 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.96 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3524 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Flt Permitted | | 0.84 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 2959 | | | 3539 | 1461 | | 3472 | 1520 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.99 | 0.96 | 0.96 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 80 | 1163 | 0 | 0 | 516 | 317 | 260 | 807 | 53 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 87 | 0 | 0 | 2 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1243 | 0 | 0 | 516 | 230 | 0 | 1067 | 51 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 36 | | 36 | 52 | | 52 | 35 | | 35 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | 5 | | | 21 | | | | | | 22 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | |
| Actuated Green, G (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Effective Green, g (s) | | 18.0 | | | 18.0 | 18.0 | | 32.0 | 32.0 | | | |
| Actuated g/C Ratio | | 0.30 | | | 0.30 | 0.30 | | 0.53 | 0.53 | | | |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 | | | |
| Lane Grp Cap (vph) | | 888 | | | 1062 | 438 | | 1852 | 811 | | | |
| v/s Ratio Prot | | | | | 0.15 | | | | | | | |
| v/s Ratio Perm | | c0.42 | | | | 0.16 | | 0.31 | 0.03 | | | |
| v/c Ratio | | 1.40 | | | 0.49 | 0.53 | | 0.58 | 0.06 | | | |
| Uniform Delay, d1 | | 21.0 | | | 17.2 | 17.5 | | 9.4 | 6.8 | | | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 186.7 | | | 1.6 | 4.5 | | 1.3 | 0.1 | | | |
| Delay (s) | | 207.7 | | | 18.8 | 21.9 | | 10.7 | 6.9 | | | |
| Level of Service | | F | | | B | C | | B | A | | | |
| Approach Delay (s) | | 207.7 | | | 20.0 | | | 10.6 | | | 0.0 | |
| Approach LOS | | F | | | B | | | B | | | A | |

Intersection Summary

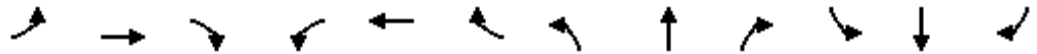
| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 89.7 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.87 | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | 10.0 |
| Intersection Capacity Utilization | 94.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: 14th Street & Madison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | | | ↑ | ↑↑ | |
| Volume (vph) | 0 | 751 | 85 | 47 | 653 | 0 | 0 | 0 | 0 | 684 | 782 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | | | | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3464 | | | 3526 | | | | | 1734 | 3511 | |
| Flt Permitted | | 1.00 | | | 0.87 | | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 3464 | | | 3062 | | | | | 1734 | 3511 | |
| Peak-hour factor, PHF | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.92 |
| Adj. Flow (vph) | 0 | 816 | 92 | 51 | 710 | 0 | 0 | 0 | 0 | 728 | 815 | 38 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 889 | 0 | 0 | 761 | 0 | 0 | 0 | 0 | 728 | 845 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 25 | | 25 | 17 | | 17 | 24 | | 24 |
| Confl. Bikes (#/hr) | | | 16 | | | 17 | | | 2 | | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 8 | | | 4 | | | | | | 6 | |
| Permitted Phases | | | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Effective Green, g (s) | | 19.0 | | | 19.0 | | | | | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | | 0.42 | | | | | 0.42 | 0.42 | |
| Clearance Time (s) | | 3.0 | | | 3.0 | | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | | | | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | | 1463 | | | 1293 | | | | | 732 | 1482 | |
| v/s Ratio Prot | | c0.26 | | | | | | | | | 0.24 | |
| v/s Ratio Perm | | | | | 0.25 | | | | | c0.42 | | |
| v/c Ratio | | 0.61 | | | 0.59 | | | | | 0.99 | 0.57 | |
| Uniform Delay, d1 | | 10.1 | | | 10.0 | | | | | 12.9 | 9.9 | |
| Progression Factor | | 1.00 | | | 1.00 | | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.9 | | | 2.0 | | | | | 32.0 | 1.6 | |
| Delay (s) | | 12.0 | | | 12.0 | | | | | 44.9 | 11.5 | |
| Level of Service | | B | | | B | | | | | D | B | |
| Approach Delay (s) | | 12.0 | | | 12.0 | | | 0.0 | | | 26.9 | |
| Approach LOS | | B | | | B | | | A | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 19.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 91.2% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 34: 14th Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| Volume (vph) | 85 | 501 | 10 | 22 | 467 | 52 | 81 | 523 | 29 | 133 | 226 | 59 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | | 0.95 | | | 0.95 | | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 0.99 | | | 1.00 | | | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Frt | | 1.00 | | | 0.99 | | | 0.99 | | | 0.98 | |
| Flt Protected | | 0.99 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Satd. Flow (prot) | | 3486 | | | 3456 | | | 3475 | | | 3369 | |
| Flt Permitted | | 0.82 | | | 0.92 | | | 0.84 | | | 0.60 | |
| Satd. Flow (perm) | | 2869 | | | 3200 | | | 2946 | | | 2068 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 92 | 545 | 11 | 24 | 508 | 57 | 88 | 568 | 32 | 145 | 233 | 64 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 17 | 0 | 0 | 8 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 0 | 645 | 0 | 0 | 572 | 0 | 0 | 680 | 0 | 0 | 410 | 0 |
| Confl. Peds. (#/hr) | 80 | | 80 | 58 | | 58 | 44 | | 44 | 41 | | 41 |
| Confl. Bikes (#/hr) | | | 14 | | | 10 | | | 7 | | | 4 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | 1 | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | | 21.6 | | | 21.6 | | | 15.9 | | | 15.9 | |
| Effective Green, g (s) | | 21.6 | | | 21.6 | | | 15.9 | | | 15.9 | |
| Actuated g/C Ratio | | 0.48 | | | 0.48 | | | 0.35 | | | 0.35 | |
| Clearance Time (s) | | 3.5 | | | 3.5 | | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1377 | | | 1536 | | | 1041 | | | 731 | |
| v/s Ratio Prot | | | | | | | | | | | | |
| v/s Ratio Perm | | c0.22 | | | 0.18 | | | c0.23 | | | 0.20 | |
| v/c Ratio | | 0.47 | | | 0.37 | | | 0.65 | | | 0.56 | |
| Uniform Delay, d1 | | 7.9 | | | 7.4 | | | 12.2 | | | 11.7 | |
| Progression Factor | | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 1.1 | | | 0.7 | | | 1.5 | | | 1.0 | |
| Delay (s) | | 9.0 | | | 8.1 | | | 13.7 | | | 12.7 | |
| Level of Service | | A | | | A | | | B | | | B | |
| Approach Delay (s) | | 9.0 | | | 8.1 | | | 13.7 | | | 12.7 | |
| Approach LOS | | A | | | A | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 10.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.5 |
| Intersection Capacity Utilization | 76.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | ←←←← | | | | | | ↑↑↑↑ | |
| Volume (vph) | 0 | 0 | 0 | 290 | 1096 | 0 | 0 | 0 | 0 | 0 | 895 | 57 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.86 | | | | | | 0.91 | |
| Frbp, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 6270 | | | | | | 5026 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 6270 | | | | | | 5026 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 315 | 1130 | 0 | 0 | 0 | 0 | 0 | 973 | 62 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1418 | 0 | 0 | 0 | 0 | 0 | 1023 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 47 | | 47 | 36 | | 36 | 29 | | 29 |
| Confl. Bikes (#/hr) | | | 3 | | | 13 | | | 9 | | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | 6 | | | | | | | | |
| Actuated Green, G (s) | | | | | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2717 | | | | | | 2220 | |
| v/s Ratio Prot | | | | | | | | | | | c0.20 | |
| v/s Ratio Perm | | | | | 0.23 | | | | | | | |
| v/c Ratio | | | | | 0.52 | | | | | | 0.46 | |
| Uniform Delay, d1 | | | | | 12.4 | | | | | | 11.7 | |
| Progression Factor | | | | | 0.65 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.6 | | | | | | 0.7 | |
| Delay (s) | | | | | 8.7 | | | | | | 12.4 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 8.7 | | | 0.0 | | | 12.4 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.2 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.49 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | 7.5 | | |
| Intersection Capacity Utilization | | | 48.1% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 36: 12th Street & Oak St.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | ↑↑↑ | | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1183 | 70 | 436 | 1152 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | | | 0.97 | | | | |
| Frt | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6330 | | | 6107 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6330 | | | 6107 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1245 | 76 | 474 | 1200 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 16 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1319 | 0 | 0 | 1658 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | 121 | 69 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | 3 | | | | | | | | | 15 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3154 | | | 2097 | | | | |
| v/s Ratio Prot | | | | | 0.21 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.27 | | | | |
| v/c Ratio | | | | | 0.42 | | | 0.79 | | | | |
| Uniform Delay, d1 | | | | | 9.5 | | | 17.8 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.4 | | | 3.1 | | | | |
| Delay (s) | | | | | 9.9 | | | 20.9 | | | | |
| Level of Service | | | | | A | | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 9.9 | | | 20.9 | | | 0.0 | |
| Approach LOS | | A | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 16.1 | | | | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | | | 0.57 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | Sum of lost time (s) | | | 9.5 | |
| Intersection Capacity Utilization | | | 58.7% | | | | | ICU Level of Service | | | B | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 37: 11th Street & Oak Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 80 | 0 | 0 | 1262 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.25 | 0.92 | 0.25 | 0.25 |
| Hourly flow rate (vph) | 87 | 0 | 0 | 1372 | 0 | 0 |
| Pedestrians | 6 | | | | | |
| Lane Width (ft) | 12.0 | | | | | |
| Walking Speed (ft/s) | 4.0 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 1055 | 320 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 349 | 6 | 6 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 349 | 6 | 6 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 86 | 100 | 100 | | | |
| cM capacity (veh/h) | 619 | 1069 | 1605 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | NB 4 | |
| Volume Total | 87 | 343 | 343 | 343 | 343 | |
| Volume Left | 87 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 619 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.14 | 0.20 | 0.20 | 0.20 | 0.20 | |
| Queue Length 95th (ft) | 12 | 0 | 0 | 0 | 0 | |
| Control Delay (s) | 11.8 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 11.8 | 0.0 | | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.7 | | | | |
| Intersection Capacity Utilization | | 29.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

















| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 1295 | 226 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1100 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 0.99 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.98 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 6225 | | | | | | | | | 5068 | |
| Flt Permitted | | 1.00 | | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 6225 | | | | | | | | | 5068 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 1349 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 1183 | 0 |
| RTOR Reduction (vph) | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 1580 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1244 | 0 |
| Confl. Peds. (#/hr) | 20 | | 20 | 30 | | 30 | 12 | | 12 | 17 | | 17 |
| Confl. Bikes (#/hr) | | | 5 | | | 7 | | | 3 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | 4 | | |
| Actuated Green, G (s) | | 23.0 | | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 2386 | | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.25 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.25 | |
| v/c Ratio | | 0.66 | | | | | | | | | 0.57 | |
| Uniform Delay, d1 | | 15.3 | | | | | | | | | 12.8 | |
| Progression Factor | | 0.83 | | | | | | | | | 0.55 | |
| Incremental Delay, d2 | | 1.4 | | | | | | | | | 1.0 | |
| Delay (s) | | 14.1 | | | | | | | | | 8.0 | |
| Level of Service | | B | | | | | | | | | A | |
| Approach Delay (s) | | 14.1 | | | 0.0 | | | 0.0 | | | 8.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 11.4 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.61 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | 11.0 | | |
| Intersection Capacity Utilization | | | 54.5% | | | ICU Level of Service | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | | | | |  | | | | |
| Volume (vph) | 35 | 844 | 0 | 0 | 0 | 0 | 0 | 387 | 156 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6385 | | | | | | 6043 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6385 | | | | | | 6043 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 38 | 917 | 0 | 0 | 0 | 0 | 0 | 421 | 161 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 943 | 0 | 0 | 0 | 0 | 0 | 568 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | 17 | 53 | | 53 | 68 | | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | 1 | | | 6 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 15.4 | | | | | | 37.6 | | | | |
| Effective Green, g (s) | | 15.4 | | | | | | 37.6 | | | | |
| Actuated g/C Ratio | | 0.26 | | | | | | 0.63 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1639 | | | | | | 3787 | | | | |
| v/s Ratio Prot | | | | | | | | c0.09 | | | | |
| v/s Ratio Perm | | 0.15 | | | | | | | | | | |
| v/c Ratio | | 0.58 | | | | | | 0.15 | | | | |
| Uniform Delay, d1 | | 19.4 | | | | | | 4.6 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.3 | | | | | | 0.1 | | | | |
| Delay (s) | | 19.8 | | | | | | 4.7 | | | | |
| Level of Service | | B | | | | | | A | | | | |
| Approach Delay (s) | | 19.8 | | | 0.0 | | | 4.7 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.1 | | | | | | HCM Level of Service | | B | | |
| HCM Volume to Capacity ratio | | 0.27 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | Sum of lost time (s) | | 7.0 | | |
| Intersection Capacity Utilization | | 40.3% | | | | | | ICU Level of Service | | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 40: 7th St. & Oak St.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



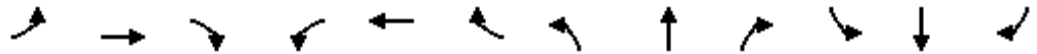
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|--------|------|------|------|------|
| Lane Configurations | | 4↑↑↑ | | | | | | ↑↑↑ | | | | |
| Volume (vph) | 208 | 1541 | 0 | 0 | 0 | 0 | 0 | 1102 | 1185 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Util. Factor | | 0.86 | | | | | | 0.91 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.99 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.92 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 6355 | | | | | | 4638 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 6355 | | | | | | 4638 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.98 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.94 | 0.96 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 226 | 1572 | 0 | 0 | 0 | 0 | 0 | 1172 | 1234 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1787 | 0 | 0 | 0 | 0 | 0 | 2404 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 22 | | 22 | 50 | | 50 | 14 | | 14 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 16 | | | 1 | | | 2 | | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | | |
| Permitted Phases | 1 | | | | | | | | | | | |
| Actuated Green, G (s) | | 18.0 | | | | | | 18.0 | | | | |
| Effective Green, g (s) | | 18.0 | | | | | | 18.0 | | | | |
| Actuated g/C Ratio | | 0.40 | | | | | | 0.40 | | | | |
| Clearance Time (s) | | 4.5 | | | | | | 4.5 | | | | |
| Lane Grp Cap (vph) | | 2542 | | | | | | 1855 | | | | |
| v/s Ratio Prot | | | | | | | | c0.52 | | | | |
| v/s Ratio Perm | | 0.28 | | | | | | | | | | |
| v/c Ratio | | 0.70 | | | | | | 1.93dr | | | | |
| Uniform Delay, d1 | | 11.3 | | | | | | 13.5 | | | | |
| Progression Factor | | 0.78 | | | | | | 1.35 | | | | |
| Incremental Delay, d2 | | 0.6 | | | | | | 136.6 | | | | |
| Delay (s) | | 9.4 | | | | | | 154.8 | | | | |
| Level of Service | | A | | | | | | F | | | | |
| Approach Delay (s) | | 9.4 | | | 0.0 | | | 154.8 | | | 0.0 | |
| Approach LOS | | A | | | A | | | F | | | A | |

Intersection Summary

| | | | |
|---|-------|----------------------|-----|
| HCM Average Control Delay | 92.6 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.00 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 83.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 41: 7th St. & Madison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|------|------|------|------|------|------|------|------|------------------------|
| Lane Configurations | | ↑↑↑ | | | | | | | | | ↑↑↑ | |
| Volume (vph) | 0 | 1580 | 485 | 0 | 0 | 0 | 0 | 0 | 0 | 544 | 1756 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Lane Util. Factor | | 0.86 | | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | | | | 1.00 | |
| Frt | | 0.96 | | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (prot) | | 6145 | | | | | | | | | 5015 | |
| Flt Permitted | | 1.00 | | | | | | | | | 0.99 | |
| Satd. Flow (perm) | | 6145 | | | | | | | | | 5015 | |
| Peak-hour factor, PHF | 0.25 | 0.99 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.95 | 0.25 |
| Adj. Flow (vph) | 0 | 1596 | 527 | 0 | 0 | 0 | 0 | 0 | 0 | 591 | 1848 | 0 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 2121 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2437 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 8 | | 8 | 2 | | 2 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 2 | | | |
| Turn Type | | | | | | | | | | Perm | | |
| Protected Phases | | 4 | | | | | | | | | 6 | |
| Permitted Phases | | | | | | | | | | 6 | | |
| Actuated Green, G (s) | | 18.0 | | | | | | | | | 20.0 | |
| Effective Green, g (s) | | 18.0 | | | | | | | | | 20.0 | |
| Actuated g/C Ratio | | 0.40 | | | | | | | | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | | | | 3.0 | |
| Vehicle Extension (s) | | 2.0 | | | | | | | | | 2.0 | |
| Lane Grp Cap (vph) | | 2458 | | | | | | | | | 2229 | |
| v/s Ratio Prot | | c0.35 | | | | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | | 0.49 | |
| v/c Ratio | | 0.86 | | | | | | | | | 1.09 | |
| Uniform Delay, d1 | | 12.4 | | | | | | | | | 12.5 | |
| Progression Factor | | 1.00 | | | | | | | | | 1.00 | |
| Incremental Delay, d2 | | 4.3 | | | | | | | | | 49.9 | |
| Delay (s) | | 16.7 | | | | | | | | | 62.4 | |
| Level of Service | | B | | | | | | | | | E | |
| Approach Delay (s) | | 16.7 | | | 0.0 | | | 0.0 | | | 62.4 | |
| Approach LOS | | B | | | A | | | A | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 41.1 | | | | | | | | | HCM Level of Service D |
| HCM Volume to Capacity ratio | | | 0.98 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 45.0 | | | | | | | | 7.0 | Sum of lost time (s) |
| Intersection Capacity Utilization | | | 84.9% | | | | | | | | | ICU Level of Service E |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 42: I-880 NB On-ramp & Jackson Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|-------|------|------|-------|-------|
| Lane Configurations | | | | ↰ | ↱ | ↰ | | ↕ | | | ↱ | ↰ |
| Volume (vph) | 0 | 0 | 0 | 8 | 430 | 66 | 409 | 410 | 0 | 0 | 251 | 1916 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Lane Util. Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | 0.93 | | 1.00 | | | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | 0.98 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | 1.00 | | 0.98 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1726 | 1863 | 1471 | | 1817 | | | 1863 | 1559 |
| Flt Permitted | | | | 0.95 | 1.00 | 1.00 | | 0.71 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1726 | 1863 | 1471 | | 1316 | | | 1863 | 1559 |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 9 | 467 | 72 | 445 | 446 | 0 | 0 | 273 | 1955 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 28 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 9 | 467 | 17 | 0 | 891 | 0 | 0 | 273 | 1927 |
| Confl. Peds. (#/hr) | 4 | | 4 | 20 | | 20 | 1 | | 1 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 10 | | | 7 | | | | | | |
| Turn Type | | | | Perm | | Perm | Perm | | | | | Perm |
| Protected Phases | | | | | 1 | | | 2 | | | 2 | |
| Permitted Phases | | | | 1 | | 1 | 2 | | | | | 2 |
| Actuated Green, G (s) | | | | 14.5 | 14.5 | 14.5 | | 34.5 | | | 34.5 | 34.5 |
| Effective Green, g (s) | | | | 14.5 | 14.5 | 14.5 | | 34.5 | | | 34.5 | 34.5 |
| Actuated g/C Ratio | | | | 0.24 | 0.24 | 0.24 | | 0.57 | | | 0.57 | 0.57 |
| Clearance Time (s) | | | | 5.5 | 5.5 | 5.5 | | 5.5 | | | 5.5 | 5.5 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 417 | 450 | 355 | | 757 | | | 1071 | 896 |
| v/s Ratio Prot | | | | c0.25 | | | | | | | 0.15 | |
| v/s Ratio Perm | | | | 0.01 | | 0.01 | | 0.68 | | | | c1.24 |
| v/c Ratio | | | | 0.02 | 1.04 | 0.05 | | 1.18 | | | 0.25 | 2.15 |
| Uniform Delay, d1 | | | | 17.3 | 22.8 | 17.5 | | 12.8 | | | 6.3 | 12.8 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.0 | 52.5 | 0.1 | | 93.2 | | | 0.6 | 521.5 |
| Delay (s) | | | | 17.4 | 75.3 | 17.5 | | 105.9 | | | 6.9 | 534.3 |
| Level of Service | | | | B | E | B | | F | | | A | F |
| Approach Delay (s) | | 0.0 | | | 66.8 | | | 105.9 | | | 469.6 | |
| Approach LOS | | A | | | E | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 321.1 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.82 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 199.9% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

43: 6th St. & Oak St.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | WBR | NBL | NBT | NWL2 | NWL | NWR |
|-----------------------------------|--------|------|-------|------|----------------------|------|
| Lane Configurations | ↰ | | ↰↰ | | ↰↰ | ↰ |
| Volume (vph) | 0 | 215 | 731 | 77 | 66 | 855 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Util. Factor | | | 0.95 | | 0.97 | 0.91 |
| Frpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | 1.00 | | 1.00 | 1.00 |
| Frt | | | 1.00 | | 0.89 | 0.85 |
| Flt Protected | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (prot) | | | 3499 | | 3170 | 1441 |
| Flt Permitted | | | 0.99 | | 0.99 | 1.00 |
| Satd. Flow (perm) | | | 3499 | | 3170 | 1441 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 |
| Adj. Flow (vph) | 0 | 234 | 795 | 84 | 72 | 910 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 1029 | 0 | 611 | 455 |
| Confl. Peds. (#/hr) | 46 | | | | | |
| Confl. Bikes (#/hr) | 3 | | | | | |
| Turn Type | custom | Perm | | Perm | | Perm |
| Protected Phases | | | 3 | | 1 | |
| Permitted Phases | 2 | 3 | | 1 | | 1 |
| Actuated Green, G (s) | | | 16.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | | | 16.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | | | 0.36 | | 0.36 | 0.36 |
| Clearance Time (s) | | | 3.5 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | | | 1267 | | 1141 | 519 |
| v/s Ratio Prot | | | | | | |
| v/s Ratio Perm | | | 0.29 | | 0.19 | 0.32 |
| v/c Ratio | | | 0.81 | | 0.54 | 0.88 |
| Uniform Delay, d1 | | | 13.0 | | 11.4 | 13.5 |
| Progression Factor | | | 0.76 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | 0.5 | | 1.8 | 18.5 |
| Delay (s) | | | 10.4 | | 13.2 | 32.0 |
| Level of Service | | | B | | B | C |
| Approach Delay (s) | | | 10.4 | | 21.2 | |
| Approach LOS | | | B | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 15.9 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.83 | | | |
| Actuated Cycle Length (s) | | | 45.0 | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | 75.5% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 44: 5th St. & Oak St.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↑ | | | ↑ | |
| Volume (vph) | 339 | 711 | 96 | 0 | 0 | 0 | 0 | 622 | 86 | 1 | 81 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Util. Factor | | 0.91 | | | | | | 1.00 | | | 1.00 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | 1.00 | |
| Frt | | 0.99 | | | | | | 0.98 | | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 4924 | | | | | | 1832 | | | 1862 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | 0.72 | |
| Satd. Flow (perm) | | 1000 | | | | | | 1300 | | | 1300 | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 |
| Adj. Flow (vph) | 368 | 765 | 104 | 0 | 0 | 0 | 0 | 676 | 93 | 1 | 88 | 0 |
| RTOR Reduction (vph) | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1213 | 0 | 0 | 0 | 0 | 0 | 758 | 0 | 0 | 89 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | 4 | | | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 1 | | | | | | 2 | | | 2 | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Effective Green, g (s) | | 22.5 | | | | | | 15.5 | | | 15.5 | |
| Actuated g/C Ratio | | 0.50 | | | | | | 0.34 | | | 0.34 | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | 3.5 | |
| Lane Grp Cap (vph) | | 500 | | | | | | 631 | | | 448 | |
| v/s Ratio Prot | | | | | | | | c0.41 | | | | |
| v/s Ratio Perm | | c1.21 | | | | | | | | | 0.07 | |
| v/c Ratio | | 2.43 | | | | | | 1.20 | | | 0.20 | |
| Uniform Delay, d1 | | 11.2 | | | | | | 14.8 | | | 10.4 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | 0.08 | |
| Incremental Delay, d2 | | 647.8 | | | | | | 105.1 | | | 0.9 | |
| Delay (s) | | 659.0 | | | | | | 119.9 | | | 1.7 | |
| Level of Service | | F | | | | | | F | | | A | |
| Approach Delay (s) | | 659.0 | | | 0.0 | | | 119.9 | | | 1.7 | |
| Approach LOS | | F | | | A | | | F | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 433.2 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.93 | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 |
| Intersection Capacity Utilization | 70.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (WB) & Grand Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



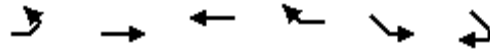
| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|-------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 207 | 182 | 1395 | 1030 | 213 | 1166 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3311 | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3311 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 225 | 198 | 1484 | 1120 | 232 | 1267 |
| RTOR Reduction (vph) | 0 | 161 | 146 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 225 | 37 | 2458 | 0 | 232 | 1267 |
| Turn Type | Perm | | | Prot | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | 4 | | | | |
| Actuated Green, G (s) | 16.8 | 16.8 | 37.7 | | 23.5 | 65.2 |
| Effective Green, g (s) | 16.8 | 16.8 | 37.7 | | 23.5 | 65.2 |
| Actuated g/C Ratio | 0.19 | 0.19 | 0.42 | | 0.26 | 0.72 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 330 | 295 | 1387 | | 462 | 2564 |
| v/s Ratio Prot | c0.13 | | c0.74 | | 0.13 | c0.36 |
| v/s Ratio Perm | | 0.02 | | | | |
| v/c Ratio | 0.68 | 0.13 | 1.77 | | 0.50 | 0.49 |
| Uniform Delay, d1 | 34.1 | 30.5 | 26.2 | | 28.3 | 5.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.73 | 0.82 |
| Incremental Delay, d2 | 5.7 | 0.2 | 350.3 | | 1.6 | 0.3 |
| Delay (s) | 39.8 | 30.7 | 376.4 | | 22.1 | 4.6 |
| Level of Service | D | C | F | | C | A |
| Approach Delay (s) | 35.5 | | 376.4 | | | 7.3 |
| Approach LOS | D | | F | | | A |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 222.3 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.16 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 104.9% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis
46: Lakeshore Drive & El Embarcadero (WB)

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|------------------------|-------|------|-------|------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 273 | 487 | 265 | 151 | 718 | 478 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3347 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3347 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 297 | 529 | 288 | 164 | 780 | 520 |
| RTOR Reduction (vph) | 0 | 0 | 131 | 0 | 0 | 310 |
| Lane Group Flow (vph) | 297 | 529 | 321 | 0 | 780 | 210 |
| Turn Type | Prot | | | Perm | | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 13.0 | 27.7 | 10.7 | | 24.1 | 24.1 |
| Effective Green, g (s) | 13.0 | 27.7 | 10.7 | | 24.1 | 24.1 |
| Actuated g/C Ratio | 0.22 | 0.46 | 0.18 | | 0.40 | 0.40 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 385 | 1639 | 599 | | 713 | 638 |
| v/s Ratio Prot | c0.17 | 0.15 | c0.10 | | c0.44 | |
| v/s Ratio Perm | | | | | | 0.13 |
| v/c Ratio | 0.77 | 0.32 | 0.54 | | 1.09 | 0.33 |
| Uniform Delay, d1 | 22.0 | 10.1 | 22.3 | | 17.8 | 12.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 9.2 | 0.1 | 0.9 | | 62.3 | 0.3 |
| Delay (s) | 31.2 | 10.2 | 23.2 | | 80.1 | 12.6 |
| Level of Service | C | B | C | | F | B |
| Approach Delay (s) | | 17.8 | 23.2 | | 53.1 | |
| Approach LOS | | B | C | | D | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 36.5 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.88 | | |
| Actuated Cycle Length (s) | 59.8 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 77.1% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study



| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | 3 1 1 | | | 2 2 | 1 | 1 | 2 2 | |
| Volume (vph) | 0 | 0 | 340 | 2180 | 346 | 0 | 615 | 861 | 738 | 1165 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4940 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4940 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 354 | 2370 | 376 | 0 | 661 | 936 | 802 | 1266 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 16 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 3079 | 0 | 0 | 661 | 920 | 802 | 1266 | 0 |
| Turn Type | | | Split | | | | | Perm | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 1 2 | |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1647 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.62 | | | 0.19 | | c0.45 | 0.36 | |
| v/s Ratio Perm | | | | | | | | c0.58 | | | |
| v/c Ratio | | | | 1.87 | | | 0.96 | 2.99 | 1.38 | 0.63 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.9 | 36.2 | 30.3 | 13.2 | |
| Progression Factor | | | | 1.00 | | | 1.51 | 1.52 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 393.7 | | | 4.6 | 894.8 | 182.8 | 0.7 | |
| Delay (s) | | | | 423.7 | | | 58.7 | 949.9 | 213.1 | 13.8 | |
| Level of Service | | | | F | | | E | F | F | B | |
| Approach Delay (s) | 0.0 | | | 423.7 | | | 581.0 | | | 91.1 | |
| Approach LOS | A | | | F | | | F | | | F | |

Intersection Summary

| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 359.2 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.94 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 123.9% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study















| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|-------|------|--------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 489 | 2163 | 881 | 183 | 372 | 1030 | 148 | 575 | 26 | 307 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.99 | 0.85 | | 0.89 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3180 | 1441 | | 3136 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3180 | 1441 | | 3136 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 532 | 2301 | 958 | 199 | 404 | 1120 | 161 | 625 | 28 | 334 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 479 | 2459 | 1042 | 0 | 1676 | 0 | 0 | 0 | 653 | 334 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 989 | 448 | | 1289 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.30 | c0.77 | 0.72 | | c0.53 | | | | c0.37 | 0.09 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.96 | 2.49 | 2.33 | | 1.91dr | | | | 2.77 | 0.16 |
| Uniform Delay, d1 | 30.4 | 31.0 | 31.0 | | 26.5 | | | | 39.0 | 8.4 |
| Progression Factor | 0.62 | 0.63 | 0.62 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.5 | 669.1 | 597.6 | | 141.0 | | | | 806.9 | 0.2 |
| Delay (s) | 24.4 | 688.7 | 616.8 | | 167.5 | | | | 845.9 | 8.6 |
| Level of Service | C | F | F | | F | | | | F | A |
| Approach Delay (s) | | 590.0 | | | 167.5 | | | | | 562.5 |
| Approach LOS | | F | | | F | | | | | F |

Intersection Summary

| | | | |
|---|--------|----------------------|------|
| HCM Average Control Delay | 479.1 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.96 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 153.6% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | |
| c Critical Lane Group | | | |

















HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | | | ↑↑↑ | ↑ | | ↑↑↑ | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2113 | 296 | 416 | 1356 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | *0.88 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1583 | | 4862 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1583 | | 4862 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.98 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2201 | 322 | 424 | 1443 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2201 | 320 | 0 | 1866 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | 2 | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | 30.0 | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | 4.0 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2543 | 792 | | 1783 | | | | |
| v/s Ratio Prot | | | | | c0.43 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.20 | | 0.38 | | | | |
| v/c Ratio | | | | | 0.87 | 0.40 | | 1.05 | | | | |
| Uniform Delay, d1 | | | | | 13.2 | 9.4 | | 19.0 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.12 | | | | |
| Incremental Delay, d2 | | | | | 4.3 | 1.5 | | 22.8 | | | | |
| Delay (s) | | | | | 17.5 | 10.9 | | 44.1 | | | | |
| Level of Service | | | | | B | B | | D | | | | |
| Approach Delay (s) | | 0.0 | | | 16.6 | | | 44.1 | | | 0.0 | |
| Approach LOS | | A | | | B | | | D | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 28.3 | | | HCM Level of Service | | | C | | | | |
| HCM Volume to Capacity ratio | | 0.94 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 82.1% | | | ICU Level of Service | | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |


















HCM Signalized Intersection Capacity Analysis 50: Santa Clara Avenue & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | |  |  | | | | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 844 | 1734 | 0 | 0 | 0 | 0 | 0 | 912 | 83 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4775 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4775 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 917 | 1788 | 0 | 0 | 0 | 0 | 0 | 991 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 17 | 17 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 634 | 2037 | 0 | 0 | 0 | 0 | 0 | 1077 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2308 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.31 | |
| v/s Ratio Perm | | | | 0.42 | 0.43 | | | | | | | |
| v/c Ratio | | | | 0.86 | 0.88 | | | | | | 0.80 | |
| Uniform Delay, d1 | | | | 13.7 | 14.0 | | | | | | 16.5 | |
| Progression Factor | | | | 1.29 | 1.29 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 6.4 | 2.6 | | | | | | 5.2 | |
| Delay (s) | | | | 24.2 | 20.6 | | | | | | 21.7 | |
| Level of Service | | | | C | C | | | | | | C | |
| Approach Delay (s) | | 0.0 | | | 21.5 | | | 0.0 | | | 21.7 | |
| Approach LOS | | A | | | C | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.5 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.85 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 82.1% | | | ICU Level of Service | | | E | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis 51: Oakland Avenue & Monte Vista Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | |  | | |  | |
| Sign Control | Stop | | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 291 | 698 | 14 | 22 | 313 | 26 | 21 | 31 | 38 | 86 | 64 | 57 |
| Peak Hour Factor | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 316 | 743 | 15 | 24 | 340 | 28 | 23 | 34 | 41 | 93 | 70 | 62 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 316 | 758 | 392 | 98 | 225 | | | | | | | |
| Volume Left (vph) | 316 | 0 | 24 | 23 | 93 | | | | | | | |
| Volume Right (vph) | 0 | 15 | 28 | 41 | 62 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.17 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.9 | 6.4 | 6.3 | 7.3 | 6.9 | | | | | | | |
| Degree Utilization, x | 0.61 | 1.34 | 0.68 | 0.20 | 0.43 | | | | | | | |
| Capacity (veh/h) | 513 | 566 | 557 | 435 | 489 | | | | | | | |
| Control Delay (s) | 18.8 | 184.4 | 21.7 | 12.1 | 15.2 | | | | | | | |
| Approach Delay (s) | 135.7 | | 21.7 | 12.1 | 15.2 | | | | | | | |
| Approach LOS | F | | C | B | C | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 88.8 | | | | | | | | | |
| HCM Level of Service | | | F | | | | | | | | | |
| Intersection Capacity Utilization | | | 85.1% | ICU Level of Service | | | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

APPENDIX G.3

Revision of Measure DD Configuration for Harrison Street / Lakeside Drive / 20th Street Triangle

AECOM

155 Grand Avenue, Suite 700, Oakland, CA 94612
T 510.763.2929 F 510.834.5220

Memorandum

Date: January 12, 2009
To: Margaret Stanzione, City of Oakland, Community and Economic Development
Agency
Tomas Schoenberg, The Swig Company, LLC
From: Jeffrey Chan, PTP
Subject: Revision of Measure DD Configuration for Harrison Street / Lakeside Drive / 20th
Street Triangle

This memorandum summarizes the proposed revision of the Measure DD configuration for the three intersections at the confluence of Harrison Street, Lakeside Drive, and 20th Street, herein referred to as the "Triangle." The analysis presented below considers the following two intersections, which would be most affected by implementation of Measure DD:

- 24. Harrison Street / 20th Street / Kaiser Center Access Road; and,
- 26. Harrison Street / Lakeside Drive.

The third intersection in the Triangle (Intersection #27: Lakeside Drive / 20th Street) would be removed with implementation of Measure DD and would operate without conflicting movements.

Measure DD Configuration

The aim of Measure DD is to enlarge Snow Park and provide enhanced pedestrian access to open space along the shore of Lake Merritt. As originally proposed, Measure DD would remove the 20th Street leg of the Triangle. The primary result of this reconfiguration would be the following changes in traffic flow in the Triangle:

- Eastbound-through vehicles (eastbound vehicles on 20th Street attempting to access Lakeside Drive) would need to first turn left onto northbound Harrison Street before turning right onto Lakeside Drive); and,
- Westbound-through vehicles (westbound vehicles on Lakeside Drive attempting to reach 20th Street) would first need to turn left at Intersection #26.

As Measure DD has already been approved, the Cumulative plus Project Conditions scenario presented in the Measure DD Implementation Project Environmental Impact Report (EIR) was assumed to be the cumulative base scenario for analysis of the Kaiser Center Redevelopment Project—i.e., Cumulative Conditions without the project. Project-related traffic was then added on top to generate Cumulative plus Project Conditions.

Cumulative plus Project Conditions (Kaiser Center Redevelopment Project EIR)

The LOS results for Cumulative plus Project Conditions for the Kaiser Center Redevelopment Project EIR are summarized in **Table 1**.

Table 1: Intersection Level of Service Comparison

| Intersection | | Existing Conditions | Cumulative Conditions | | Cumulative plus Project Conditions |
|--------------|----------------------------------|---------------------|------------------------------|----------------------------------|------------------------------------|
| | | Kaiser EIR (2008) | DD EIR (2025) ⁽¹⁾ | Kaiser EIR (2030) ⁽²⁾ | DD Geometry ⁽³⁾ |
| AM Peak Hour | | | | | |
| 24 | Harrison Street / 20th Street | D 40.6 | C 25.2 | C 28.4 | F 272.8 |
| 26 | Harrison Street / Lakeside Drive | A 7.6 | C 23.3 | C 23.8 | C 26.3 |
| PM Peak Hour | | | | | |
| 24 | Harrison Street / 20th Street | C 34.1 | C 22.5 | D 47.9 | F 255.9 |
| 26 | Harrison Street / Lakeside Drive | B 13.1 | C 25.3 | D 53.0 | E 66.2 |

Notes:

Bold indicates intersections operating at **LOS E** or **LOS F**.

⁽¹⁾ Cumulative plus Project Conditions as presented in the Measure DD Implementation Project EIR.

⁽²⁾ Cumulative Conditions for the Kaiser Center Redevelopment EIR, assuming identical geometry at Measure DD intersections (#24 and #26) as that presented in the Measure DD Implementation Project EIR for Cumulative plus Project Conditions.

⁽³⁾ Assumes minor timing and phasing adjustments to accommodate the additional southeastbound approach to be constructed at Intersection #24 as part of the project. An additional eastbound left-turn pocket would be provided, as the existing pocket immediately before the intersection would be removed. Cycle length, however, is assumed to remain constant.

As shown in **Table 1**, the project would contribute to significant cumulative impacts under both the AM and PM peak hours at the intersection of Harrison Street / 20th Street. The project would also potentially contribute to a significant cumulative impact under the PM peak hour at the intersection of Harrison Street / Lakeside Drive.

In order to mitigate the project's contribution to cumulative impacts at the intersection of Harrison Street / 20th Street, the following changes would be required:

- For the AM peak hour, an additional southbound-through lane would be needed, with timing adjustments to increase the green time to this movement.
- For the PM peak hour, the following changes would need to be made:
 - The southeastbound approach (the internal access road) would need to be reconfigured from a through-left and exclusive right to an exclusive left, exclusive through, and exclusive right; and,

- The northbound approach (Harrison Street) would need to be reconfigured from a shared left-through-right and exclusive right to an exclusive left, exclusive through, and two exclusive rights.

These changes would be in addition to the “basic” changes necessitated by the new approach, as detailed in Note #3 of **Table 1**. After these changes, the two intersections would operate at acceptable levels of service.

Microsimulation Analysis

Because of the proximity of the intersections of Harrison Street / 20th Street and Harrison Street / Lakeside Drive and the resulting potential for queuing impacts, a preliminary microsimulation analysis of the roadways and intersections in the immediate vicinity of the project was conducted. The microsimulation analysis concluded the following:

- Substantial queuing would occur on the following movements after reconfiguration:
 - All movements on the northbound approach at Harrison Street / 20th Street, especially the northbound-left and northbound-right movements;
 - All movements on the southeastbound approach (internal access road) at Harrison Street / 20th Street;
 - Eastbound-through movement at Harrison Street / Lakeside Drive (Harrison Street to Harrison Street), leading to spillback queuing affecting throughput at Harrison Street / 20th Street;
 - Southbound-left movement at Harrison Street / Lakeside Drive (Harrison Street to Lakeside Drive), leading to spillback queuing affecting throughput at Harrison Street / 21st Street; and,
 - Northbound-through movement at Harrison Street / Lakeside Drive (Lakeside Drive to Harrison Street).
- The removal of the eastern 20th Street leg at Harrison Street / 20th Street introduces traffic flow conflicts between northbound Harrison Street vehicles bound for Grand Avenue and I-580 and eastbound 20th Street vehicles attempting to access southbound Lakeside Drive to reach 11th / 12th Streets and I-880. This increases the potential for collisions as vehicles attempt to weave into the appropriate lane or make sudden lane changes and turning movements over short distances.

Improvement Measures

Based on the microsimulation analysis, the reconfiguration of the Harrison Street / Lakeside Drive / 20th Street Triangle as originally proposed by Measure DD would result in substantial queuing issues and weaving conflicts as detailed above. These issues would be complicated by the addition of project-generated traffic.

As a possible alternative configuration, it was proposed that the Lakeside Drive section of the Triangle be removed instead. This would present the following benefits:

- Complete removal of one intersection from the roadway network, streamlining traffic flows. The reconfiguration as originally proposed by Measure DD would have removed the 20th Street section of the Triangle, but the intersection of Harrison Street / 20th Street would still have remained because of the presence of conflicting movements.

Ms. Margaret Stanzone

Mr. Tomas Schoenberg

January 12, 2009

Revision of Measure DD Configuration for Harrison Street / Lakeside Drive / 20th Street Triangle

Page 4

- Elimination of the intersection queuing and associated spillback queuing impacts at the intersection of Harrison Street / Lakeside Drive. The alternative configuration would result in approximately 600 feet of unobstructed queuing storage along Harrison Street.
- Elimination of the weaving conflicts and potential for collisions discussed previously, as eastbound-through vehicles from 20th Street would no longer have to use Harrison Street to access Lakeside Drive.
- Placement of the new open space where it results in the most benefits. The original proposal called for Snow Park to be expanded, but the new open space would still be separated from Lake Merritt by Lakeside Drive. The alternative configuration removes the Lakeside Drive section of the Triangle and allows existing open space abutting the lake to be expanded west. This reduces the number of crosswalks by one for pedestrians attempting to access the lakeshore from 20th Street west of Harrison Street and enhances the attractiveness of the shoreline area as a lunchtime or recreational spot for employees in nearby office buildings.
- Improved options for project-related traffic, as the alternative configuration improves connections to Lakeside Drive for vehicles coming to and from the internal access road.

The alternative reconfiguration would require changes to lane striping and configuration and signal timing and phasing. The alternative reconfiguration would also likely result in higher delays and poorer level of service (LOS) at the intersection of Harrison Street / 20th Street than the original reconfiguration. Given, however, that it would produce the benefits described above, particularly the improvement of non-auto access to open space—a primary goal of Measure DD—it is recommended that the analysis proceed assuming the alternative configuration.

Next Steps

AECOM will conduct a microsimulation analysis under Cumulative plus Project Conditions of intersections immediately adjacent to the project site and develop a preliminary design for the intersections of Harrison Street / 20th Street, Harrison Street / Lakeside Drive, and, potentially, Harrison Street / 21st Street. The preliminary design will include the following elements:

- Intersection geometry;
- Roadway geometry;
- Signal timing plans;
- Signal phasing plans; and,
- Any additional considerations such as off-peak access to the parking garage, access to the loading docks, pedestrian access, and bikeway facilities.

The proposed design will be presented to City of Oakland Community and Economic Development Agency (CEDA) and Transportation Services Division (TSD) staff for preliminary approval before proceeding with the rest of the analysis.

APPENDIX G.4

Pedestrian Facilities Survey

Inventory of Pedestrian Signals

| Intersection | Cross-walk | Signal Head? | Countdown? |
|--|------------|----------------------|----------------------|
| 13 Harrison Street / 21st Street | S | Y | N |
| | W | NB: Y / SB: N | N |
| --- Kaiser Plaza / 21st Street | N | N/A | N/A |
| | E | N/A | N/A |
| | W | N/A | N/A |
| 17 Webster Street / 21st Street | N | N | N |
| | S | N | N |
| | E | NB: Y / SB: N | N |
| | W | NB: Y / SB: N | N |
| 18 Franklin Street / 21st Street | N | Y | Y |
| | S | Y | Y |
| | E | Y | Y |
| | W | Y | Y |
| 22 Franklin Street / 20th Street | N | Y | Y |
| | S | Y | Y |
| | E | Y | Y |
| | W | Y | Y |
| 23 Webster Street / 20th Street | N | Y | Y |
| | S | EB: N / WB: Y | EB: N / WB: Y |
| | E | Y | Y |
| | W | Y | Y |
| 24 Harrison Street / 20th Street / Kaiser Center Access Road | S | Y | Y |
| | E | Y | Y |
| | W | Y | Y |
| 26 Harrison Street / Lakeside Drive | SE | Y | Y |
| | SW | EB: N / WB: Y | EB: N / WB: Y |

Inventory of Curb Ramps

| Intersection | Corner | Curb Ramp? | Detectable Warning? |
|--|--------|-----------------------------------|---------------------|
| 13 Harrison Street / 21st Street | NW | Y | Y |
| | SE | Y | Y |
| | SW | Y | N |
| --- Kaiser Plaza / 21st Street | NE | Y, but not aligned with crosswalk | N |
| | NW | N: Y / W: N | N |
| | SE | Y, but not aligned with crosswalk | N |
| | SW | N | N |
| 17 Webster Street / 21st Street | NE | Y | N |
| | NW | Y | N |
| | SE | Y | N |
| | SW | Y | N |
| 18 Franklin Street / 21st Street | NE | Y | Y |
| | NW | Y | N |
| | SE | Y | N |
| | SW | Y | N |
| 22 Franklin Street / 20th Street | NE | Y | N |
| | NW | Y | N |
| | SE | Y | N |
| | SW | Y | N |
| 23 Webster Street / 20th Street | NE | Y | N |
| | NW | Y | N |
| | SE | Y | N |
| | SW | Y | N |
| 24 Harrison Street / 20th Street / Kaiser Center Access Road | NE | Y | N |
| | NW | Y | N |
| | SE | Y | N |
| | SW | Y | N |
| 26 Harrison Street / Lakeside Drive | SE | Y | N |
| | SW | Y | N |

APPENDIX G.5

Mode Split Findings

AECOM

155 Grand Avenue, Suite 700, Oakland, CA 94612
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Memorandum

Date: October 17, 2008

To: Margaret Stanzione, Community and Economic Development Agency,
City of Oakland
Gordon Lum, Transportation Services Division, Community and Economic
Development Agency, City of Oakland

From: Jeffrey Chan, PTP

Subject: Kaiser Center Redevelopment Project Transportation Impact Analysis –
Mode Split Findings

This memorandum summarizes the findings from the comparison of mode split and average vehicle occupancy (AVO) results contained in various technical sources documenting travel behavior for the Downtown area in the City of Oakland⁽¹⁾. The results of the comparison facilitate the determination of the most suitable mode split and AVO to be used for the proposed Kaiser Center Redevelopment Project located in the City of Oakland, herein referred to as the Project.

Project Description

The proposed project would primarily consist of two new office towers totaling 1,320,000 square feet of office space adjacent to the existing Kaiser Center office tower, located on the west corner of the block bounded by 21st Street on the north, 20th Street on the south, Webster Street on the west and Harrison Street / Lakeside Drive on the east, herein defined as the "Kaiser Center block." Approximately 48,000 square feet of existing retail space would be removed and replaced with 46,000 square feet of retail located at street level along 20th Street and Webster Street and on the sixth floor adjacent to the existing Kaiser Center rooftop garden.

The project is divided into two phases:

- Development Phase I consists of the 42-story North Tower in conjunction with the street level retail complex along Webster Street, comprising approximately 768,000 square feet of office space and approximately 19,000 square feet of retail space located at street level and on the sixth floor; and,
- Development Phase II, which would be commenced concurrently with or following Development Phase I, consists of the 34-story South Tower in conjunction with the street level retail complex along 20th Street, comprising approximately 552,000 square feet of office space and approximately 27,000 square feet of retail space located at street level and on the sixth floor.

⁽¹⁾ Downtown is defined in the Land Use and Transportation Element of the General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south, and I-980 / Brush Street to the west.

A total of 48,000 square feet of existing retail space would be demolished as part of the project. The removal of retail space would be spread across the two phases.

In summary, the overall project (Phase I and Phase II) proposes the following net changes in land use to the Kaiser Center block:

- Increase of 1.32 million square feet of office space; and,
- Decrease of 2,000 square feet of retail space.

The project also proposes new subterranean and above-grade parking consisting of an additional 697 parking spaces. The new parking structures would be incorporated into the existing Kaiser Center Garage. Pedestrian entrances to the office towers would be located on Harrison Street, Webster Street, and 20th Street, while vehicular entrances to the project complex would be via driveways on Harrison Street, 20th Street, and 21st Street. Vehicular access to the garage structure would be provided via the existing entrances and exits located on 21st Street and via the access road on the eastern portion of the block (entrances currently via Harrison Street, 20th Street, and 21st Street).

Data Sources

The mode split and AVO findings were compiled from four different sources with various publication / completion dates:

- *Standard Operating Procedure: Technical Guidelines for Transportation Impact Study*, published by the City of Oakland Community and Economic Development Agency's (CEDA) Transportation Services Division (TSD) in March 2007;
- *Alameda County Congestion Management Agency (ACCMA) Transportation Survey* for the Oakland City Center Complex, commissioned by the Alameda County Congestion Management Agency (ACCMA) in May 1993;
- *Downtown Transportation and Parking Plan*, compiled by Dowling Associates for CEDA and the City of Oakland Redevelopment Agency in October 2003; and,
- Journey to Work Surveys for the 2000 U.S. Census, compiled by the U.S Census Bureau in May 2000.

The results of the mode split and AVO findings from these four sources are summarized in **Table 1**.

Normally, the City of Oakland CEDA TSD has specific mode splits contained in the TSD Guidelines, which are deemed appropriate for projects in Downtown Oakland and account for the extensive transit facilities available in the Downtown area. However, as shown in **Table 1**, different areas of Downtown exhibit different mode split characteristics. These differences are partly a result of the variability in the degree of accessibility by transit facilities, with the City Center Complex being the most accessible by transit facilities and areas north of Downtown being less accessible by transit facilities. The differences are also likely due in part to the availability and cost of parking in the area, with the City Center Garage at high occupancies despite relatively high cost compared to other parking facilities in the Downtown area.

In order to adequately evaluate the potential impacts to area transit facilities due to the Project, it is evident that an alternative mode split would be needed to account for the extensive transit facilities in the vicinity of the Project. In addition, the mode split contained in the TSD Guidelines has a much higher automobile split of 83 percent, compared to the other sources outlined in **Table 1**, which range from 42 percent to 66 percent.

Table 1: Mode Split and Average Vehicle Occupancy Summary

| Data | | Source | | | | |
|---------------------------------|---------|--|------------------------------------|---|---------------------------------|---------------------------------|
| | | Oakland CEDA TSD Guidelines ^(a) | ACCMA Travel Survey ^(b) | Downtown Transportation and Parking Plan ^(c) | | 2000 U.S. Census ^(d) |
| Area of Downtown | | Entire Downtown | City Center Complex ⁽¹⁾ | City Center Complex ⁽¹⁾ | Rest of Downtown ⁽²⁾ | Entire Downtown |
| Mode Split | Auto | 83% | 65% | 42% | 66% | 54% |
| | Transit | 17% | 30% | 55% | 30% | 27% |
| | Other | -- | 5% | 3% | 4% | 19% |
| Average Vehicle Occupancy (AVO) | | -- | 1.48 ⁽³⁾ | 1.13 | 1.16 | 1.16 |

Source:

(a) *Transportation Impact Study (TIS) Technical Guidelines* - Section 3B, Transportation Services Division, dated March 9, 2007.

(b) *Alameda County Transportation Survey – City Center Complex, Oakland* (ID Number: 10-7-1), data collected May 1993.

(c) *Downtown Transportation and Parking Plan*, Dowling Associates, dated October 2003.

(d) Average of Census Tracts 4013, 4028, 4029, 4030, 4031, 4033, 4034, 4035, and 4036 from the 2000 U.S. Census.

Notes:

(1) "City Center Complex" is defined as the area of Downtown Oakland bounded by 14th Street to the north, 8th Street to the south, Broadway to the east, and Martin Luther King, Jr. Way to the west.

(2) "Rest of Downtown" is defined as the remainder of Downtown Oakland excluding the City Center Complex.

(3) Adjusted average vehicle occupancy.

Upon reviewing the mode split results contained in the four sources, it was determined that the mode split and AVO results from the 2000 U.S. Census would be inappropriate for the purposes of transportation impact analysis for the Project, as the survey compiled information for home-based work trips originating in Downtown Oakland—i.e., trips by residents living in Downtown Oakland. The two other surveys—conducted by ACCMA and by Dowling Associates—were compiled for work trips terminating in Downtown Oakland—i.e., trips by people who work in Downtown Oakland. As the Project land use program consists of office and retail uses, the 2000 U.S. Census results would not be appropriate.

In addition, it was determined that the mode split and AVO results contained in the transportation survey for the Oakland City Center Complex commissioned by ACCMA in May 1993 are superseded by those contained in the *Downtown Transportation and Parking Plan* compiled by Dowling Associates in October 2003. Specifically, the Dowling Associates study evaluated a specific survey subarea coinciding with the area surveyed for the City Center Complex transportation survey by ACCMA. The survey methodologies were also similar, consisting of paper survey forms distributed to employers in the Oakland City Center Complex. Since the Dowling Associates study was completed in October 2003, the study and its associated results for the Oakland City Center Complex effectively supersede and replace those of the ACCMA transportation survey from 1993.

Finally, it was determined that the mode split and AVO results for the "Rest of Downtown" area from the Dowling Associates study would be the most appropriate due to the survey being the most recent and most applicable in terms of location. The "Rest of Downtown" area is generally well-served by transit facilities but includes areas with varying degrees of transit accessibility, with some areas less accessible to transit facilities than others, unlike the City Center Complex, which is immediately adjacent to the Oakland City Center / 12th Street BART Station. It is important to note that in the survey, "Rest of Downtown" area includes the following areas:

- Old Oakland, in the vicinity of Washington Street / 8th Street, within three blocks of the Oakland City Center / 12th Street BART Station;

- Metro Center, in the vicinity of Harrison Street / 8th Street, adjacent to the Lake Merritt BART Station;
- County Center, in the vicinity of Oak Street / 14th Street, within six blocks of both the Lake Merritt BART Station and 12th Street BART Station; and,
- Upper Downtown, in the vicinity of Harrison Street / 20th Street, adjacent to the Project and within two blocks of the 19th Street / Oakland BART Station.

It must be stressed that for the transportation surveys distributed in Metro Center, County Center, and some Upper Downtown office buildings such as the Caltrans Building, the transit mode share tended to be higher than other office buildings in the “Rest of Downtown” area, as the aforementioned office buildings contain offices of State and County public agencies. State and County agencies provide transit subsidies as part of employee benefits, therefore resulting in a higher transit mode share than typically observed at other office buildings.

Therefore, it would be most prudent to use the mode split and AVO results from the *Downtown Transportation and Parking Plan* compiled by Dowling Associates in October 2003, with a mode split of 66 percent automobile, 30 percent transit, and 4 percent other to be used in the Transportation Impact Analysis for the Project. These numbers would be used in lieu of the standard mode split of 83 percent automobile and 17 percent transit as outlined in the City of Oakland CEDA TSD Guidelines. To simplify the analysis, a mode split of 70 percent automobile and 30 percent transit was assumed in all trip generation calculations.

APPENDIX G.6

Travel Demand Model Land Use Findings

AECOM

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Memorandum

Date: May 1, 2009

To: Margaret Stanzione, Community and Economic Development Agency,
City of Oakland
Gordon Lum, Transportation Services Division, Community and Economic
Development Agency, City of Oakland

From: Jeffrey Chan, PTP

Subject: Kaiser Center Redevelopment Project Transportation Impact Analysis –
Travel Demand Model Land Use Findings

This memorandum summarizes the findings from the comparison of land use (LU) information contained in the Alameda County Congestion Management Agency's Travel Demand Model (ACCMA Model), CUBE Version 2007, based on Association of Bay Area Governments' (ABAG) and Metropolitan Transportation Commission's (MTC) *Projections 2005* LU information.

ACCMA Model *Projections 2005* Land Use Information

The ACCMA *Projections 2005* LU information allocations represent estimates of existing (Year 2005) and future development (Year 2030) in Alameda County. This land use information was assembled during April 2005 through June 2006. The source data were obtained solely from secondary sources such as Census 2000 counts and estimates, the *Census Planning Package 2000*, development capacity and growth projections from General Plan studies, and comments submitted by local jurisdictions.

The final LU allocations in the ACCMA Model for Year 2030 were adjusted to maintain close compliance to the county-wide control totals, within one (1) percent variance from ABAG and MTC *Projections 2005* control totals, as specified by MTC's publication *Guidance for Consistency of Congestion Management Programs with the Regional Transportation Plan*.

The *Projections 2005* LU information contained in the ACCMA Model for the Transportation Analysis Zones (TAZ) within the City of Oakland (City) were summarized for Year 2005 and Year 2030, aggregated by number of households and number of employment by category. **Table 1** summarizes the LU information in the ACCMA Model for the City, with the ABAG control totals for the City also presented for comparison purposes.

Table 1: ACCMA Model Projections 2005 Land Use Information – City of Oakland

| Land Use Type | Year 2005 | | Year 2030 | | Growth
Year 2005 to Year 2030 | |
|--------------------|----------------|---------------------|----------------|---------------------|----------------------------------|---------------------|
| | ACCMA
Model | ABAG
Projections | ACCMA
Model | ABAG
Projections | ACCMA
Model | ABAG
Projections |
| Residential | | | | | | |
| Households | 154,726 | 154,330 | 195,909 | 195,690 | 41,183 | 41,360 |
| Employment | | | | | | |
| Retail | 24,470 | n/d | 39,821 | n/d | 15,351 | n/d |
| Service | 90,051 | n/d | 131,926 | n/d | 41,875 | n/d |
| Agricultural | 290 | n/d | 354 | n/d | 64 | n/d |
| Manufacturing | 16,512 | n/d | 28,530 | n/d | 12,018 | n/d |
| Wholesale | 6,490 | n/d | 6,470 | n/d | -20 | n/d |
| Other | 70,687 | n/d | 73,776 | n/d | 3,089 | n/d |
| Total | 208,500 | 207,100 | 280,877 | 279,340 | 72,377 | 72,240 |

Source: Alameda County Congestion Management Agency, 2006; Association of Bay Area Governments, 2005; AECOM, 2009.

Note: n/d denotes no data available.

As shown in **Table 1**, the ACCMA Model Projections 2005 LU information for TAZ within the City are within one (1) percent variance of the ABAG Projections 2005 control totals for both residential and employment LU information types, for both Year 2005 and Year 2030, as specified by the MTC. Therefore, it was prudent and reasonable to use ACCMA Model citywide LU information projections for Year 2005 and Year 2030 for the purpose of traffic projections for the Kaiser Center Project (Project) Transportation Impact Analysis (TIA).

Project Vicinity – Area of Influence

As recommended in the *Mode Split Findings Memorandum* dated October 17, 2008, the Upper Downtown⁽¹⁾ portion of the “Rest of Downtown” area, as specified in the *Downtown Transportation and Parking Study Report* completed by Dowling Associates in October 2003, contained travel characteristics most suitable for the purpose of the Project TIA. This project vicinity area also contains LU information that are expected to have the most influence on travel demand projections for the purpose of Project TIA.

Specifically, the Upper Downtown area, in the vicinity of Harrison Street / 20th Street, adjacent to the Project and within two (2) to three (3) blocks of the 19th Street / Oakland BART Station, contains the Project and other approved, pending, and concurrent developments, is chosen as the area of influence for LU information comparison purposes.

In terms of geographic features, the Upper Downtown area is bounded by Grand Avenue to the north, Lake Merritt to the east, 14th Street to the south, and San Pablo Avenue to the west. Technically, the Upper Downtown area is comprised of twelve (12) ACCMA Model TAZ – TAZ 219 to TAZ 225, TAZ 228 to TAZ 231, and TAZ 279. **Figure 1** shows the Upper Downtown area TAZ locations in relation to the rest of the City.

⁽¹⁾ Downtown is defined in the Land Use and Transportation Element of the General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south, and I-980 / Brush Street to the west.

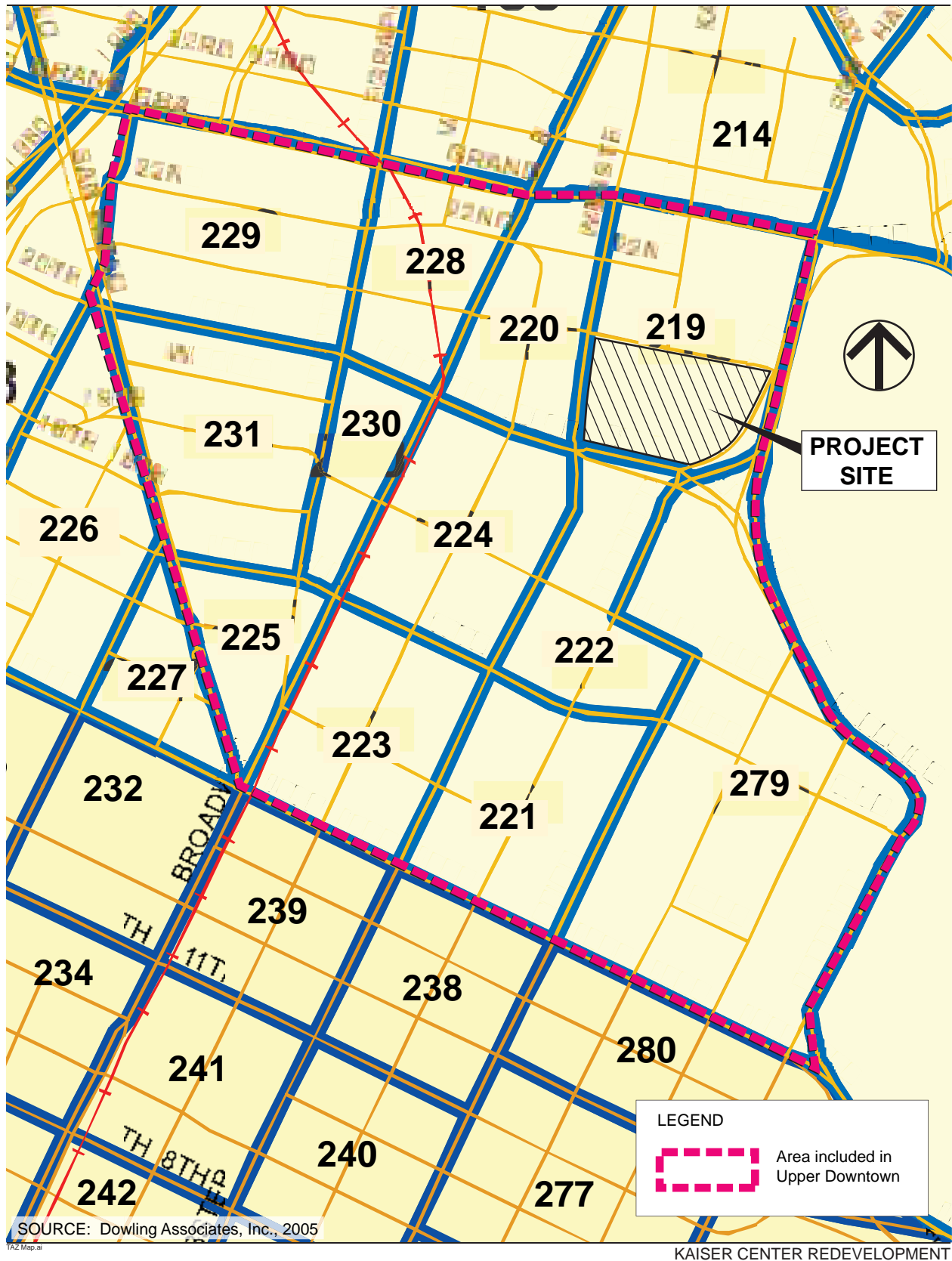


Figure 1
TAZ MAP – UPPER DOWNTOWN OAKLAND

Land Use Adjustments in Project Vicinity

The following two (2) adjustments were made as part of the Project TIA efforts:

- **TAZ 219**, which contains the Project, had its LU information adjusted to remove 190 retail employment and 1,372 service employment to result in zero (0) net growth from Year 2005 to Year 2030 as part of the TIA, as the TIA adopted a methodology to use Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 7th Edition* trip generation rates combined with mode split information contained in the *Mode Split Findings Memorandum* dated October 17, 2008 for Project-generated trips in lieu of ACCMA Model growth projections for solely this Project; and,
- **TAZ 279**, which contains the Emerald Views Condominiums at 222 19th Street, had its LU information adjusted by an additional 370 dwelling units (DU) and three (3) retail employment (equivalent of approximately 933 square feet (SF) café) as part of the TIA.

All other ACCMA Model TAZ LU information were not adjusted as part of the Project TIA efforts.

Table 2 below summarizes the LU information in the TAZ in the Upper Downtown area and the adjustments made to these LU information as part of the Project TIA.

Table 2: ACCMA Model Projections 2005 Land Use Information – Upper Downtown

| Land Use Type | Year 2005 | Year 2030 | Growth
Year 2005 to Year 2030 | | |
|--------------------|---------------|---------------|----------------------------------|------------------------|-----------------------|
| | ACCMA Model | ACCMA Model | ACCMA Model | Kaiser TIA Adjustments | Net After Adjustments |
| Residential | | | | | |
| Households | 3,961 | 7,360 | 3,399 | 370 | 3,769 |
| Employment | | | | | |
| Retail | 1,674 | 2,802 | 1,128 | -190 | 938 |
| Service | 13,312 | 20,132 | 6,820 | -1,372 | 5,448 |
| Agricultural | 0 | 0 | 0 | n/a | 0 |
| Manufacturing | 1,122 | 2,175 | 1,053 | n/a | 1,053 |
| Wholesale | 282 | 276 | -6 | n/a | -6 |
| Other | 10,710 | 11,171 | 461 | n/a | 461 |
| Total | 27,100 | 36,556 | 9,456 | -1,562 | 7,894 |

Source: Alameda County Congestion Management Agency, 2006; Association of Bay Area Governments, 2005; City of Oakland, 2009; AECOM, 2009.

Note: n/a denotes not adjusted.

Land Use Information from Past, Present, Existing, Approved, Pending, and Reasonably Foreseeable Future Developments in Project Vicinity

The following developments are in the Upper Downtown area, and are considered past, present, existing, approved, pending, and reasonably foreseeable future developments as of the Project's Notice of Preparation date on May 22, 2008. The developments and their respective LU information, aggregated by locations of the development by ACCMA Model TAZ, are as follows:

- **TAZ 223** – in the vicinity of east of Broadway between 14th Street and 17th Street, encompasses:
 - 1538 Broadway – 69 DU; and,
 - 1640 Broadway – 254 DU, 177,600 SF office, 4,700 SF retail.
- **TAZ 224** – in the vicinity of east of Broadway between 17th Street and 20th Street, encompasses:
 - 1938 Broadway – 220 DU, 829,500 SF office, 85,200 SF retail.
- **TAZ 229** – in the vicinity of west of Telegraph Avenue between 20th Street and West Grand Avenue, encompasses:
 - 630 Thomas Berkley Square – 88 DU, three (3) commercial spaces.
- **TAZ 231** – in the vicinity of west of Telegraph Avenue between 17th Street and 20th Street, encompasses:
 - Fox Courts – 80 DU, 2,500 SF childcare, art studio;
 - 1755 Broadway – 24 DU;
 - Uptown Development – 665 DU, 14,000 SF retail; and,
 - Uptown Parcel 4 – 370 DU.
- **TAZ 279** – in the vicinity of east of Alice Street between 14th Street and 20th Street, encompasses:
 - Emerald Views Condominiums at 222 19th Street – 370 DU, 933 SF café; and,
 - Jackson Courtyard Condominiums – 45 DU.

Table 3 below summarizes the Upper Downtown area TAZ LU information from all the above mentioned past, present, existing, approved, pending, and reasonably foreseeable future developments against the net growth after adjustments made to the LU information as part of the Project TIA. Note that LU information for TAZ 279 for the Emerald Views Condominiums at 222 19th Street had been adjusted as part of the Project TIA, and thus are not included in the calculation of past, present, existing, approved, pending, and reasonably foreseeable future developments in the Project vicinity. Detailed calculations of LU information by TAZ are presented in the **Appendix** to this memorandum.

Table 3: ACCMA Model Projections 2005 Land Use Information – Upper Downtown

| Land Use Type | Growth
Year 2005 to Year 2030 | | | | |
|--------------------|----------------------------------|---------------------------|--------------------------|---|--------------|
| | ACCMA
Model | Kaiser TIA
Adjustments | Net After
Adjustments | Past, Present,
Existing, Approved,
Pending, and
Reasonably
Foreseeable Future
Developments | Difference |
| Residential | | | | | |
| Households | 3,399 | 370 | 3,769 | 1,815 | 1,954 |
| Employment | | | | | |
| Retail | 1,128 | -190 | 938 | 211 | 727 |
| Service | 6,820 | -1,372 | 5,448 | 3,398 | 2,050 |
| Agricultural | 0 | n/a | 0 | n/a | 0 |
| Manufacturing | 1,053 | n/a | 1,053 | n/a | 1,053 |
| Wholesale | -6 | n/a | -6 | n/a | -6 |
| Other | 461 | n/a | 461 | n/a | 461 |
| Total | 9,456 | -1,562 | 7,894 | 3,609 | 4,285 |

Source: Alameda County Congestion Management Agency, 2006; Association of Bay Area Governments, 2005; City of Oakland, 2009; AECOM, 2009.

Note: n/a denotes not adjusted.

As shown in **Table 3**, the calculated growth in the ACCMA Model *Projections 2005* LU information from Year 2005 to Year 2030, even after adjustments made to LU information in TAZ 219 and TAZ 279 as part of the Project TIA, overestimates past, present, existing, approved, pending, and reasonably foreseeable future developments by the following amounts in the LU information for the Upper Downtown area – 1,954 DU, 727 retail employment (equivalent of approximately 363,500 SF of retail space), and 2,050 service employment (equivalent of approximately 615,000 SF of office space). These excesses in LU information were accounted for in the projections of the 2030 Cumulative No Project intersections and roadway traffic volumes in the Project TIA, and as such, represent the maximum-probable development scenario for the Upper Downtown area, as contained in the ACCMA Model *Projections 2005* LU information, which is deemed to be consistent within one (1) percent of the ABAG LU *Projections 2005*.

Therefore, it would be most prudent to recommend no further adjustments to the ACCMA Model LU information for the purpose of the Project TIA, and retain the hybrid trip generation methodology of using ITE *Trip Generation Manual, 7th Edition* trip generation rates in conjunction with the mode split and other travel characteristics results as summarized in the *Mode Split Findings Memorandum* dated October 17, 2008 for the purpose of evaluating Project-related trips and their potential impacts.

Appendix: Kaiser Center Redevelopment Project - Travel Demand Model Land Use Findings - Land Use Calculations and Adjustments

ACCMA Model Year 2005 Land Uses - Upper Downtown Oakland Area

| ZONE | TOTHH | HHPOP | TOTPOP | EMPRES | SFHH | MFHH | TACRES | RESACRE | CIACRE | Z2SHARE | TEMP | RETEMP | SEREMP | OTHEMP | AGEMP | MANEMP | WHOEMP |
|-------|-------|-------|--------|--------|------|------|--------|---------|--------|---------|-------|--------|--------|--------|-------|--------|--------|
| 219 | 1 | 1 | 1 | 0 | 0 | 1 | 22 | 0 | 34 | 0.2290 | 7522 | 223 | 2753 | 4018 | 0 | 464 | 64 |
| 220 | 1 | 4 | 4 | 0 | 0 | 1 | 12 | 0 | 4 | 0.2290 | 857 | 90 | 340 | 397 | 0 | 30 | 0 |
| 221 | 823 | 1178 | 1178 | 556 | 36 | 787 | 17 | 5 | 6 | 0.2290 | 1430 | 135 | 395 | 842 | 0 | 58 | 0 |
| 222 | 2 | 2 | 2 | 1 | 0 | 2 | 13 | 0 | 20 | 0.2290 | 4494 | 120 | 2678 | 1337 | 0 | 269 | 90 |
| 223 | 23 | 28 | 46 | 22 | 1 | 22 | 17 | 0 | 12 | 0.2290 | 2654 | 300 | 1235 | 1019 | 0 | 80 | 20 |
| 224 | 44 | 77 | 77 | 34 | 1 | 43 | 17 | 0 | 13 | 0.2290 | 2922 | 180 | 2034 | 641 | 0 | 67 | 0 |
| 225 | 45 | 68 | 68 | 16 | 1 | 44 | 8 | 1 | 15 | 0.2570 | 1755 | 96 | 942 | 703 | 0 | 10 | 4 |
| 228 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 10 | 0.2570 | 1206 | 60 | 773 | 302 | 0 | 36 | 35 |
| 229 | 429 | 597 | 630 | 177 | 15 | 414 | 23 | 9 | 8 | 0.2570 | 958 | 45 | 436 | 438 | 0 | 28 | 11 |
| 230 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 6 | 0.2570 | 740 | 305 | 275 | 130 | 0 | 20 | 10 |
| 231 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 2 | 0.2570 | 239 | 40 | 172 | 27 | 0 | 0 | 0 |
| 279 | 2593 | 3912 | 3988 | 2029 | 25 | 2568 | 49 | 42 | 25 | 0.1990 | 2323 | 80 | 1279 | 856 | 0 | 60 | 48 |
| Total | 3961 | 5867 | 5994 | 2835 | 79 | 3882 | 216 | 57 | 155 | | 27100 | 1674 | 13312 | 10710 | 0 | 1122 | 282 |

ACCMA Model Year 2030 Land Uses - Upper Downtown Oakland Area

| ZONE | TOTHH | HHPOP | TOTPOP | EMPRES | SFHH | MFHH | TACRES | RESACRE | CIACRE | Z2SHARE | TEMP | RETEMP | SEREMP | OTHEMP | AGEMP | MANEMP | WHOEMP |
|-------|-------|-------|--------|--------|------|------|--------|---------|--------|---------|-------|--------|--------|--------|-------|--------|--------|
| 219 | 1 | 1 | 1 | 0 | 0 | 1 | 22 | 0 | 8 | 0.1910 | 9414 | 416 | 4125 | 4086 | 0 | 724 | 63 |
| 220 | 1 | 5 | 5 | 0 | 0 | 1 | 12 | 4 | 6 | 0.1910 | 2144 | 211 | 1026 | 461 | 0 | 446 | 0 |
| 221 | 1104 | 1894 | 1880 | 894 | 12 | 1092 | 17 | 0 | 18 | 0.1910 | 1545 | 173 | 469 | 845 | 0 | 58 | 0 |
| 222 | 2 | 2 | 2 | 1 | 0 | 2 | 13 | 1 | 21 | 0.1910 | 4581 | 158 | 2725 | 1341 | 0 | 269 | 88 |
| 223 | 185 | 273 | 436 | 216 | 4 | 181 | 17 | 0 | 18 | 0.1910 | 5437 | 400 | 3558 | 1177 | 0 | 283 | 19 |
| 224 | 44 | 92 | 92 | 41 | 0 | 44 | 17 | 0 | 8 | 0.1910 | 4591 | 309 | 3227 | 776 | 0 | 279 | 0 |
| 225 | 45 | 83 | 75 | 19 | 4 | 41 | 8 | 6 | 10 | 0.2130 | 2029 | 182 | 1127 | 706 | 0 | 10 | 4 |
| 228 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 13 | 3 | 0.2130 | 1409 | 112 | 920 | 307 | 0 | 36 | 34 |
| 229 | 1875 | 3173 | 3025 | 925 | 154 | 1721 | 23 | 0 | 6 | 0.2130 | 727 | 85 | 193 | 438 | 0 | 0 | 11 |
| 230 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 10 | 3 | 0.2130 | 1364 | 408 | 780 | 146 | 0 | 20 | 10 |
| 231 | 1427 | 3180 | 3181 | 934 | 83 | 1344 | 19 | 0 | 44 | 0.2130 | 650 | 228 | 390 | 32 | 0 | 0 | 0 |
| 279 | 2676 | 4452 | 4505 | 2511 | 25 | 2651 | 49 | 2 | 9 | 0.2270 | 2665 | 120 | 1592 | 856 | 0 | 50 | 47 |
| Total | 7360 | 13155 | 13202 | 5541 | 282 | 7078 | 216 | 36 | 154 | | 36556 | 2802 | 20132 | 11171 | 0 | 2175 | 276 |

ACCMA Model Year 2005 to Year 2030 Growth

| ZONE | TOTHH | HHPOP | TOTPOP | EMPRES | SFHH | MFHH | TACRES | RESACRE | CIACRE | Z2SHARE | TEMP | RETEMP | SEREMP | OTHEMP | AGEMP | MANEMP | WHOEMP |
|-------|-------|-------|--------|--------|------|------|--------|---------|--------|---------|------|--------|--------|--------|-------|--------|--------|
| 219 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -26 | 0 | 1892 | 193 | 1372 | 68 | 0 | 260 | -1 |
| 220 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 1287 | 121 | 686 | 64 | 0 | 416 | 0 |
| 221 | 281 | 716 | 702 | 338 | -24 | 305 | 0 | -5 | 12 | 0 | 115 | 38 | 74 | 3 | 0 | 0 | 0 |
| 222 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 87 | 38 | 47 | 4 | 0 | 0 | -2 |
| 223 | 162 | 245 | 390 | 194 | 3 | 159 | 0 | 0 | 6 | 0 | 2783 | 100 | 2323 | 158 | 0 | 203 | -1 |
| 224 | 0 | 15 | 15 | 7 | -1 | 1 | 0 | 0 | -5 | 0 | 1669 | 129 | 1193 | 135 | 0 | 212 | 0 |
| 225 | 0 | 15 | 7 | 3 | 3 | -3 | 0 | 5 | -5 | 0 | 274 | 86 | 185 | 3 | 0 | 0 | 0 |
| 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | -7 | 0 | 203 | 52 | 147 | 5 | 0 | 0 | -1 |
| 229 | 1446 | 2576 | 2395 | 748 | 139 | 1307 | 0 | -9 | -2 | 0 | -231 | 40 | -243 | 0 | 0 | -28 | 0 |
| 230 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | -3 | 0 | 624 | 103 | 505 | 16 | 0 | 0 | 0 |
| 231 | 1427 | 3180 | 3181 | 934 | 83 | 1344 | 0 | 0 | 42 | 0 | 411 | 188 | 218 | 5 | 0 | 0 | 0 |
| 279 | 83 | 540 | 517 | 482 | 0 | 83 | 0 | -40 | -16 | 0 | 342 | 40 | 313 | 0 | 0 | -10 | -1 |
| Total | 3399 | 7288 | 7208 | 2706 | 203 | 3196 | 0 | -21 | -1 | | 9456 | 1128 | 6820 | 461 | 0 | 1053 | -6 |

Appendix: Kaiser Center Redevelopment Project - Travel Demand Model Land Use Findings - Land Use Calculations and Adjustments

Kaiser Center TIA Adjustments

| ZONE | TOTHH | HHPOP | TOTPOP | EMPRES | SFHH | MFHH | TACRES | RESACRE | CIACRE | Z2SHARE | TEMP | RETEMP | SEREMP | OTHEMP | AGEMP | MANEMP | WHOEMP | |
|-------|-------|-------|--------|--------|------|------|--------|---------|--------|---------|-------|--------|--------|--------|-------|--------|--------|---|
| 219 | | | | | | | | | | | -1565 | -193 | -1372 | | | | | * Adjusted to zero-out Kaiser Center Project growth |
| 220 | | | | | | | | | | | | | | | | | | |
| 221 | | | | | | | | | | | | | | | | | | |
| 222 | | | | | | | | | | | | | | | | | | |
| 223 | | | | | | | | | | | | | | | | | | |
| 224 | | | | | | | | | | | | | | | | | | |
| 225 | | | | | | | | | | | | | | | | | | |
| 228 | | | | | | | | | | | | | | | | | | |
| 229 | | | | | | | | | | | | | | | | | | |
| 230 | | | | | | | | | | | | | | | | | | |
| 231 | | | | | | | | | | | | | | | | | | * Adjusted to account for 222-10th Street Development |
| 279 | 370 | | | | | | | | | | 3 | 3 | | | | | | |
| Total | 370 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | -1562 | -190 | -1372 | 0 | 0 | 0 | 0 | |

Net Growth After Kaiser Center TIA Adjustments

| ZONE | TOTHH | HHPOP | TOTPOP | EMPRES | SFHH | MFHH | TACRES | RESACRE | CIACRE | Z2SHARE | TEMP | RETEMP | SEREMP | OTHEMP | AGEMP | MANEMP | WHOEMP |
|-------|-------|-------|--------|--------|------|------|--------|---------|--------|---------|------|--------|--------|--------|-------|--------|--------|
| 219 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -26 | -0.0380 | 327 | 0 | 0 | 68 | 0 | 260 | -1 |
| 220 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | -0.0380 | 1287 | 121 | 686 | 64 | 0 | 416 | 0 |
| 221 | 281 | 716 | 702 | 338 | -24 | 305 | 0 | -5 | 12 | -0.0380 | 115 | 38 | 74 | 3 | 0 | 0 | 0 |
| 222 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | -0.0380 | 87 | 38 | 47 | 4 | 0 | 0 | -2 |
| 223 | 162 | 245 | 390 | 194 | 3 | 159 | 0 | 0 | 6 | -0.0380 | 2783 | 100 | 2323 | 158 | 0 | 203 | -1 |
| 224 | 0 | 15 | 15 | 7 | -1 | 1 | 0 | 0 | -5 | -0.0380 | 1669 | 129 | 1193 | 135 | 0 | 212 | 0 |
| 225 | 0 | 15 | 7 | 3 | 3 | -3 | 0 | 5 | -5 | -0.0440 | 274 | 86 | 185 | 3 | 0 | 0 | 0 |
| 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | -7 | -0.0440 | 203 | 52 | 147 | 5 | 0 | 0 | -1 |
| 229 | 1446 | 2576 | 2395 | 748 | 139 | 1307 | 0 | -9 | -2 | -0.0440 | -231 | 40 | -243 | 0 | 0 | -28 | 0 |
| 230 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | -3 | -0.0440 | 624 | 103 | 505 | 16 | 0 | 0 | 0 |
| 231 | 1427 | 3180 | 3181 | 934 | 83 | 1344 | 0 | 0 | 42 | -0.0440 | 411 | 188 | 218 | 5 | 0 | 0 | 0 |
| 279 | 453 | 540 | 517 | 482 | 0 | 83 | 0 | -40 | -16 | 0.0280 | 345 | 43 | 313 | 0 | 0 | -10 | -1 |
| Total | 3769 | 7288 | 7208 | 2706 | 203 | 3196 | 0 | -21 | -1 | | 7894 | 938 | 5448 | 461 | 0 | 1053 | -6 |

Approved, Pending, and Planned Project Adjustments

| ZONE | TOTHH | HHPOP | TOTPOP | EMPRES | SFHH | MFHH | TACRES | RESACRE | CIACRE | Z2SHARE | TEMP | RETEMP | SEREMP | OTHEMP | AGEMP | MANEMP | WHOEMP | |
|-------|-------|-------|--------|--------|------|------|--------|---------|--------|---------|------|--------|--------|--------|-------|--------|--------|--|
| 219 | | | | | | | | | | | | | | | | | | |
| 220 | | | | | | | | | | | | | | | | | | |
| 221 | | | | | | | | | | | | | | | | | | |
| 222 | | | | | | | | | | | | | | | | | | |
| 223 | 323 | | | | | | | | | | 601 | 9 | 592 | | | | | * Adjusted to include 1538, 1640 Broadway |
| 224 | 220 | | | | | | | | | | 2964 | 171 | 2793 | | | | | |
| 225 | | | | | | | | | | | | | | | | | | |
| 228 | | | | | | | | | | | | | | | | | | |
| 229 | 88 | | | | | | | | | | 6 | 3 | 3 | | | | | * Adjusted to include 630 Thomas Berkley Square |
| 230 | 1139 | | | | | | | | | | 38 | 28 | 10 | | | | | |
| 231 | | | | | | | | | | | | | | | | | | * Adjusted to include Fox Courts, 1755 Broadway, Uptown Development, Uptown Parcel 4 |
| 279 | 45 | | | | | | | | | | | | | | | | | |
| Total | 1815 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 3609 | 211 | 3398 | 0 | 0 | 0 | 0 | |

Appendix: Kaiser Center Redevelopment Project - Travel Demand Model Land Use Findings - Land Use Calculations and Adjustments

Difference

| ZONE | TOTHH | HHPOP | TOTPOP | EMPRES | SFHH | MFHH | TACRES | RESACRE | CIACRE | Z2SHARE | TEMP | RETEMP | SEREMP | OTHEMP | AGEMP | MANEMP | WHOEMP |
|-------|-------|-------|--------|--------|------|------|--------|---------|--------|---------|-------|--------|--------|--------|-------|--------|--------|
| 219 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -26 | | 327 | 0 | 0 | 68 | 0 | 260 | -1 |
| 220 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | | 1287 | 121 | 686 | 64 | 0 | 416 | 0 |
| 221 | 281 | 716 | 702 | 338 | -24 | 305 | 0 | -5 | 12 | | 115 | 38 | 74 | 3 | 0 | 0 | 0 |
| 222 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 87 | 38 | 47 | 4 | 0 | 0 | -2 |
| 223 | -161 | 245 | 390 | 194 | 3 | 159 | 0 | 0 | 6 | | 2182 | 91 | 1731 | 158 | 0 | 203 | -1 |
| 224 | -220 | 15 | 15 | 7 | -1 | 1 | 0 | 0 | -5 | | -1295 | -42 | -1600 | 135 | 0 | 212 | 0 |
| 225 | 0 | 15 | 7 | 3 | 3 | -3 | 0 | 5 | -5 | | 274 | 86 | 185 | 3 | 0 | 0 | 0 |
| 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | -7 | | 203 | 52 | 147 | 5 | 0 | 0 | -1 |
| 229 | 1358 | 2576 | 2395 | 748 | 139 | 1307 | 0 | -9 | -2 | | -237 | 37 | -246 | 0 | 0 | -28 | 0 |
| 230 | -1139 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | -3 | | 586 | 75 | 495 | 16 | 0 | 0 | 0 |
| 231 | 1427 | 3180 | 3181 | 934 | 83 | 1344 | 0 | 0 | 42 | | 411 | 188 | 218 | 5 | 0 | 0 | 0 |
| 279 | 408 | 540 | 517 | 482 | 0 | 83 | 0 | -40 | -16 | | 345 | 43 | 313 | 0 | 0 | -10 | -1 |
| Total | 1954 | 7288 | 7208 | 2706 | 203 | 3196 | 0 | -21 | -1 | | 4285 | 727 | 2050 | 461 | 0 | 1053 | -6 |

| Conversion Rates | | |
|------------------|-----|-----------------|
| Office | 300 | SQFT / Employee |
| Retail | 500 | SQFT / Employee |


| Abbreviations | |
|---------------|--------------------------|
| TOTHH | Total Households |
| HHPOP | Household Population |
| TOTPOP | Total Population |
| EMPRES | Employed Residents |
| SFHH | Single Family Households |
| MFHH | Multi-Family Households |
| TEMP | Total Employment |
| RETEMP | Retail Employment |
| SEREMP | Service Employment |
| OTHEMP | Other Employment |
| AGEMP | Agricultural Employment |
| MANEMP | Manufacturing Employment |
| WHOEMP | Wholesale Employment |

APPENDIX G.7

Queue Calculations

Existing Conditions


Queues Existing AM
42: I-880 NB On-ramp & Jackson Street Kaiser Center Transportation Study



| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 28 | 308 | 52 | 505 | 175 | 1589 |
| v/c Ratio | 0.06 | 0.64 | 0.12 | 0.71 | 0.19 | 1.78 |
| Control Delay | 11.9 | 21.2 | 5.2 | 17.8 | 7.7 | 372.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.9 | 21.2 | 5.2 | 17.8 | 7.7 | 372.1 |
| Queue Length 50th (ft) | 5 | 68 | 0 | 95 | 23 | ~640 |
| Queue Length 95th (ft) | 14 | 124 | 16 | #228 | 46 | #869 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 521 | 559 | 487 | 715 | 928 | 894 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.55 | 0.11 | 0.71 | 0.19 | 1.78 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.


Queues Existing PM
2: Oakland Avenue & I-580 Off-ramp Kaiser Center Transportation Study



| Lane Group | SEL2 | SET | NET | NER |
|-------------------------|------|------|------|-------|
| Lane Group Flow (vph) | 457 | 470 | 1028 | 693 |
| v/c Ratio | 0.86 | 0.95 | 0.48 | 1.89 |
| Control Delay | 34.2 | 53.6 | 7.4 | 433.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 34.2 | 53.6 | 7.4 | 433.0 |
| Queue Length 50th (ft) | 123 | 160 | 93 | ~402 |
| Queue Length 95th (ft) | #272 | #294 | 128 | #589 |
| Internal Link Dist (ft) | | 880 | 451 | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 534 | 495 | 2155 | 366 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.86 | 0.95 | 0.48 | 1.89 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.


Queues Existing PM
3: 27th Street & Harrison Street Kaiser Center Transportation Study



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph) | 194 | 388 | 108 | 69 | 182 | 208 | 320 | 1117 | 199 | 539 |
| v/c Ratio | 0.53 | 0.38 | 0.23 | 0.41 | 0.62 | 0.50 | 0.64 | 1.02 | 0.92 | 0.56 |
| Control Delay | 40.0 | 27.9 | 25.3 | 44.9 | 43.8 | 8.9 | 42.2 | 64.9 | 85.2 | 30.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 40.0 | 27.9 | 25.3 | 44.9 | 43.8 | 8.9 | 42.2 | 64.9 | 85.2 | 30.0 |
| Queue Length 50th (ft) | 99 | 95 | 43 | 38 | 98 | 0 | 89 | ~345 | 114 | 134 |
| Queue Length 95th (ft) | #213 | 142 | 89 | 72 | 143 | 45 | 129 | #486 | #242 | 191 |
| Internal Link Dist (ft) | | 1001 | | | 87 | | | 632 | | 676 |
| Turn Bay Length (ft) | 70 | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 368 | 1034 | 470 | 216 | 559 | 608 | 572 | 1092 | 216 | 961 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.38 | 0.23 | 0.32 | 0.33 | 0.34 | 0.56 | 1.02 | 0.92 | 0.56 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues Existing PM
24: 20th Street & Harrison Street Kaiser Center Transportation Study



| Lane Group | EBL | EBT | WBL | WBT | NBT | SBT | SBR | SBR2 |
|-------------------------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph) | 253 | 179 | 11 | 145 | 879 | 199 | 86 | 40 |
| v/c Ratio | 0.32 | 0.43 | 0.06 | 0.43 | 0.78 | 0.43 | 0.14 | 0.06 |
| Control Delay | 23.2 | 23.7 | 26.1 | 32.1 | 30.1 | 39.4 | 18.6 | 11.0 |
| Queue Delay | 0.2 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 23.4 | 24.3 | 26.1 | 32.1 | 30.1 | 39.4 | 18.6 | 11.0 |
| Queue Length 50th (ft) | 45 | 56 | 5 | 36 | 209 | 57 | 35 | 0 |
| Queue Length 95th (ft) | 79 | 119 | 8 | 32 | 255 | 77 | 75 | 29 |
| Internal Link Dist (ft) | | 30 | | 382 | 601 | 222 | | |
| Turn Bay Length (ft) | | | 175 | | | | 90 | 90 |
| Base Capacity (vph) | 792 | 412 | 221 | 435 | 1225 | 458 | 624 | 708 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 116 | 59 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.51 | 0.05 | 0.33 | 0.72 | 0.43 | 0.14 | 0.06 |

Intersection Summary

Queues Existing PM
42: I-880 NB On-ramp & Jackson Street Kaiser Center Transportation Study

| | WBL | WBT | WBR | NBT | SBT | SBR |
|---|------|------|------|------|------|-------|
| Lane Group | | | | | | |
| Lane Group Flow (vph) | 12 | 395 | 56 | 676 | 196 | 1388 |
| v/c Ratio | 0.03 | 0.89 | 0.14 | 0.85 | 0.18 | 1.47 |
| Control Delay | 17.7 | 48.1 | 7.1 | 24.1 | 6.6 | 235.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 17.7 | 48.1 | 7.1 | 24.1 | 6.6 | 235.2 |
| Queue Length 50th (ft) | 3 | 138 | 0 | 181 | 30 | ~710 |
| Queue Length 95th (ft) | 8 | #218 | 21 | #398 | 56 | #943 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 417 | 450 | 398 | 795 | 1078 | 945 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.03 | 0.88 | 0.14 | 0.85 | 0.18 | 1.47 |
| Intersection Summary | | | | | | |
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

AECOM

Synchro 7 - Report

Queues Existing PM
44: 5th St. & Oak St. Kaiser Center Transportation Study

| | EBT | NBT | SBT |
|---|-------|------|------|
| Lane Group | | | |
| Lane Group Flow (vph) | 891 | 684 | 80 |
| v/c Ratio | 1.67 | 1.07 | 0.18 |
| Control Delay | 327.0 | 74.1 | 1.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 327.0 | 74.1 | 1.2 |
| Queue Length 50th (ft) | 130 | ~204 | 0 |
| Queue Length 95th (ft) | 197 | #275 | 0 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 534 | 642 | 448 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.67 | 1.07 | 0.18 |
| Intersection Summary | | | |
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |

AECOM

Synchro 7 - Report

Queues Existing PM
45: El Embarcadero (WB) & Grand Avenue Kaiser Center Transportation Study

| | NWL | NWR | NET | SWL | SWT |
|---|------|------|-----------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 269 | 327 | 1897 | 255 | 810 |
| v/c Ratio | 0.73 | 0.27 | 1.25 | 0.59 | 0.33 |
| Control Delay | 44.1 | 1.4 | 142.4 | 30.4 | 6.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.1 | 1.4 | 142.4 | 30.4 | 6.5 |
| Queue Length 50th (ft) | 143 | 0 | ~682 | 121 | 86 |
| Queue Length 95th (ft) | 208 | 15 | #822m#237 | m204 | |
| Internal Link Dist (ft) | 560 | | 322 | 429 | |
| Turn Bay Length (ft) | 150 | | | 150 | |
| Base Capacity (vph) | 511 | 1208 | 1516 | 434 | 2484 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.27 | 1.25 | 0.59 | 0.33 |
| Intersection Summary | | | | | |
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues Existing PM
47: MacArthur Blvd (EB) & Grand Avenue Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|---|------|-----------|-------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 1421 | 748 | 667 | 389 | 811 |
| v/c Ratio | 0.86 | 0.91 | 1.43 | 0.74 | 0.40 |
| Control Delay | 33.4 | 51.2 | 223.8 | 37.3 | 11.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.4 | 51.2 | 223.8 | 37.3 | 11.2 |
| Queue Length 50th (ft) | 251 | ~262 | ~500 | 189 | 124 |
| Queue Length 95th (ft) | 309 | m217m#412 | 290 | 164 | |
| Internal Link Dist (ft) | 1276 | 429 | | 958 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1681 | 819 | 468 | 580 | 2046 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.85 | 0.91 | 1.43 | 0.67 | 0.40 |
| Intersection Summary | | | | | |
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Near-Term (2015) without Project Conditions

Level Of Service Computation Report
 2000 HCM Unsignalized Method (Future Volume Alternative)
 Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
 Average Delay (sec/veh): 9.0 Worst Case Level Of Service: D[28.3]
 Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp
 Approach: North Bound South Bound East Bound West Bound
 Movement: L - T - R L - T - R L - T - R L - T - R
 Control: Uncontrolled Uncontrolled Yield Sign Yield Sign
 Rights: Include Include Include Include
 Lanes: 0 0 0 0 0 3 0 0 0 0 0 0 1 0 0 0 0 0
 Volume Module:
 Base Vol: 0 0 0 0 1060 0 0 0 491 0 0 0
 Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 Initial Bae: 0 0 0 0 1060 0 0 0 491 0 0 0
 Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0
 PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0
 Initial Fut: 0 0 0 0 1060 0 0 0 491 0 0 0
 User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.92 1.00 1.00 1.00
 PHF Volume: 0 0 0 0 1152 0 0 0 534 0 0 0
 Reduct Vol: 0 0 0 0 0 0 0 0 534 0 0 0
 FinalVolume: 0 0 0 0 1152 0 0 0 534 0 0 0
 Critical Gap Module:
 Critical Gap: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 6.2 xxxxxx xxxxxx
 FollowUpTim: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 3.3 xxxxxx xxxxxx
 Capacity Module:
 Chflict Vol: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 384 xxxxx xxxxx xxxxxx
 Potent Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 668 xxxxx xxxxx xxxxxx
 Move Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 668 xxxxx xxxxx xxxxxx
 Volume/Cap: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 0.80 xxxxx xxxxx xxxxxx
 Level Of Service Module:
 2Way95thQ: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 8.1 xxxxx xxxxx xxxxxx
 Control Del: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 28.3 xxxxxx xxxxxx xxxxxx
 LOS by Move: * * * * * * * * * * D * * * *
 Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT
 Shared Cap.: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx
 SharedQueue: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx
 Shrd ConDel: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx
 Shared LOS: * * * * * * * * * * * * * *
 ApproachDel: xxxxxx xxxxxx 28.3 xxxxxx
 ApproachLOS: * * D *
 Note: Queue reported is the number of cars per lane.

Traffic 8.0.0715 (c) 2008 Dowling Assoc. Licensed to DMJM HARRIS, OAKLAND, CA

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 26 | 362 | 58 | 553 | 182 | 1871 |
| v/c Ratio | 0.06 | 0.71 | 0.13 | 0.80 | 0.20 | 2.21 |
| Control Delay | 11.7 | 23.7 | 5.1 | 23.0 | 8.0 | 563.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.7 | 23.7 | 5.1 | 23.0 | 8.0 | 563.9 |
| Queue Length 50th (ft) | 5 | 80 | 0 | 116 | 26 | ~834 |
| Queue Length 95th (ft) | 17 | #156 | 18 | #275 | 54 | #1064 |
| Internal Link Dist (ft) | 298 | | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 521 | 559 | 492 | 694 | 901 | 848 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.65 | 0.12 | 0.80 | 0.20 | 2.21 |

Intersection Summary
 - Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 1274 | 382 | 154 |
| v/c Ratio | 1.30 | 0.59 | 0.28 |
| Control Delay | 157.9 | 15.5 | 11.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 157.9 | 15.5 | 11.6 |
| Queue Length 50th (ft) | 159 | 70 | 43 |
| Queue Length 95th (ft) | #235 | 137 | m78 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 983 | 644 | 551 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.30 | 0.59 | 0.28 |

Intersection Summary
 - Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

| Lane Group | NWT | NWR | NET |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 2679 | 137 | 929 |
| v/c Ratio | 1.11 | 0.17 | 0.46 |
| Control Delay | 78.5 | 3.1 | 17.3 |
| Queue Delay | 81.0 | 0.0 | 0.1 |
| Total Delay | 159.6 | 3.1 | 17.4 |
| Queue Length 50th (ft) | 569 | 1 | 121 |
| Queue Length 95th (ft) | #664 | 29 | 157 |
| Internal Link Dist (ft) | 378 | | 334 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 2415 | 821 | 2036 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 341 | 0 | 238 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.29 | 0.17 | 0.52 |

Intersection Summary
 - Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
2: Oakland Avenue & I-580 Off-ramp

Near-Term PM
Kaiser Center Transportation Study

| Lane Group | SEL2 | SET | NET | NER |
|-------------------------|-------|-------|------|-------|
| Lane Group Flow (vph) | 585 | 596 | 1352 | 756 |
| v/c Ratio | 1.20 | 1.20 | 0.63 | 2.12 |
| Control Delay | 130.1 | 130.3 | 9.1 | 535.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 130.1 | 130.3 | 9.1 | 535.1 |
| Queue Length 50th (ft) | 263 | ~272 | 140 | ~450 |
| Queue Length 95th (ft) | #449 | #458 | 195 | #636 |
| Internal Link Dist (ft) | 880 | 451 | | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 489 | 498 | 2153 | 356 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.20 | 1.20 | 0.63 | 2.12 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: 27th Street & Harrison Street

Near-Term PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|------|------|-------|------|
| Lane Group Flow (vph) | 226 | 452 | 126 | 74 | 196 | 224 | 383 | 1175 | 239 | 646 |
| v/c Ratio | 0.64 | 0.44 | 0.27 | 0.43 | 0.63 | 0.51 | 0.72 | 1.08 | 1.11 | 0.69 |
| Control Delay | 44.9 | 28.9 | 26.2 | 45.4 | 43.6 | 8.6 | 44.5 | 81.5 | 131.8 | 33.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.9 | 28.9 | 26.2 | 45.4 | 43.6 | 8.6 | 44.5 | 81.5 | 131.8 | 33.7 |
| Queue Length 50th (ft) | 118 | 113 | 52 | 40 | 105 | 0 | 106 | ~394 | ~156 | 172 |
| Queue Length 95th (ft) | #270 | 165 | 104 | 81 | 161 | 56 | 154 | #525 | #301 | 234 |
| Internal Link Dist (ft) | 1001 | | | 87 | | | 632 | | | 676 |
| Turn Bay Length (ft) | 70 | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 355 | 1028 | 467 | 216 | 559 | 619 | 572 | 1091 | 216 | 931 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 0.44 | 0.27 | 0.34 | 0.35 | 0.36 | 0.67 | 1.08 | 1.11 | 0.69 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
5: 27th Street & Telegraph Avenue

Near-Term PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|----------|-------|------|------|------|
| Lane Group Flow (vph) | 228 | 438 | 148 | 70 | 576 | 124 | 190 | 571 | 145 | 879 |
| v/c Ratio | 0.78 | 0.59 | 0.21 | 0.20 | 0.92 | 0.21 | 1.31 | 0.42 | 0.54 | 0.62 |
| Control Delay | 35.9 | 25.1 | 4.2 | 19.5 | 60.1 | 12.2 | 202.3 | 13.3 | 29.3 | 16.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 35.9 | 25.1 | 4.2 | 19.5 | 60.1 | 12.2 | 202.3 | 13.3 | 29.3 | 16.3 |
| Queue Length 50th (ft) | 67 | 186 | 0 | 23 | 330 | 9 | ~135 | 71 | 59 | 133 |
| Queue Length 95th (ft) | #177 | 296 | 37 | m45 | #526 | m41m#245 | m92 | 123 | 195 | |
| Internal Link Dist (ft) | 468 | | | 962 | | | 1466 | | 318 | |
| Turn Bay Length (ft) | | | | 150 | | 70 | | 80 | | |
| Base Capacity (vph) | 311 | 746 | 711 | 443 | 623 | 602 | 145 | 1360 | 268 | 1427 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.73 | 0.59 | 0.21 | 0.16 | 0.92 | 0.21 | 1.31 | 0.42 | 0.54 | 0.62 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Queues
12: Grand Avenue & Harrison Street

Near-Term PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBT | NBR | SBT |
|-------------------------|------|------|------|------|------|------|------|-------|------|
| Lane Group Flow (vph) | 145 | 684 | 140 | 333 | 910 | 46 | 1262 | 1084 | 696 |
| v/c Ratio | 0.49 | 0.55 | 0.24 | 0.71 | 0.62 | 0.07 | 0.74 | 1.39 | 0.41 |
| Control Delay | 48.9 | 28.3 | 12.6 | 50.1 | 25.8 | 6.1 | 31.2 | 204.4 | 24.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.9 | 28.3 | 12.6 | 50.1 | 25.8 | 6.1 | 31.2 | 204.4 | 24.2 |
| Queue Length 50th (ft) | 46 | 183 | 27 | 105 | 235 | 0 | 253 | ~761 | 117 |
| Queue Length 95th (ft) | 75 | 248 | 73 | 148 | 316 | 22 | 309 | #1011 | 152 |
| Internal Link Dist (ft) | 526 | | | 509 | | | 546 | | 632 |
| Turn Bay Length (ft) | 240 | | | 230 | | | | | |
| Base Capacity (vph) | 549 | 1253 | 575 | 549 | 1465 | 630 | 1702 | 779 | 1693 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.26 | 0.55 | 0.24 | 0.61 | 0.62 | 0.07 | 0.74 | 1.39 | 0.41 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
24: 20th Street & Harrison Street

Near-Term PM
Kaiser Center Transportation Study

| | EBL | NBT | SBT | SBR | SBR2 |
|---|------|------|------|------|------|
| Lane Group | EBL | NBT | SBT | SBR | SBR2 |
| Lane Group Flow (vph) | 535 | 1028 | 341 | 154 | 55 |
| v/c Ratio | 0.40 | 0.79 | 0.54 | 0.21 | 0.07 |
| Control Delay | 19.2 | 24.6 | 24.6 | 9.5 | 2.5 |
| Queue Delay | 0.0 | 62.1 | 2.1 | 1.5 | 0.0 |
| Total Delay | 19.2 | 86.7 | 26.6 | 11.0 | 2.5 |
| Queue Length 50th (ft) | 54 | 204 | 57 | 32 | 0 |
| Queue Length 95th (ft) | 87 | 260 | 86 | 63 | m11 |
| Internal Link Dist (ft) | 30 | 601 | 103 | | |
| Turn Bay Length (ft) | | | | 90 | 90 |
| Base Capacity (vph) | 1332 | 1407 | 637 | 743 | 843 |
| Starvation Cap Reductn | 0 | 0 | 169 | 435 | 0 |
| Spillback Cap Reductn | 12 | 497 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.41 | 1.13 | 0.73 | 0.50 | 0.07 |
| Intersection Summary | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues
42: I-880 NB On-ramp & Jackson Street

Near-Term PM
Kaiser Center Transportation Study

| | WBL | WBT | WBR | NBT | SBT | SBR |
|---|------|------|------|------|------|-------|
| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
| Lane Group Flow (vph) | 8 | 401 | 61 | 765 | 235 | 1662 |
| v/c Ratio | 0.02 | 0.90 | 0.15 | 0.98 | 0.22 | 1.77 |
| Control Delay | 17.6 | 49.1 | 7.0 | 44.3 | 6.8 | 367.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 17.6 | 49.1 | 7.0 | 44.3 | 6.8 | 367.2 |
| Queue Length 50th (ft) | 2 | 140 | 0 | 240 | 37 | ~932 |
| Queue Length 95th (ft) | 11 | #284 | 24 | #480 | 66 | #1174 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 417 | 450 | 402 | 779 | 1075 | 941 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.02 | 0.89 | 0.15 | 0.98 | 0.22 | 1.77 |
| Intersection Summary | | | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

AECOM

Synchro 7 - Report

Queues
44: 5th St. & Oak St.

Near-Term PM
Kaiser Center Transportation Study

| | EBT | NBT | SBT |
|---|-------|------|------|
| Lane Group | EBT | NBT | SBT |
| Lane Group Flow (vph) | 1019 | 660 | 76 |
| v/c Ratio | 1.94 | 1.03 | 0.17 |
| Control Delay | 446.4 | 62.2 | 1.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 446.4 | 62.2 | 1.6 |
| Queue Length 50th (ft) | 160 | ~172 | 1 |
| Queue Length 95th (ft) | #230 | #354 | m2 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 526 | 643 | 448 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.94 | 1.03 | 0.17 |
| Intersection Summary | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

AECOM

Synchro 7 - Report






Queues
45: El Embarcadero (WB) & Grand Avenue







Near-Term PM
Kaiser Center Transportation Study

| | NWL | NWR | NET | SWL | SWT |
|---|------|------|-------|------|------|
| Lane Group | NWL | NWR | NET | SWL | SWT |
| Lane Group Flow (vph) | 209 | 185 | 2146 | 162 | 895 |
| v/c Ratio | 0.66 | 0.43 | 1.34 | 0.37 | 0.35 |
| Control Delay | 44.0 | 7.7 | 179.8 | 21.1 | 2.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.0 | 7.7 | 179.8 | 21.1 | 2.5 |
| Queue Length 50th (ft) | 112 | 0 | ~810 | 41 | 23 |
| Queue Length 95th (ft) | 169 | 50 | #989 | m87 | m89 |
| Internal Link Dist (ft) | 560 | | 322 | | 429 |
| Turn Bay Length (ft) | 150 | | | 150 | |
| Base Capacity (vph) | 511 | 589 | 1603 | 435 | 2594 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.41 | 0.31 | 1.34 | 0.37 | 0.35 |
| Intersection Summary | | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

| |  |  |  |  |  |
|-------------------------|---|---|---|---|---|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1963 | 614 | 730 | 533 | 1128 |
| v/c Ratio | 1.18 | 0.89 | 2.03 | 0.92 | 0.56 |
| Control Delay | 116.3 | 54.2 | 492.1 | 52.7 | 13.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 116.3 | 54.2 | 492.1 | 52.7 | 13.4 |
| Queue Length 50th (ft) | 479 | 191 | -638 | 289 | 196 |
| Queue Length 95th (ft) | 574 | 160 | m#480 | #485 | 252 |
| Internal Link Dist (ft) | 1276 | 429 | | 958 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1665 | 688 | 359 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.18 | 0.89 | 2.03 | 0.92 | 0.56 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | |

| |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
| Lane Group Flow (vph) | 405 | 1485 | 647 | 1051 | 384 | 264 |
| v/c Ratio | 0.81 | 1.52 | 1.39 | 1.01 | 1.63 | 0.13 |
| Control Delay | 21.3 | 258.2 | 200.8 | 28.4 | 329.8 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 21.3 | 258.2 | 200.8 | 28.4 | 329.8 | 8.4 |
| Queue Length 50th (ft) | 178 | -686 | -527 | 265 | -318 | 32 |
| Queue Length 95th (ft) | 124 | m#477 | m#357 | 348 | #491 | 49 |
| Internal Link Dist (ft) | 1206 | | | 1205 | | 1978 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 975 | 464 | 1322 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.81 | 1.52 | 1.39 | 0.80 | 1.63 | 0.13 |
| Intersection Summary | | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |
| dr | Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | |

Cumulative (2030) without Project Conditions

Level Of Service Computation Report
 2000 HCM Unsignalized Method (Future Volume Alternative)
 Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
 Average Delay (sec/veh): 21.6 Worst Case Level Of Service: F [68.7]
 Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp
 Approach: North Bound South Bound East Bound West Bound
 Movement: L - T - R L - T - R L - T - R L - T - R
 Control: Uncontrolled Uncontrolled Yield Sign Yield Sign
 Rights: Include Include Include Include
 Lanes: 0 0 0 0 0 3 0 0 0 0 0 0 1 0 0 0 0 0
 Volume Module:
 Base Vol: 0 0 0 0 1253 0 0 0 0 581 0 0 0 0
 Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 Initial Bae: 0 0 0 0 1253 0 0 0 0 581 0 0 0 0
 Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 Initial Fut: 0 0 0 0 1253 0 0 0 0 581 0 0 0 0
 User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.93 1.00 1.00 1.00 1.00
 PHF Volume: 0 0 0 0 1362 0 0 0 0 625 0 0 0 0
 Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 FinalVolume: 0 0 0 0 1362 0 0 0 0 625 0 0 0 0
 Critical Gap Module:
 Critical Gap: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 6.2 xxxxxx xxxxxx xxxxxx
 FollowUpTim: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 3.3 xxxxxx xxxxxx xxxxxx
 Capacity Module:
 Chflict Vol: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx 454 xxxxx xxxxx xxxxxx
 Potent Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx 610 xxxxx xxxxx xxxxxx
 Move Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx 610 xxxxx xxxxx xxxxxx
 Volume/Cap: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxxx 1.02 xxxxx xxxxx xxxxx
 Level Of Service Module:
 2Way95thQ: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx 16.2 xxxxx xxxxx xxxxxx
 Control Del: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 68.7 xxxxxx xxxxxx xxxxxx
 LOS by Move: * * * * * * * * * * F * * * * *
 Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT
 Shared Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx
 SharedQueue: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx
 Shrd ConDel: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx
 Shared LOS: * * * * * * * * * * * * * * * *
 ApproachDel: xxxxxx xxxxxx 68.7 xxxxxx
 ApproachLOS: * * F *
 Note: Queue reported is the number of cars per lane.

Traffic 8.0.0715 (c) 2008 Dowling Assoc. Licensed to DMJM HARRIS, OAKLAND, CA

Queues 2: I-580 EB On-Ramp & Oakland Avenue

Cumulative AM
Kaiser Center Transportation Study

| Lane Group | SEL2 | SET | NET | NER |
|-------------------------|------|------|------|-------|
| Lane Group Flow (vph) | 388 | 394 | 1289 | 577 |
| v/c Ratio | 0.86 | 0.85 | 0.57 | 1.45 |
| Control Delay | 38.2 | 36.9 | 7.9 | 240.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 38.2 | 36.9 | 7.9 | 240.6 |
| Queue Length 50th (ft) | 113 | 114 | 130 | ~311 |
| Queue Length 95th (ft) | #250 | #250 | 181 | #480 |
| Internal Link Dist (ft) | 880 | 451 | | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 495 | 508 | 2247 | 398 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 0.78 | 0.57 | 1.45 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues 3: 27th Street & Harrison Street

Cumulative AM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 88 | 153 | 182 | 125 | 217 | 186 | 546 | 725 | 177 | 1530 |
| v/c Ratio | 0.45 | 0.25 | 0.65 | 0.64 | 0.58 | 0.42 | 0.79 | 0.53 | 0.70 | 1.32 |
| Control Delay | 44.3 | 31.4 | 41.9 | 53.2 | 39.5 | 7.6 | 44.2 | 24.0 | 53.0 | 178.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.3 | 31.4 | 41.9 | 53.2 | 39.5 | 7.6 | 44.2 | 24.0 | 53.0 | 178.4 |
| Queue Length 50th (ft) | 47 | 40 | 90 | 68 | 116 | 0 | 147 | 170 | 94 | ~635 |
| Queue Length 95th (ft) | 93 | 61 | 143 | #126 | 174 | 50 | #249 | 243 | #210 | #815 |
| Internal Link Dist (ft) | | 998 | | | 87 | | | 632 | | 676 |
| Turn Bay Length (ft) | | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 196 | 904 | 399 | 216 | 580 | 594 | 692 | 1378 | 258 | 1160 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.45 | 0.17 | 0.46 | 0.58 | 0.37 | 0.31 | 0.79 | 0.53 | 0.69 | 1.32 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues 12: Grand Avenue & Harrison Street

Cumulative AM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBT | NBR | SBT |
|-------------------------|------|------|------|-------|------|------|--------|------|-------|
| Lane Group Flow (vph) | 126 | 279 | 109 | 672 | 907 | 149 | 1400 | 426 | 1644 |
| v/c Ratio | 0.45 | 0.24 | 0.22 | 1.22 | 0.61 | 0.21 | 3.84dl | 0.54 | 1.23 |
| Control Delay | 48.8 | 25.1 | 24.4 | 153.5 | 25.2 | 5.7 | 98.4 | 5.2 | 139.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.8 | 25.1 | 24.4 | 153.5 | 25.2 | 5.7 | 98.4 | 5.2 | 139.7 |
| Queue Length 50th (ft) | 40 | 67 | 47 | ~273 | 232 | 8 | ~379 | 0 | ~469 |
| Queue Length 95th (ft) | 68 | 100 | 90 | #385 | 311 | 47 | #473 | 65 | #567 |
| Internal Link Dist (ft) | | 526 | | 2242 | | 546 | | 632 | |
| Turn Bay Length (ft) | 240 | | | 230 | | | | | |
| Base Capacity (vph) | 549 | 1168 | 492 | 549 | 1483 | 695 | 1245 | 783 | 1336 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.23 | 0.24 | 0.22 | 1.22 | 0.61 | 0.21 | 1.12 | 0.54 | 1.23 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Queues
42: I-880 NB On-ramp & Jackson Street

Cumulative AM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 29 | 417 | 66 | 636 | 209 | 2151 |
| v/c Ratio | 0.06 | 0.79 | 0.14 | 0.95 | 0.24 | 2.66 |
| Control Delay | 11.7 | 28.0 | 4.9 | 42.6 | 8.4 | 764.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.7 | 28.0 | 4.9 | 42.6 | 8.4 | 764.3 |
| Queue Length 50th (ft) | 5 | 95 | 0 | 149 | 30 | 1015 |
| Queue Length 95th (ft) | 18 | #208 | 19 | #333 | 61 | #1253 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 521 | 559 | 497 | 666 | 878 | 810 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.06 | 0.75 | 0.13 | 0.95 | 0.24 | 2.66 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

AECOM

Synchro 7 - Report

Queues
44: 5th St. & Oak St.

Cumulative AM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 1467 | 438 | 176 |
| v/c Ratio | 1.49 | 0.68 | 0.32 |
| Control Delay | 244.7 | 18.5 | 11.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 244.7 | 18.5 | 11.4 |
| Queue Length 50th (ft) | 202 | 85 | 50 |
| Queue Length 95th (ft) | #280 | #177 | m74 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 983 | 644 | 551 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.49 | 0.68 | 0.32 |

| Intersection Summary | | | |
|---|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

AECOM

Synchro 7 - Report

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative AM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|-------|------|------|------|------|
| Lane Group Flow (vph) | 1990 | 527 | 298 | 407 | 1486 |
| v/c Ratio | 1.24 | 0.90 | 0.76 | 0.63 | 0.73 |
| Control Delay | 113.0 | 63.7 | 34.2 | 32.7 | 19.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 113.0 | 63.7 | 34.2 | 32.7 | 19.2 |
| Queue Length 50th (ft) | 567 | 186 | 94 | 224 | 365 |
| Queue Length 95th (ft) | #663 | #283 | #221 | 329 | 451 |
| Internal Link Dist (ft) | 1105 | 413 | | 511 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1710 | 584 | 390 | 651 | 2037 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.16 | 0.90 | 0.76 | 0.63 | 0.73 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | |

AECOM

Synchro 7 - Report

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative AM
Kaiser Center Transportation Study


| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
|-------------------------|------|------|------|------|-------|------|
| Lane Group Flow (vph) | 284 | 820 | 360 | 800 | 857 | 561 |
| v/c Ratio | 0.58 | 0.87 | 0.70 | 0.89 | 1.58 | 0.26 |
| Control Delay | 26.2 | 32.1 | 18.6 | 50.0 | 298.1 | 10.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.2 | 32.1 | 18.6 | 50.0 | 298.1 | 10.0 |
| Queue Length 50th (ft) | 137 | 262 | 108 | 273 | -842 | 87 |
| Queue Length 95th (ft) | m159 | m273 | m86 | #382 | #1079 | 116 |
| Internal Link Dist (ft) | | 774 | | 703 | | 185 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 969 | 524 | 902 | 543 | 2170 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.57 | 0.85 | 0.69 | 0.89 | 1.58 | 0.26 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | | |

AECOM

Synchro 7 - Report

Queues Cumulative AM
49: Santa Clara Avenue & Oakland Avenue Kaiser Center Transportation Study



| Lane Group | NWT | NWR | NET |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 3167 | 162 | 1098 |
| v/c Ratio | 1.31 | 0.20 | 0.89 |
| Control Delay | 166.3 | 4.1 | 18.4 |
| Queue Delay | 158.2 | 0.0 | 0.2 |
| Total Delay | 324.4 | 4.1 | 18.5 |
| Queue Length 50th (ft) | 758 | 8 | 150 |
| Queue Length 95th (ft) | 851 | 38 | 191 |
| Internal Link Dist (ft) | 378 | | 334 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 2415 | 821 | 2036 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 511 | 0 | 238 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.66 | 0.20 | 0.61 |


Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Queues Cumulative AM
50: MacArthur Blvd (WB) & Harrison Street Kaiser Center Transportation Study



| Lane Group | NWL | NWT | SWT |
|-------------------------|-------|-------|-------|
| Lane Group Flow (vph) | 898 | 2778 | 1568 |
| v/c Ratio | 1.03 | 1.02 | 1.37 |
| Control Delay | 41.1 | 33.3 | 196.5 |
| Queue Delay | 177.0 | 201.6 | 0.0 |
| Total Delay | 218.1 | 234.8 | 196.5 |
| Queue Length 50th (ft) | 403 | ~409 | ~557 |
| Queue Length 95th (ft) | 430 | m307 | #693 |
| Internal Link Dist (ft) | | 191 | 1680 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 876 | 2736 | 1148 |
| Starvation Cap Reductn | 252 | 854 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.44 | 1.48 | 1.37 |


Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues Cumulative PM
2: Oakland Avenue & I-580 Off-ramp Kaiser Center Transportation Study



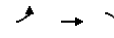
| Lane Group | SEL2 | SET | NET | NER |
|-------------------------|-------|-------|------|-------|
| Lane Group Flow (vph) | 741 | 754 | 1711 | 835 |
| v/c Ratio | 1.59 | 1.57 | 0.79 | 2.35 |
| Control Delay | 297.8 | 287.7 | 12.5 | 633.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 297.8 | 287.7 | 12.5 | 633.1 |
| Queue Length 50th (ft) | 416 | ~421 | 212 | ~511 |
| Queue Length 95th (ft) | #618 | #624 | 299 | #705 |
| Internal Link Dist (ft) | | 880 | 451 | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 466 | 481 | 2153 | 356 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.59 | 1.57 | 0.79 | 2.35 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues Cumulative PM
3: 27th Street & Harrison Street Kaiser Center Transportation Study



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|------|-------|-------|------|
| Lane Group Flow (vph) | 257 | 516 | 188 | 86 | 224 | 255 | 446 | 1292 | 277 | 784 |
| v/c Ratio | 0.78 | 0.51 | 0.41 | 0.48 | 0.67 | 0.52 | 0.81 | 1.19 | 1.28 | 0.86 |
| Control Delay | 55.5 | 30.2 | 29.9 | 46.6 | 43.6 | 8.1 | 48.6 | 122.7 | 192.6 | 42.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 55.5 | 30.2 | 29.9 | 46.6 | 43.6 | 8.1 | 48.6 | 122.7 | 192.6 | 42.8 |
| Queue Length 50th (ft) | 140 | 134 | 86 | 47 | 120 | 0 | 126 | ~469 | ~202 | 221 |
| Queue Length 95th (ft) | #334 | 189 | 153 | 92 | 179 | 57 | #192 | #602 | #355 | #325 |
| Internal Link Dist (ft) | | 1001 | | | 87 | | | 632 | | 676 |
| Turn Bay Length (ft) | 70 | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 330 | 1015 | 460 | 216 | 559 | 641 | 572 | 1090 | 216 | 907 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 0.51 | 0.41 | 0.40 | 0.40 | 0.40 | 0.78 | 1.19 | 1.28 | 0.86 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
5: 27th Street & Telegraph Avenue

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|-------|------|------|------|
| Lane Group Flow (vph) | 260 | 499 | 168 | 79 | 657 | 141 | 221 | 662 | 167 | 1018 |
| v/c Ratio | 0.85 | 0.67 | 0.23 | 0.26 | 1.08 | 0.24 | 2.19 | 0.49 | 0.74 | 0.71 |
| Control Delay | 45.2 | 28.0 | 4.2 | 19.8 | 94.9 | 12.6 | 581.7 | 13.7 | 44.5 | 19.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.2 | 28.0 | 4.2 | 19.8 | 94.9 | 12.6 | 581.7 | 13.7 | 44.5 | 19.2 |
| Queue Length 50th (ft) | 86 | 222 | 0 | 26 | -416 | 9 | -197 | 84 | 75 | 175 |
| Queue Length 95th (ft) | #222 | #357 | 40 | m46m | #593 | m41m | #310 | m104 | #182 | 248 |
| Internal Link Dist (ft) | 468 | | | 962 | | | | 1466 | | 318 |
| Turn Bay Length (ft) | | | | 150 | | | 70 | | 80 | |
| Base Capacity (vph) | 311 | 741 | 719 | 395 | 611 | 596 | 101 | 1360 | 227 | 1426 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.84 | 0.67 | 0.23 | 0.20 | 1.08 | 0.24 | 2.19 | 0.49 | 0.74 | 0.71 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
12: Grand Avenue & Harrison Street

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBT | NBR | SBT |
|-------------------------|------|------|------|------|------|------|------|-------|------|
| Lane Group Flow (vph) | 416 | 786 | 177 | 381 | 1042 | 57 | 1335 | 1398 | 972 |
| v/c Ratio | 0.81 | 0.64 | 0.32 | 0.77 | 0.84 | 0.11 | 0.79 | 1.82 | 0.58 |
| Control Delay | 54.4 | 30.8 | 19.2 | 52.2 | 37.7 | 19.2 | 32.8 | 391.9 | 24.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 54.4 | 30.8 | 19.2 | 52.2 | 37.7 | 19.2 | 32.8 | 391.9 | 24.9 |
| Queue Length 50th (ft) | 131 | 222 | 57 | 120 | 323 | 19 | 275 | -1200 | 164 |
| Queue Length 95th (ft) | #187 | 292 | 115 | 170 | #422 | 48 | 333 | #1461 | 208 |
| Internal Link Dist (ft) | 526 | | | 509 | | | 546 | | 632 |
| Turn Bay Length (ft) | 240 | | | 230 | | | | | |
| Base Capacity (vph) | 549 | 1225 | 547 | 549 | 1241 | 519 | 1689 | 770 | 1683 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.76 | 0.64 | 0.32 | 0.69 | 0.84 | 0.11 | 0.79 | 1.82 | 0.58 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
13: 21st Street & Harrison Street

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBL | NBL | NBT | SBT |
|-------------------------|------|------|------|------|
| Lane Group Flow (vph) | 495 | 127 | 1835 | 1274 |
| v/c Ratio | 0.68 | 0.37 | 0.89 | 0.36 |
| Control Delay | 30.6 | 8.5 | 26.0 | 11.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 30.6 | 8.5 | 26.0 | 11.6 |
| Queue Length 50th (ft) | 105 | 18 | 391 | 97 |
| Queue Length 95th (ft) | 141 | 45 | #682 | 156 |
| Internal Link Dist (ft) | 280 | | 400 | 546 |
| Turn Bay Length (ft) | 200 | 160 | | |
| Base Capacity (vph) | 1450 | 373 | 2057 | 3506 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.34 | 0.34 | 0.89 | 0.36 |

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
24: 20th Street & Harrison Street

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBL | NBT | SBT | SBR | SBR2 |
|-------------------------|------|-------|------|------|------|
| Lane Group Flow (vph) | 658 | 1480 | 448 | 205 | 124 |
| v/c Ratio | 0.55 | 1.06 | 0.71 | 0.29 | 0.15 |
| Control Delay | 22.6 | 64.6 | 28.6 | 11.9 | 2.2 |
| Queue Delay | 0.4 | 461.0 | 6.8 | 3.2 | 0.8 |
| Total Delay | 23.0 | 525.6 | 35.3 | 15.1 | 3.1 |
| Queue Length 50th (ft) | 76 | -377 | 72 | 50 | 0 |
| Queue Length 95th (ft) | 109 | #503 | 108 | 94 | m20 |
| Internal Link Dist (ft) | 30 | 601 | 103 | | |
| Turn Bay Length (ft) | | | 90 | 90 | |
| Base Capacity (vph) | 1187 | 1397 | 633 | 700 | 833 |
| Starvation Cap Reductn | 0 | 0 | 139 | 395 | 499 |
| Spillback Cap Reductn | 170 | 690 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.65 | 2.09 | 0.91 | 0.67 | 0.37 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
32: 14th Street & Lakeside Dr.

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBT | WBT | WBR | NBT | NBR |
|-------------------------|-------|------|------|------|------|
| Lane Group Flow (vph) | 1243 | 516 | 317 | 1061 | 53 |
| v/c Ratio | 1.40 | 0.49 | 0.60 | 0.57 | 0.07 |
| Control Delay | 209.7 | 19.1 | 16.2 | 11.0 | 6.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 3.4 | 0.0 |
| Total Delay | 209.7 | 19.1 | 16.2 | 14.3 | 6.7 |
| Queue Length 50th (ft) | 327 | 79 | 55 | 123 | 8 |
| Queue Length 95th (ft) | 442 | 120 | 129 | 173 | 21 |
| Internal Link Dist (ft) | 299 | 570 | | 197 | |
| Turn Bay Length (ft) | | | | | |
| Base Capacity (vph) | 888 | 1062 | 527 | 1852 | 813 |
| Starvation Cap Reductn | 0 | 0 | 0 | 672 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.40 | 0.49 | 0.60 | 0.90 | 0.07 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |

AECOM

Synchro 7 - Report

Queues
40: 7th St. & Oak St.

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT |
|-------------------------|-------|--------|
| Lane Group Flow (vph) | 1755 | 2399 |
| v/c Ratio | 0.691 | 0.93dr |
| Control Delay | 9.0 | 156.0 |
| Queue Delay | 0.0 | 24.3 |
| Total Delay | 9.0 | 180.3 |
| Queue Length 50th (ft) | 81 | ~320 |
| Queue Length 95th (ft) | m86m | #412 |
| Internal Link Dist (ft) | 276 | 196 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 2554 | 1858 |
| Starvation Cap Reductn | 0 | 75 |
| Spillback Cap Reductn | 0 | 0 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 0.69 | 1.35 |

| Intersection Summary | |
|---|--|
| - Volume exceeds capacity, queue is theoretically infinite. | |
| Queue shown is maximum after two cycles. | |
| # 95th percentile volume exceeds capacity, queue may be longer. | |
| Queue shown is maximum after two cycles. | |
| m Volume for 95th percentile queue is metered by upstream signal. | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | |

AECOM

Synchro 7 - Report

Queues
42: I-880 NB On-ramp & Jackson Street

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|-------|------|-------|
| Lane Group Flow (vph) | 9 | 467 | 72 | 891 | 273 | 1936 |
| v/c Ratio | 0.02 | 1.04 | 0.18 | 1.18 | 0.25 | 2.10 |
| Control Delay | 17.6 | 79.4 | 6.7 | 111.2 | 7.1 | 514.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 17.6 | 79.4 | 6.7 | 111.2 | 7.1 | 514.2 |
| Queue Length 50th (ft) | 2 | ~188 | 0 | ~399 | 43 | ~1163 |
| Queue Length 95th (ft) | 12 | #345 | 26 | #596 | 77 | #1414 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 417 | 450 | 410 | 757 | 1071 | 924 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.02 | 1.04 | 0.18 | 1.18 | 0.25 | 2.10 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

AECOM

Synchro 7 - Report

Queues
44: 5th St. & Oak St.

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|-------|------|
| Lane Group Flow (vph) | 1186 | 769 | 89 |
| v/c Ratio | 2.26 | 1.20 | 0.20 |
| Control Delay | 589.5 | 122.8 | 1.7 |
| Queue Delay | 13.7 | 18.6 | 0.0 |
| Total Delay | 603.2 | 141.4 | 1.7 |
| Queue Length 50th (ft) | 196 | ~255 | 1 |
| Queue Length 95th (ft) | #270 | #429 | m2 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 525 | 643 | 448 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 7 | 22 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 2.29 | 1.24 | 0.20 |

| Intersection Summary | | | |
|---|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

AECOM

Synchro 7 - Report

Queues
45: El Embarcadero (WB) & Grand Avenue

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | NWL | NWR | NET | SWL | SWT |
|---|------|---------|-------|------|------|
| Lane Group Flow (vph) | 225 | 198 | 2452 | 232 | 1216 |
| v/c Ratio | 0.68 | 0.43 | 1.60 | 0.50 | 0.47 |
| Control Delay | 44.0 | 7.4 | 296.9 | 23.0 | 5.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| Total Delay | 44.0 | 7.4 | 296.9 | 23.0 | 5.5 |
| Queue Length 50th (ft) | 120 | 0-1043 | 67 | 64 | |
| Queue Length 95th (ft) | 179 | 51#1185 | m135 | m188 | |
| Internal Link Dist (ft) | 560 | 322 | | 429 | |
| Turn Bay Length (ft) | 150 | | 150 | | |
| Base Capacity (vph) | 511 | 598 | 1530 | 462 | 2562 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 616 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.44 | 0.33 | 1.60 | 0.50 | 0.62 |
| Intersection Summary | | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|---|-------|------|-------|-------|------|
| Lane Group Flow (vph) | 3100 | 661 | 861 | 802 | 1215 |
| v/c Ratio | 1.86 | 0.96 | 2.66 | 1.38 | 0.60 |
| Control Delay | 412.1 | 58.5 | 768.0 | 210.6 | 14.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 412.1 | 58.5 | 768.0 | 210.6 | 14.1 |
| Queue Length 50th (ft) | 969 | 212 | -858 | -612 | 220 |
| Queue Length 95th (ft) | 1061 | m148 | m534 | #833 | 282 |
| Internal Link Dist (ft) | 1276 | 429 | | 958 | |
| Turn Bay Length (ft) | | 200 | 150 | | |
| Base Capacity (vph) | 1668 | 688 | 324 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.86 | 0.96 | 2.66 | 1.38 | 0.60 |
| Intersection Summary | | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
|---|------|-------|-------|-------|-------|------|
| Lane Group Flow (vph) | 479 | 2406 | 1032 | 1607 | 653 | 334 |
| v/c Ratio | 0.96 | 2.44 | 2.25 | 1.81 | 2.77 | 0.16 |
| Control Delay | 27.4 | 663.9 | 583.0 | 141.3 | 825.8 | 8.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 27.4 | 663.9 | 583.0 | 141.3 | 825.8 | 8.6 |
| Queue Length 50th (ft) | 231 | -1322 | -1041 | -606 | -639 | 41 |
| Queue Length 95th (ft) | m83 | m549 | m415 | #744 | #847 | 61 |
| Internal Link Dist (ft) | 1206 | | 1205 | | 1978 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 988 | 458 | 1296 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.96 | 2.44 | 2.25 | 1.24 | 2.77 | 0.16 |
| Intersection Summary | | | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | |

AECOM

Synchro 7 - Report

Existing plus Project (Phase I and II) Conditions

Queues
42: I-880 NB On-ramp & Jackson Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 28 | 309 | 52 | 505 | 175 | 1592 |
| v/c Ratio | 0.06 | 0.64 | 0.12 | 0.71 | 0.19 | 1.78 |
| Control Delay | 11.9 | 21.2 | 5.2 | 17.9 | 7.7 | 374.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.9 | 21.2 | 5.2 | 17.9 | 7.7 | 374.3 |
| Queue Length 50th (ft) | 5 | 68 | 0 | 95 | 24 | ~643 |
| Queue Length 95th (ft) | 14 | 125 | 16 | #228 | 46 | #871 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 521 | 559 | 487 | 714 | 928 | 893 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.55 | 0.11 | 0.71 | 0.19 | 1.78 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
2: Oakland Avenue & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | SEL2 | SET | NET | NER |
|-------------------------|------|------|------|-------|
| Lane Group Flow (vph) | 457 | 470 | 1112 | 907 |
| v/c Ratio | 0.88 | 0.95 | 0.52 | 2.54 |
| Control Delay | 38.6 | 53.6 | 7.8 | 719.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 38.6 | 53.6 | 7.8 | 719.4 |
| Queue Length 50th (ft) | 131 | 160 | 103 | ~567 |
| Queue Length 95th (ft) | #285 | #294 | 143 | #766 |
| Internal Link Dist (ft) | | 880 | 451 | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 519 | 495 | 2155 | 357 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.88 | 0.95 | 0.52 | 2.54 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: 27th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|------|-------|------|------|
| Lane Group Flow (vph) | 204 | 388 | 113 | 69 | 182 | 208 | 426 | 1402 | 199 | 582 |
| v/c Ratio | 0.55 | 0.38 | 0.24 | 0.41 | 0.62 | 0.50 | 0.78 | 1.28 | 0.92 | 0.64 |
| Control Delay | 40.9 | 27.9 | 25.7 | 44.9 | 43.8 | 8.9 | 47.0 | 163.3 | 85.2 | 32.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 40.9 | 27.9 | 25.7 | 44.9 | 43.8 | 8.9 | 47.0 | 163.3 | 85.2 | 32.5 |
| Queue Length 50th (ft) | 104 | 95 | 46 | 38 | 98 | 0 | 120 | ~541 | 114 | 151 |
| Queue Length 95th (ft) | #228 | 142 | 94 | 72 | 143 | 45 | #173 | #676 | #242 | 208 |
| Internal Link Dist (ft) | | 1001 | | | 87 | | | 632 | | 676 |
| Turn Bay Length (ft) | 70 | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 368 | 1034 | 470 | 216 | 559 | 608 | 572 | 1093 | 216 | 914 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.55 | 0.38 | 0.24 | 0.32 | 0.33 | 0.34 | 0.74 | 1.28 | 0.92 | 0.64 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
24: 20th Street & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL2 | EBL | EBT | WBL | WBT | NBT | SBT | SBR | SBR2 | SEL | SER2 |
|-------------------------|------|------|------|------|------|-------|------|------|------|-------|------|
| Lane Group Flow (vph) | 16 | 280 | 182 | 11 | 149 | 893 | 204 | 87 | 40 | 215 | 103 |
| v/c Ratio | 0.05 | 0.46 | 0.57 | 0.06 | 0.44 | 1.12 | 0.45 | 0.48 | 0.17 | 1.29 | 0.38 |
| Control Delay | 47.0 | 53.0 | 55.7 | 25.0 | 32.7 | 100.8 | 29.3 | 35.8 | 9.2 | 199.8 | 16.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.0 | 53.0 | 55.7 | 25.0 | 32.7 | 100.8 | 29.3 | 35.8 | 9.2 | 199.8 | 16.1 |
| Queue Length 50th (ft) | 9 | 85 | 102 | 5 | 38 | ~275 | 56 | 48 | 4 | ~139 | 11 |
| Queue Length 95th (ft) | m27 | 128 | 164 | 14 | 61 | #407 | 79 | 98 | 27 | #273 | 57 |
| Internal Link Dist (ft) | | 450 | | | 382 | 601 | 222 | | | 205 | |
| Turn Bay Length (ft) | 100 | 100 | | 175 | | | | 90 | 90 | | 50 |
| Base Capacity (vph) | 354 | 604 | 319 | 221 | 434 | 799 | 458 | 180 | 233 | 167 | 270 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.46 | 0.57 | 0.05 | 0.34 | 1.12 | 0.45 | 0.48 | 0.17 | 1.29 | 0.38 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Queues
42: I-880 NB On-ramp & Jackson Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 12 | 395 | 56 | 676 | 196 | 1407 |
| v/c Ratio | 0.03 | 0.89 | 0.14 | 0.85 | 0.18 | 1.49 |
| Control Delay | 17.7 | 48.1 | 7.1 | 24.1 | 6.6 | 244.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 17.7 | 48.1 | 7.1 | 24.1 | 6.6 | 244.1 |
| Queue Length 50th (ft) | 3 | 138 | 0 | 181 | 30 | ~725 |
| Queue Length 95th (ft) | 8 | #218 | 21 | #398 | 56 | #959 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 417 | 450 | 398 | 795 | 1078 | 945 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.03 | 0.88 | 0.14 | 0.85 | 0.18 | 1.49 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

AECOM

Synchro 7 - Report

Queues
44: 5th St. & Oak St.

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 941 | 684 | 80 |
| v/c Ratio | 1.77 | 1.07 | 0.18 |
| Control Delay | 373.0 | 74.1 | 1.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 373.0 | 74.1 | 1.2 |
| Queue Length 50th (ft) | 141 | ~204 | 0 |
| Queue Length 95th (ft) | #209 | #275 | 0 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 531 | 642 | 448 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.77 | 1.07 | 0.18 |

| Intersection Summary | | | |
|---|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |

AECOM

Synchro 7 - Report

Queues
45: El Embarcadero (WB) & Grand Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | NWL | NWR | NET | SWL | SWT |
|-------------------------|------|------|-----------|------|------|
| Lane Group Flow (vph) | 269 | 327 | 2056 | 255 | 875 |
| v/c Ratio | 0.73 | 0.27 | 1.35 | 0.59 | 0.35 |
| Control Delay | 44.1 | 1.4 | 186.9 | 30.5 | 7.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.1 | 1.4 | 186.9 | 30.5 | 7.0 |
| Queue Length 50th (ft) | 143 | 0 | ~782 | 130 | 153 |
| Queue Length 95th (ft) | 208 | 15 | #922m#236 | m225 | |
| Internal Link Dist (ft) | 560 | | 322 | 429 | |
| Turn Bay Length (ft) | 150 | | | 150 | |
| Base Capacity (vph) | 511 | 1208 | 1519 | 434 | 2484 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.27 | 1.35 | 0.59 | 0.35 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|------|-----------|-------|------|------|
| Lane Group Flow (vph) | 1421 | 748 | 749 | 389 | 863 |
| v/c Ratio | 0.86 | 0.92 | 1.61 | 0.74 | 0.42 |
| Control Delay | 33.4 | 50.4 | 302.7 | 37.0 | 11.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.4 | 50.4 | 302.7 | 37.0 | 11.5 |
| Queue Length 50th (ft) | 251 | ~261 | ~602 | 189 | 135 |
| Queue Length 95th (ft) | 309 | m204m#453 | 290 | 177 | |
| Internal Link Dist (ft) | 1276 | 429 | | 958 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1681 | 813 | 466 | 580 | 2041 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.85 | 0.92 | 1.61 | 0.67 | 0.42 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Near-Term (2015) plus Project (Phase I) Conditions

Queues
42: I-880 NB On-ramp & Jackson Street

Near-Term + I AM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 26 | 362 | 58 | 553 | 182 | 1872 |
| v/c Ratio | 0.06 | 0.71 | 0.13 | 0.80 | 0.20 | 2.21 |
| Control Delay | 11.7 | 23.7 | 5.1 | 23.0 | 8.0 | 564.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.7 | 23.7 | 5.1 | 23.0 | 8.0 | 564.4 |
| Queue Length 50th (ft) | 5 | 80 | 0 | 116 | 26 | ~835 |
| Queue Length 95th (ft) | 17 | #156 | 18 | #275 | 54 | #1065 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 521 | 559 | 492 | 694 | 901 | 848 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.65 | 0.12 | 0.80 | 0.20 | 2.21 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

Queues
44: 5th St. & Oak St.

Near-Term + I AM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 1278 | 382 | 154 |
| v/c Ratio | 1.30 | 0.59 | 0.28 |
| Control Delay | 160.2 | 15.5 | 11.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 160.2 | 15.5 | 11.6 |
| Queue Length 50th (ft) | 160 | 70 | 43 |
| Queue Length 95th (ft) | #236 | 137 | m77 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 982 | 644 | 551 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.30 | 0.59 | 0.28 |

| Intersection Summary | | | |
|---|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

Queues
49: Santa Clara Avenue & Oakland Avenue






Near-Term + I AM
Kaiser Center Transportation Study

| Lane Group | NWT | NWR | NET |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 2724 | 137 | 932 |
| v/c Ratio | 1.13 | 0.17 | 0.46 |
| Control Delay | 86.3 | 3.3 | 17.3 |
| Queue Delay | 87.8 | 0.0 | 0.1 |
| Total Delay | 174.0 | 3.3 | 17.4 |
| Queue Length 50th (ft) | 586 | 2 | 121 |
| Queue Length 95th (ft) | #681 | 30 | 157 |
| Internal Link Dist (ft) | 378 | | 334 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 2415 | 820 | 2036 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 359 | 0 | 238 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.32 | 0.17 | 0.52 |

| Intersection Summary | | | |
|---|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |


















HCM Signalized Intersection Capacity Analysis
2: Oakland Avenue & I-580 Off-ramp

Near-Term + I PM
Kaiser Center Transportation Study

| Movement | SEL2 | SET | NET | NER | NER2 |
|-----------------------------------|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |
| Volume (vph) | 738 | 349 | 1276 | 680 | 98 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1738 | 3539 | 1583 | |
| Flt Permitted | 0.95 | 0.98 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1738 | 3539 | 1583 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 802 | 379 | 1387 | 739 | 107 |
| RTOR Reduction (vph) | 37 | 34 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 548 | 562 | 1387 | 846 | 0 |
| Confl. Peds. (#/hr) | | | | 2 | |
| Confl. Bikes (#/hr) | | | | | |
| Turn Type | Perm | | | custom | |
| Protected Phases | | 4 | 5 | 1 | |
| Permitted Phases | 4 | | | | 1 |
| Actuated Green, G (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Effective Green, g (s) | 16.0 | 16.0 | 36.5 | 13.5 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.61 | 0.22 | |
| Clearance Time (s) | 4.0 | 4.0 | 3.5 | 3.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 448 | 463 | 2153 | 356 | |
| v/s Ratio Prot | | | c0.39 | c0.53 | |
| v/s Ratio Perm | c0.33 | 0.32 | | | |
| v/c Ratio | 1.22 | 1.21 | 0.64 | 2.38 | |
| Uniform Delay, d1 | 22.0 | 22.0 | 7.6 | 23.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 118.7 | 114.3 | 1.5 | 628.0 | |
| Delay (s) | 140.7 | 136.3 | 9.1 | 651.2 | |
| Level of Service | F | F | A | F | |
| Approach Delay (s) | 138.5 | 252.4 | | | |
| Approach LOS | F | F | | | |
| Intersection Summary | | | | | |
| HCM Average Control Delay | 213.0 | | HCM Level of Service | | F |
| HCM Volume to Capacity ratio | 1.25 | | | | |
| Actuated Cycle Length (s) | 60.0 | | Sum of lost time (s) | | 7.5 |
| Intersection Capacity Utilization | 84.7% | | ICU Level of Service | | E |
| Analysis Period (min) | 15 | | | | |
| c Critical Lane Group | | | | | |

HCM Signalized Intersection Capacity Analysis 3: 27th Street & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study














| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|---|---|--|--|--|---|--|--|--|---|---|
| Movement | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBL2 | NBL | NBT | NBR |
| Lane Configurations | |  |  | | | |  | | | |  |  |
| Volume (vph) | 212 | 425 | 101 | | 20 | 52 | 16 | 180 | 206 | 10 | 391 | 1093 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | | | | 1.00 | 1.00 | 1.00 | | 0.97 | 0.95 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | 1.00 | 1.00 | 0.96 | | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | | | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.99 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | | | | 1770 | 1863 | 1522 | | 3433 | 3482 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 1583 | | | | 1770 | 1863 | 1522 | | 3433 | 3482 |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | | 0.94 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 226 | 452 | 107 | | 21 | 57 | 17 | 196 | 224 | 11 | 425 | 1188 |
| RTOR Reduction (vph) | 0 | 0 | 7 | | 0 | 0 | 0 | 0 | 187 | 0 | 0 | 8 |
| Lane Group Flow (vph) | 226 | 452 | 121 | | 0 | 0 | 74 | 196 | 37 | 0 | 436 | 1292 |
| Confl. Peds. (#/hr) | 26 | | | | | | | | | | | 20 |
| Confl. Bikes (#/hr) | | | | | | | | | 20 | | | 9 |
| Turn Type | Prot | 3 | Perm | | Prot | 7 | Prot | 7 | Perm | Prot | 1 | Prot |
| Protected Phases | | 8 | | | | | 4 | | | | | 6 |
| Permitted Phases | | | 8 | | | | | 4 | | | | |
| Actuated Green, G (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 14.5 | 27.2 | |
| Effective Green, g (s) | 18.9 | 26.1 | 26.1 | | | 7.7 | 14.9 | 14.9 | | 14.5 | 27.2 | |
| Actuated g/C Ratio | 0.21 | 0.29 | 0.29 | | | 0.09 | 0.17 | 0.17 | | 0.16 | 0.30 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | | | 4.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 372 | 1026 | 459 | | | 151 | 308 | 252 | | 553 | 1052 | |
| v/s Ratio Prot | c0.13 | 0.13 | | | | 0.04 | c0.11 | | | 0.13 | c0.37 | |
| v/s Ratio Perm | | | 0.08 | | | | | 0.02 | | | | |
| v/c Ratio | 0.61 | 0.44 | 0.26 | | | 0.49 | 0.64 | 0.15 | | 0.79 | 1.23 | |
| Uniform Delay, d1 | 32.2 | 26.0 | 24.6 | | | 39.3 | 35.0 | 32.1 | | 36.3 | 31.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.8 | 0.3 | 0.3 | | | 2.5 | 4.3 | 0.3 | | 7.3 | 11.3 | |
| Delay (s) | 35.0 | 26.3 | 24.9 | | | 41.8 | 39.3 | 32.4 | | 43.6 | 142.7 | |
| Level of Service | C | C | C | | | D | D | C | | D | F | |
| Approach Delay (s) | 28.5 | | | | | 36.5 | | | | 117.8 | | |
| Approach LOS | C | | | | | D | | | | F | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 76.6 | | | | HCM Level of Service | | | | E | | | |
| HCM Volume to Capacity ratio | 0.92 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 90.0 | | | | Sum of lost time (s) | | | | 18.0 | | | |
| Intersection Capacity Utilization | 82.2% | | | | ICU Level of Service | | | | E | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 12: Grand Avenue & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study













| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 133 | 629 | 129 | 350 | 846 | 42 | 11 | 1314 | 1058 | 2 | 620 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | | 0.91 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.92 | | 1.00 | 0.93 | | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1484 | 3433 | 3539 | 1460 | | 5082 | 1466 | | 4986 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.93 | 1.00 | | 0.94 | |
| Satd. Flow (perm) | 3433 | 3539 | 1484 | 3433 | 3539 | 1460 | | 4735 | 1466 | | 4669 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 |
| Adj. Flow (vph) | 145 | 684 | 140 | 357 | 910 | 46 | 12 | 1428 | 1150 | 2 | 646 | 65 |
| RTOR Reduction (vph) | 0 | 0 | 46 | 0 | 0 | 27 | 0 | 0 | 251 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 145 | 684 | 94 | 357 | 910 | 19 | 0 | 1440 | 899 | 0 | 701 | 0 |
| Confl. Peds. (#/hr) | 31 | | 31 | 48 | | 48 | 42 | | 42 | 34 | | 34 |
| Confl. Bikes (#/hr) | | | 22 | | | 15 | | | 22 | | | 20 |
| Turn Type | Prot | 1 | Perm | Prot | 5 | Perm | Perm | Perm | Perm | Perm | Perm | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | | | 4 |
| Permitted Phases | | | 6 | | | 2 | | 4 | | 4 | | |
| Actuated Green, G (s) | 8.6 | 35.0 | 35.0 | 14.0 | 41.4 | 41.4 | | 36.0 | 36.0 | | 36.0 | |
| Effective Green, g (s) | 8.6 | 35.0 | 35.0 | 14.0 | 41.4 | 41.4 | | 36.0 | 36.0 | | 36.0 | |
| Actuated g/C Ratio | 0.09 | 0.35 | 0.35 | 0.14 | 0.41 | 0.41 | | 0.36 | 0.36 | | 0.36 | |
| Clearance Time (s) | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | |
| Lane Grp Cap (vph) | 295 | 1239 | 519 | 481 | 1465 | 604 | | 1705 | 528 | | 1681 | |
| v/s Ratio Prot | 0.04 | 0.19 | | c0.10 | c0.26 | | | | | | | |
| v/s Ratio Perm | | | 0.06 | | | 0.01 | | 0.30 | c0.61 | | 0.15 | |
| v/c Ratio | 0.49 | 0.55 | 0.18 | 0.74 | 0.62 | 0.03 | | 0.84 | 1.70 | | 0.42 | |
| Uniform Delay, d1 | 43.6 | 26.2 | 22.6 | 41.3 | 23.1 | 17.4 | | 29.4 | 32.0 | | 24.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.5 | 1.8 | 0.8 | 5.4 | 2.0 | 0.1 | | 5.3 | 32.4 | | 0.8 | |
| Delay (s) | 44.1 | 28.0 | 23.3 | 46.6 | 25.1 | 17.5 | | 34.8 | 356.3 | | 24.9 | |
| Level of Service | D | C | C | D | C | B | | C | F | | C | |
| Approach Delay (s) | 29.7 | | | 30.7 | | | | 177.5 | | | 24.9 | |
| Approach LOS | C | | | C | | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 97.9 | | | | HCM Level of Service | | | | F | | | |
| HCM Volume to Capacity ratio | 1.06 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 100.0 | | | | Sum of lost time (s) | | | | 10.0 | | | |
| Intersection Capacity Utilization | 122.3% | | | | ICU Level of Service | | | | H | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 24: 20th Street & Harrison Street

Near-Term + I PM
Kaiser Center Transportation Study

| Movement | EBL2 | EBL | EBR | NBL2 | NBL | NBT | SBT | SBR | SBR2 | SEL | SER | SER2 |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 7 | 389 | 103 | 97 | 26 | 828 | 188 | 268 | 51 | 0 | 128 | 55 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.94 | | | | 0.95 | 0.91 | 0.91 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 0.48 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | | | 1.00 | 0.94 | 0.85 | 0.85 | | 0.85 | 0.85 |
| Flt Protected | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | 841 | 4894 | | | | 3517 | 3186 | 1441 | 1583 | | 1583 | 1554 |
| Flt Permitted | 0.95 | 0.96 | | | | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | 841 | 4894 | | | | 3517 | 3186 | 1441 | 1583 | | 1583 | 1554 |
| Peak-hour factor, PHF | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 7 | 423 | 112 | 105 | 28 | 900 | 204 | 291 | 55 | 0 | 135 | 58 |
| RTOR Reduction (vph) | 0 | 72 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 44 |
| Lane Group Flow (vph) | 7 | 463 | 0 | 0 | 0 | 1033 | 341 | 154 | 23 | 0 | 135 | 14 |
| Confl. Peds. (#/hr) | 22 | | | | | 7 | | | 8 | | | 7 |
| Confl. Bikes (#/hr) | | | | | | | | | | | | |
| Turn Type | Prot | 5 | | | Split | Split | | custom | custom | | custom | custom |
| Protected Phases | | 1 | | | 8 | 8 | 8 | 2 | 6 | 6 | | |
| Permitted Phases | | | 1 | | | | | | | | 9 | 2 |
| Actuated Green, G (s) | 0.8 | 13.1 | | | | 16.0 | 17.2 | 29.5 | 29.5 | | 7.7 | 17.2 |
| Effective Green, g (s) | 0.8 | 13.1 | | | | 16.0 | 17.2 | 29.5 | 29.5 | | 7.7 | 17.2 |
| Actuated g/C Ratio | 0.01 | 0.19 | | | | 0.23 | 0.25 | 0.42 | 0.42 | | 0.11 | 0.25 |
| Clearance Time (s) | 4.0 | 4.0 | | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 2.0 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 10 | 916 | | | | 804 | 783 | 607 | 667 | | 174 | 382 |
| v/s Ratio Prot | 0.01 | c0.09 | | | | c0.29 | c0.11 | 0.11 | 0.01 | | | |
| v/s Ratio Perm | | | | | | | | | | | c0.09 | 0.01 |
| v/c Ratio | 0.70 | 0.51 | | | | 1.28 | 0.44 | 0.25 | 0.03 | | 0.78 | 0.04 |
| Uniform Delay, d1 | 34.5 | 25.5 | | | | 27.0 | 22.3 | 13.1 | 11.9 | | 30.3 | 20.1 |
| Progression Factor | 1.00 | 1.00 | | | | 1.00 | 1.41 | 1.63 | 2.67 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 120.0 | 2.0 | | | | 137.6 | 0.1 | 1.0 | 1.1 | | 17.7 | 0.0 |
| Delay (s) | 154.5 | 27.5 | | | | 164.6 | 31.6 | 22.3 | 31.8 | | 48.0 | 20.1 |
| Level of Service | F | C | | | | F | C | C | C | | D | C |
| Approach Delay (s) | | | | | | 164.6 | 29.0 | | | 39.6 | | |
| Approach LOS | | C | | | | | F | C | | D | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 90.3 | | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 0.75 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 70.0 | | | Sum of lost time (s) | | | | 16.0 | | |
| Intersection Capacity Utilization | | | 62.9% | | | ICU Level of Service | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
44: 5th St. & Oak St.

Near-Term + I PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | ←↑↑ | ↑↑↑ | | ← | ← | ← | ← | ↑ | ↑ | ← | ↑ | ↑ |
| Volume (vph) | 291 | 590 | 83 | 0 | 0 | 0 | 0 | 534 | 74 | 1 | 69 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.5 | | | 3.5 | | | 3.5 | | | 3.5 | | |
| Lane Util. Factor | 0.91 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| Frpb, ped/bikes | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| Flpb, ped/bikes | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| Frt | 0.99 | | | 0.98 | | | 1.00 | | | 1.00 | | |
| Flt Protected | 0.99 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| Satd. Flow (prot) | 4920 | | | 1832 | | | 1862 | | | 1862 | | |
| Flt Permitted | 0.99 | | | 1.00 | | | 0.84 | | | 0.84 | | |
| Satd. Flow (perm) | 1000 | | | 1300 | | | 1300 | | | 1300 | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 |
| Adj. Flow (vph) | 316 | 634 | 90 | 0 | 0 | 0 | 0 | 580 | 80 | 1 | 75 | 0 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1016 | 0 | 0 | 0 | 0 | 0 | 649 | 0 | 0 | 76 | 0 |
| Confl. Peds. (#/hr) | 9 | | 9 | 38 | | 38 | | | | 2 | | 2 |
| Confl. Bikes (#/hr) | | | 11 | | | | 4 | | | | | 2 |
| Turn Type | Perm | | | | | | | | | Perm | | |
| Protected Phases | 1 | | | | | | 2 | | | 2 | | |
| Permitted Phases | 1 | | | | | | | | | 2 | | |
| Actuated Green, G (s) | 22.5 | | | | | | 15.5 | | | 15.5 | | |
| Effective Green, g (s) | 22.5 | | | | | | 15.5 | | | 15.5 | | |
| Actuated g/C Ratio | 0.50 | | | | | | 0.34 | | | 0.34 | | |
| Clearance Time (s) | 3.5 | | | | | | 3.5 | | | 3.5 | | |
| Lane Grp Cap (vph) | 500 | | | | | | 631 | | | 448 | | |
| v/s Ratio Prot | | | | | | | c0.35 | | | | | |
| v/s Ratio Perm | c1.02 | | | | | | | | | 0.06 | | |
| v/c Ratio | 2.03 | | | | | | 1.03 | | | 0.17 | | |
| Uniform Delay, d1 | 11.2 | | | | | | 14.8 | | | 10.3 | | |
| Progression Factor | 1.00 | | | | | | 1.00 | | | 0.08 | | |
| Incremental Delay, d2 | 470.9 | | | | | | 43.3 | | | 0.8 | | |
| Delay (s) | 482.2 | | | | | | 58.0 | | | 1.5 | | |
| Level of Service | F | | | | | | E | | | A | | |
| Approach Delay (s) | 482.2 | | | 0.0 | | | 58.0 | | | 1.5 | | |
| Approach LOS | F | | | A | | | E | | | A | | |

| Intersection Summary | | | | |
|-----------------------------------|-------|----------------------|-----|--|
| HCM Average Control Delay | 304.0 | HCM Level of Service | F | |
| HCM Volume to Capacity ratio | 1.62 | | | |
| Actuated Cycle Length (s) | 45.0 | Sum of lost time (s) | 7.0 | |
| Intersection Capacity Utilization | 62.1% | ICU Level of Service | B | |
| Analysis Period (min) | 15 | | | |

c Critical Lane Group

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (WB) & Grand Avenue

Near-Term + I PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|------------------------|-------|------|-------|------|------|-------|
| Lane Configurations | ←↑↑ | ↑↑↑ | ↑↑↑ | ↑↑↑ | ←↑↑ | ↑↑↑ |
| Volume (vph) | 192 | 170 | 1199 | 862 | 149 | 847 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 0.85 | 0.94 | 1.00 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3314 | 1770 | 3539 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3314 | 1770 | 3539 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 209 | 185 | 1276 | 937 | 162 | 921 |
| RTOR Reduction (vph) | 0 | 152 | 136 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 209 | 33 | 2077 | 0 | 162 | 921 |
| Turn Type | Perm | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | |
| Permitted Phases | 4 | | | | 2 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 39.9 | | 22.1 | 66.0 |
| Actuated g/C Ratio | 0.18 | 0.18 | 0.44 | | 0.25 | 0.73 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 315 | 281 | 1469 | | 435 | 2595 |
| v/s Ratio Prot | c0.12 | | c0.63 | | 0.09 | c0.26 |
| v/s Ratio Perm | | 0.02 | | | | |
| v/c Ratio | 0.66 | 0.12 | 1.41 | | 0.37 | 0.35 |
| Uniform Delay, d1 | 34.5 | 31.1 | 25.0 | | 28.2 | 4.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.66 | 0.46 |
| Incremental Delay, d2 | 5.2 | 0.2 | 190.2 | | 1.9 | 0.3 |
| Delay (s) | 39.7 | 31.3 | 215.3 | | 20.3 | 2.3 |
| Level of Service | D | C | F | | C | A |
| Approach Delay (s) | 35.7 | | 215.3 | | 5.0 | |
| Approach LOS | D | | F | | A | |

| Intersection Summary | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 134.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 0.97 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 89.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

c Critical Lane Group

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term + I PM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|-------|-------|------|------|-------|-------|------|-------|------|-----------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 703 | 490 | 1062 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.0 |
| Lane Util. Factor | | | | 0.94 | 0.95 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 0.95 |
| Frt | | | | 0.99 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 |
| Flt Protected | | | | 0.96 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 4962 | 3539 | 3539 | 1583 | 1770 | 1770 | 3539 | 3539 |
| Flt Permitted | | | | 0.96 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 4962 | 3539 | 3539 | 1583 | 1770 | 1770 | 3539 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 329 | 1480 | 154 | 0 | 614 | 764 | 533 | 1154 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 52 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1952 | 0 | 0 | 614 | 712 | 533 | 1154 | 0 |
| Turn Type | Split | | | 4 | | 4 | | Perm | | 1 2 | |
| Protected Phases | | | | 4 | | 2 | | 2 | | 1 2 | |
| Permitted Phases | | | | 4 | | 2 | | 2 | | 1 2 | |
| Actuated Green, G (s) | | | | 30.0 | | 17.5 | | 17.5 | | 29.5 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | 17.5 | | 17.5 | | 29.5 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | 0.19 | | 0.19 | | 0.33 0.57 | |
| Clearance Time (s) | | | | 4.5 | | 4.5 | | 4.5 | | 4.0 4.0 | |
| Vehicle Extension (s) | | | | 3.0 | | 3.0 | | 3.0 | | 3.0 3.0 | |
| Lane Grp Cap (vph) | 1654 | | | | | 688 | | 308 | | 580 2005 | |
| v/s Ratio Prot | c0.39 | | | | | 0.17 | | c0.30 | | 0.33 | |
| v/s Ratio Perm | | | | | | | | c0.45 | | | |
| v/c Ratio | 1.18 | | | 0.89 | | 2.31 | | 0.92 | | 0.58 | |
| Uniform Delay, d1 | 30.0 | | | 35.3 | | 36.2 | | 29.1 | | 12.5 | |
| Progression Factor | 1.00 | | | 1.48 | | 1.55 | | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 87.6 | | | 1.9 | | 591.8 | | 19.6 | | 0.4 | |
| Delay (s) | 117.6 | | | 54.1 | | 648.0 | | 48.7 | | 12.9 | |
| Level of Service | F | | | D | | F | | D | | B | |
| Approach Delay (s) | 0.0 | 117.6 | | | 383.3 | | | | 24.2 | | |
| Approach LOS | A | F | | | F | | | | C | | |

Near-Term (2015) plus Project (Phase I and II) Conditions

Level Of Service Computation Report
 2000 HCM Unsignalized Method (Future Volume Alternative)
 Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
 Average Delay (sec/veh): 13.0 Worst Case Level Of Service: E[45.4]
 Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp
 Approach: North Bound South Bound East Bound West Bound
 Movement: L - T - R L - T - R L - T - R L - T - R
 Control: Uncontrolled Uncontrolled Yield Sign Yield Sign
 Rights: Include Include Include Include
 Lanes: 0 0 0 0 0 3 0 0 0 0 0 0 1 0 0 0 0 0
 Volume Module:
 Base Vol: 0 0 0 0 1270 0 0 0 517 0 0 0
 Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 Initial Bae: 0 0 0 0 1270 0 0 0 517 0 0 0
 Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0
 PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0
 Initial Fut: 0 0 0 0 1270 0 0 0 517 0 0 0
 User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.93 1.00 1.00 1.00
 PHF Volume: 0 0 0 0 1380 0 0 0 556 0 0 0
 Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0
 FinalVolume: 0 0 0 0 1380 0 0 0 556 0 0 0
 Critical Gap Module:
 Critical Gap: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 6.2 xxxxxx xxxxxx
 FollowUpTim: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 3.3 xxxxxx xxxxxx
 Capacity Module:
 Chnlet Vol: xxxxx xxxxx xxxxxx xxxxx xxxxx 460 xxxxx xxxxx xxxxxx
 Potent Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx 605 xxxxx xxxxx xxxxxx
 Move Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx 605 xxxxx xxxxx xxxxxx
 Volume/Cap: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 0.92 xxxxx xxxxx xxxxx
 Level Of Service Module:
 2Way95thQ: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 11.7 xxxxx xxxxx xxxxxx
 Control Del: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 45.4 xxxxxx xxxxxx xxxxxx
 LOS by Move: * * * * * * * * * * E * * * * *
 Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT
 Shared Cap.: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx
 SharedQueue: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxxx xxxxx xxxxxx
 Shrd ConDel: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxxx xxxxxx xxxxx xxxxxx
 Shared LOS: * * * * * * * * * * * * * * * *
 ApproachDel: xxxxxx xxxxxx 45.4 xxxxxx
 ApproachLOS: * * * * * E * * * * *
 Note: Queue reported is the number of cars per lane.

Traffic 8.0.0715 (c) 2008 Dowling Assoc. Licensed to DMJM HARRIS, OAKLAND, CA

Queues 42: I-880 NB On-ramp & Jackson Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 26 | 364 | 58 | 553 | 182 | 1873 |
| v/c Ratio | 0.06 | 0.72 | 0.13 | 0.80 | 0.20 | 2.21 |
| Control Delay | 11.7 | 23.9 | 5.1 | 23.0 | 8.0 | 565.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.7 | 23.9 | 5.1 | 23.0 | 8.0 | 565.0 |
| Queue Length 50th (ft) | 5 | 80 | 0 | 116 | 26 | ~836 |
| Queue Length 95th (ft) | 17 | #158 | 18 | #275 | 54 | #1066 |
| Internal Link Dist (ft) | 298 | | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 521 | 559 | 492 | 694 | 901 | 848 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.65 | 0.12 | 0.80 | 0.20 | 2.21 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues 44: 5th St. & Oak St.

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 1282 | 382 | 154 |
| v/c Ratio | 1.31 | 0.59 | 0.28 |
| Control Delay | 162.0 | 15.5 | 11.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 162.0 | 15.5 | 11.5 |
| Queue Length 50th (ft) | 161 | 70 | 43 |
| Queue Length 95th (ft) | 237 | 137 | m75 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 982 | 644 | 551 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.31 | 0.59 | 0.28 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Queues 49: Santa Clara Avenue & Oakland Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | NWT | NWR | NET |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 2855 | 137 | 937 |
| v/c Ratio | 1.18 | 0.17 | 0.46 |
| Control Delay | 109.4 | 3.6 | 17.4 |
| Queue Delay | 106.0 | 0.0 | 0.1 |
| Total Delay | 215.5 | 3.6 | 17.5 |
| Queue Length 50th (ft) | 637 | 4 | 122 |
| Queue Length 95th (ft) | 732 | 31 | 158 |
| Internal Link Dist (ft) | 378 | | 334 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 2415 | 817 | 2036 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 403 | 0 | 238 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.42 | 0.17 | 0.52 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Oakland Avenue & I-580 Off-ramp

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | SEL2 | SET | NET | NER |
|-------------------------|-------|-------|------|-------|
| Lane Group Flow (vph) | 585 | 596 | 1434 | 970 |
| v/c Ratio | 1.21 | 1.20 | 0.67 | 2.72 |
| Control Delay | 137.5 | 131.3 | 9.7 | 801.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 137.5 | 131.3 | 9.7 | 801.1 |
| Queue Length 50th (ft) | 270 | ~272 | 154 | ~617 |
| Queue Length 95th (ft) | #455 | #458 | 215 | #819 |
| Internal Link Dist (ft) | 880 | 451 | | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 482 | 497 | 2153 | 356 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.21 | 1.20 | 0.67 | 2.72 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: 27th Street & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|------|-------|-------|------|
| Lane Group Flow (vph) | 236 | 452 | 131 | 74 | 196 | 224 | 489 | 1460 | 239 | 689 |
| v/c Ratio | 0.66 | 0.44 | 0.28 | 0.43 | 0.63 | 0.51 | 0.87 | 1.34 | 1.11 | 0.77 |
| Control Delay | 46.2 | 28.9 | 26.7 | 45.4 | 43.6 | 8.6 | 53.6 | 186.4 | 131.8 | 37.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.2 | 28.9 | 26.7 | 45.4 | 43.6 | 8.6 | 53.6 | 186.4 | 131.8 | 37.0 |
| Queue Length 50th (ft) | 125 | 113 | 55 | 40 | 105 | 0 | 140 | ~577 | ~156 | 187 |
| Queue Length 95th (ft) | #284 | 165 | 107 | 81 | 161 | 56 | #222 | #714 | #301 | 253 |
| Internal Link Dist (ft) | 1001 | | | 87 | | | 632 | | | 676 |
| Turn Bay Length (ft) | 70 | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 355 | 1028 | 467 | 216 | 559 | 619 | 572 | 1092 | 216 | 897 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.66 | 0.44 | 0.28 | 0.34 | 0.35 | 0.36 | 0.85 | 1.34 | 1.11 | 0.77 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
5: 27th Street & Telegraph Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|----------|----------|------|-------|------|------|------|
| Lane Group Flow (vph) | 228 | 445 | 149 | 70 | 717 | 125 | 228 | 600 | 145 | 884 |
| v/c Ratio | 0.78 | 0.60 | 0.21 | 0.20 | 1.15 | 0.21 | 1.59 | 0.44 | 0.57 | 0.62 |
| Control Delay | 35.9 | 25.3 | 4.2 | 20.0 | 121.3 | 13.3 | 317.7 | 13.5 | 31.1 | 16.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 35.9 | 25.3 | 4.2 | 20.0 | 121.3 | 13.3 | 317.7 | 13.5 | 31.1 | 16.5 |
| Queue Length 50th (ft) | 67 | 190 | 0 | 24 | ~487 | 9 | ~180 | 77 | 60 | 135 |
| Queue Length 95th (ft) | #177 | 302 | 37 | m45m#695 | m41m#290 | m97 | 127 | 197 | | |
| Internal Link Dist (ft) | 468 | | | 962 | | 1466 | | 318 | | |
| Turn Bay Length (ft) | | | | 150 | | 70 | | 80 | | |
| Base Capacity (vph) | 311 | 746 | 711 | 438 | 623 | 599 | 143 | 1361 | 254 | 1427 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.73 | 0.60 | 0.21 | 0.16 | 1.15 | 0.21 | 1.59 | 0.44 | 0.57 | 0.62 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Queues
12: Grand Avenue & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBT | NBR | SBT |
|-------------------------|------|------|------|------|------|------|-----------|-------|------|
| Lane Group Flow (vph) | 154 | 692 | 143 | 381 | 910 | 46 | 1637 | 1227 | 741 |
| v/c Ratio | 0.51 | 0.56 | 0.26 | 0.77 | 0.62 | 0.07 | 0.96 | 1.58 | 0.44 |
| Control Delay | 49.0 | 29.1 | 15.3 | 52.2 | 26.0 | 6.2 | 46.0 | 286.2 | 24.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.0 | 29.1 | 15.3 | 52.2 | 26.0 | 6.2 | 46.0 | 286.2 | 24.7 |
| Queue Length 50th (ft) | 48 | 190 | 36 | 120 | 236 | 0 | 369 | ~956 | 126 |
| Queue Length 95th (ft) | 78 | 252 | 84 | 170 | 318 | 23 | #478#1214 | 163 | |
| Internal Link Dist (ft) | 526 | | | 509 | | 546 | | 632 | |
| Turn Bay Length (ft) | 240 | | | 230 | | | | | |
| Base Capacity (vph) | 549 | 1225 | 554 | 549 | 1456 | 626 | 1706 | 778 | 1689 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.28 | 0.56 | 0.26 | 0.69 | 0.63 | 0.07 | 0.96 | 1.58 | 0.44 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
24: 20th Street & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| | EBL2 | EBL | NBT | SBT | SBR | SBR2 | SER | SER2 |
|-------------------------|------|------|-------|------|------|------|------|------|
| Lane Group | EBL2 | EBL | NBT | SBT | SBR | SBR2 | SER | SER2 |
| Lane Group Flow (vph) | 15 | 564 | 1040 | 346 | 157 | 55 | 168 | 115 |
| v/c Ratio | 0.15 | 0.48 | 1.30 | 0.54 | 0.24 | 0.07 | 0.93 | 0.29 |
| Control Delay | 34.9 | 21.3 | 168.9 | 39.3 | 21.6 | 11.7 | 85.8 | 7.5 |
| Queue Delay | 0.0 | 0.0 | 539.3 | 3.1 | 1.7 | 0.0 | 0.0 | 0.0 |
| Total Delay | 34.9 | 21.3 | 708.2 | 42.5 | 23.3 | 11.7 | 85.8 | 7.5 |
| Queue Length 50th (ft) | 6 | 63 | ~308 | 86 | 59 | 0 | 73 | 0 |
| Queue Length 95th (ft) | 24 | 93 | #423 | 129 | 117 | m30 | #182 | 38 |
| Internal Link Dist (ft) | | 450 | 601 | 103 | | | | |
| Turn Bay Length (ft) | 100 | 100 | | | 90 | 90 | 75 | 75 |
| Base Capacity (vph) | 101 | 1183 | 803 | 637 | 667 | 762 | 181 | 402 |
| Starvation Cap Reductn | 0 | 0 | 0 | 193 | 367 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 22 | 614 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.15 | 0.49 | 5.50 | 0.78 | 0.52 | 0.07 | 0.93 | 0.29 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

AECOM

Synchro 7 - Report

Queues
42: I-880 NB On-ramp & Jackson Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
| Lane Group Flow (vph) | 8 | 401 | 61 | 765 | 235 | 1682 |
| v/c Ratio | 0.02 | 0.90 | 0.15 | 0.98 | 0.22 | 1.79 |
| Control Delay | 17.6 | 49.1 | 7.0 | 44.3 | 6.8 | 376.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 17.6 | 49.1 | 7.0 | 44.3 | 6.8 | 376.7 |
| Queue Length 50th (ft) | 2 | 140 | 0 | 240 | 37 | ~948 |
| Queue Length 95th (ft) | 11 | #284 | 24 | #480 | 66 | #1192 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 417 | 450 | 402 | 779 | 1075 | 941 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.02 | 0.89 | 0.15 | 0.98 | 0.22 | 1.79 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

AECOM

Synchro 7 - Report

Queues
44: 5th St. & Oak St.

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| | EBT | NBT | SBT |
|-------------------------|-------|------|------|
| Lane Group | EBT | NBT | SBT |
| Lane Group Flow (vph) | 1069 | 660 | 76 |
| v/c Ratio | 2.04 | 1.03 | 0.17 |
| Control Delay | 492.1 | 62.2 | 1.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 492.1 | 62.2 | 1.6 |
| Queue Length 50th (ft) | 171 | ~172 | 1 |
| Queue Length 95th (ft) | #242 | #354 | m2 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 524 | 643 | 448 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 2.04 | 1.03 | 0.17 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

AECOM

Synchro 7 - Report

Queues
45: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study






| | NWL | NWR | NET | SWL | SWT |
|-------------------------|------|------|-------|------|------|
| Lane Group | NWL | NWR | NET | SWL | SWT |
| Lane Group Flow (vph) | 209 | 185 | 2298 | 162 | 946 |
| v/c Ratio | 0.66 | 0.43 | 1.43 | 0.37 | 0.36 |
| Control Delay | 44.0 | 7.7 | 220.7 | 21.3 | 2.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.0 | 7.7 | 220.7 | 21.3 | 2.5 |
| Queue Length 50th (ft) | 112 | 0 | ~906 | 41 | 23 |
| Queue Length 95th (ft) | 169 | 50 | #1085 | m88 | m93 |
| Internal Link Dist (ft) | 560 | | 322 | | 429 |
| Turn Bay Length (ft) | 150 | | | 150 | |
| Base Capacity (vph) | 511 | 589 | 1605 | 435 | 2594 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.41 | 0.31 | 1.43 | 0.37 | 0.36 |







Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

AECOM

Synchro 7 - Report

| |  |  |  |  |  |
|-------------------------|---|---|---|---|---|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1963 | 614 | 805 | 533 | 1179 |
| v/c Ratio | 1.18 | 0.89 | 2.24 | 0.92 | 0.58 |
| Control Delay | 116.3 | 54.2 | 583.9 | 52.7 | 13.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 116.3 | 54.2 | 583.9 | 52.7 | 13.8 |
| Queue Length 50th (ft) | 479 | 191 | ~728 | 289 | 210 |
| Queue Length 95th (ft) | 574 | m151 | m#508 | #485 | 269 |
| Internal Link Dist (ft) | 1276 | 429 | | 958 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1665 | 688 | 359 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.18 | 0.89 | 2.24 | 0.92 | 0.58 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | |

| |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
| Lane Group Flow (vph) | 405 | 1539 | 667 | 1129 | 384 | 264 |
| v/c Ratio | 0.81 | 1.57 | 1.44 | 1.11 | 1.63 | 0.13 |
| Control Delay | 21.6 | 280.1 | 221.4 | 31.3 | 329.8 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 21.6 | 280.1 | 221.4 | 31.3 | 329.8 | 8.4 |
| Queue Length 50th (ft) | 182 | ~723 | ~556 | 293 | ~318 | 32 |
| Queue Length 95th (ft) | m123 | m#483 | m#359 | #389 | #491 | 49 |
| Internal Link Dist (ft) | | 1206 | | 1205 | | 1978 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 979 | 463 | 1324 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.81 | 1.57 | 1.44 | 0.85 | 1.63 | 0.13 |
| Intersection Summary | | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |
| dr | Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | |

Cumulative (2030) plus Project (Phase I and II) Conditions

Level Of Service Computation Report
 2000 HCM Unsignalized Method (Future Volume Alternative)
 Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
 Average Delay (sec/veh): 36.0 Worst Case Level Of Service: F[123.7]
 Street Name: Harrison Street Stanley Place / I-580 EB Off-Ramp
 Approach: North Bound South Bound East Bound West Bound
 Movement: L - T - R L - T - R L - T - R L - T - R
 Control: Uncontrolled Include Uncontrolled Include Yield Sign Include Yield Sign
 Rights: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 Lanes: 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0
 Volume Module:
 Base Vol: 0 0 0 0 1463 0 0 0 607 0 0 0
 Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 Initial Bae: 0 0 0 0 1463 0 0 0 607 0 0 0
 Added Vol: 0 0 0 0 0 0 0 0 0 0 0 0
 PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0
 Initial Fut: 0 0 0 0 1463 0 0 0 607 0 0 0
 User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
 PHF Adj: 1.00 1.00 1.00 1.00 0.92 1.00 1.00 1.00 0.93 1.00 1.00 1.00
 PHF Volume: 0 0 0 0 1590 0 0 0 653 0 0 0
 Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0
 FinalVolume: 0 0 0 0 1590 0 0 0 653 0 0 0
 Critical Gap Module:
 Critical Gap: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 6.2 xxxxxx xxxxxx
 FollowUpTim: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 3.3 xxxxxx xxxxxx
 Capacity Module:
 Chflict Vol: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 530 xxxxx xxxxx xxxxxx
 Potent Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 553 xxxxx xxxxx xxxxxx
 Move Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 553 xxxxx xxxxx xxxxxx
 Volume/Cap: xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx 1.18 xxxxx xxxxx xxxxx
 Level Of Service Module:
 2Way95thQ: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx 23.1 xxxxx xxxxx xxxxxx
 Control Del: xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx 123.7 xxxxxx xxxxxx
 LOS by Move: *
 Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT
 Shared Cap: xxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxxx
 SharedQueue: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxxx
 Shrd ConDel: xxxxxx xxxxx xxxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxxx
 Shared LOS: *
 ApproachDel: xxxxxx xxxxxx 123.7 xxxxxx
 ApproachLOS: *
 Note: Queue reported is the number of cars per lane.

Traffic 8.0.0715 (c) 2008 Dowling Assoc. Licensed to DMJM HARRIS, OAKLAND, CA

Queues 2: I-580 EB On-Ramp & Oakland Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | SEL2 | SET | NET | NER |
|-------------------------|------|------|------|-------|
| Lane Group Flow (vph) | 388 | 394 | 1297 | 633 |
| v/c Ratio | 0.86 | 0.85 | 0.58 | 1.59 |
| Control Delay | 38.4 | 37.0 | 8.0 | 301.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 38.4 | 37.0 | 8.0 | 301.7 |
| Queue Length 50th (ft) | 113 | 115 | 131 | ~354 |
| Queue Length 95th (ft) | #250 | #250 | 182 | #530 |
| Internal Link Dist (ft) | 880 | 451 | | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 494 | 507 | 2246 | 398 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.79 | 0.78 | 0.58 | 1.59 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues 3: 27th Street & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 90 | 153 | 203 | 125 | 217 | 186 | 566 | 786 | 177 | 1787 |
| v/c Ratio | 0.43 | 0.24 | 0.70 | 0.64 | 0.66 | 0.44 | 0.80 | 0.58 | 0.70 | 1.61 |
| Control Delay | 43.2 | 30.8 | 44.7 | 53.2 | 43.4 | 8.1 | 44.1 | 25.4 | 53.2 | 302.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 43.2 | 30.8 | 44.7 | 53.2 | 43.4 | 8.1 | 44.1 | 25.4 | 53.2 | 302.5 |
| Queue Length 50th (ft) | 48 | 39 | 102 | 68 | 116 | 0 | 152 | 194 | 94 | ~827 |
| Queue Length 95th (ft) | 95 | 61 | 162 | #126 | 174 | 50 | #263 | 267 | #210 | #982 |
| Internal Link Dist (ft) | | 998 | | | 87 | | | 632 | | 676 |
| Turn Bay Length (ft) | | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 208 | 904 | 397 | 216 | 580 | 594 | 710 | 1350 | 257 | 1113 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.43 | 0.17 | 0.51 | 0.58 | 0.37 | 0.31 | 0.80 | 0.58 | 0.69 | 1.61 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues 12: Grand Avenue & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBT | NBR | SBT |
|-------------------------|------|------|------|-------|------|------|--------|------|-------|
| Lane Group Flow (vph) | 128 | 282 | 110 | 920 | 907 | 149 | 1477 | 428 | 1880 |
| v/c Ratio | 0.46 | 0.24 | 0.22 | 1.68 | 0.61 | 0.22 | 3.84dl | 0.55 | 1.43 |
| Control Delay | 48.8 | 25.1 | 25.4 | 341.4 | 25.3 | 6.1 | 117.2 | 5.2 | 224.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.8 | 25.1 | 25.4 | 341.4 | 25.3 | 6.1 | 117.2 | 5.2 | 224.0 |
| Queue Length 50th (ft) | 40 | 68 | 49 | ~443 | 232 | 9 | ~413 | 0 | ~593 |
| Queue Length 95th (ft) | 69 | 101 | 93 | #565 | 312 | 49 | #508 | 65 | #691 |
| Internal Link Dist (ft) | | 526 | | | 2242 | | 546 | | 632 |
| Turn Bay Length (ft) | 240 | | | 230 | | | | | |
| Base Capacity (vph) | 549 | 1168 | 489 | 549 | 1482 | 693 | 1260 | 785 | 1318 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.23 | 0.24 | 0.22 | 1.68 | 0.61 | 0.22 | 1.17 | 0.55 | 1.43 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Queues
42: I-880 NB On-ramp & Jackson Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|------|------|-------|
| Lane Group Flow (vph) | 29 | 418 | 66 | 636 | 209 | 2153 |
| v/c Ratio | 0.06 | 0.79 | 0.14 | 0.95 | 0.24 | 2.66 |
| Control Delay | 11.7 | 28.2 | 4.9 | 42.6 | 8.4 | 766.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.7 | 28.2 | 4.9 | 42.6 | 8.4 | 766.6 |
| Queue Length 50th (ft) | 5 | 96 | 0 | 149 | 30 | 1016 |
| Queue Length 95th (ft) | 18 | #210 | 19 | #333 | 61 | #1255 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 521 | 559 | 497 | 666 | 878 | 809 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.06 | 0.75 | 0.13 | 0.95 | 0.24 | 2.66 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

AECOM

Synchro 7 - Report

Queues
44: 5th St. & Oak St.

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|------|------|
| Lane Group Flow (vph) | 1474 | 438 | 176 |
| v/c Ratio | 1.50 | 0.68 | 0.32 |
| Control Delay | 248.6 | 18.5 | 11.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 248.6 | 18.5 | 11.2 |
| Queue Length 50th (ft) | 203 | 85 | 50 |
| Queue Length 95th (ft) | #282 | #177 | m67 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 982 | 644 | 551 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.50 | 0.68 | 0.32 |

| Intersection Summary | | | |
|---|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

AECOM

Synchro 7 - Report

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|-------|------|------|------|------|
| Lane Group Flow (vph) | 1990 | 527 | 300 | 407 | 1734 |
| v/c Ratio | 1.26 | 0.90 | 0.77 | 0.63 | 0.85 |
| Control Delay | 116.0 | 63.7 | 34.7 | 32.7 | 24.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 116.0 | 63.7 | 34.7 | 32.7 | 24.0 |
| Queue Length 50th (ft) | 572 | 186 | 95 | 224 | 485 |
| Queue Length 95th (ft) | #668 | #283 | #224 | 329 | 598 |
| Internal Link Dist (ft) | 1105 | 413 | | 511 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1700 | 584 | 390 | 651 | 2037 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.17 | 0.90 | 0.77 | 0.63 | 0.85 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | |

AECOM

Synchro 7 - Report

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
|-------------------------|------|------|------|------|-------|------|
| Lane Group Flow (vph) | 284 | 822 | 360 | 802 | 857 | 561 |
| v/c Ratio | 0.58 | 0.87 | 0.70 | 0.89 | 1.58 | 0.26 |
| Control Delay | 26.1 | 32.0 | 18.5 | 50.2 | 298.4 | 10.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.1 | 32.0 | 18.5 | 50.2 | 298.4 | 10.0 |
| Queue Length 50th (ft) | 137 | 263 | 107 | 274 | -842 | 87 |
| Queue Length 95th (ft) | m157 | m272 | m85 | #384 | #1079 | 116 |
| Internal Link Dist (ft) | | 774 | | 703 | | 185 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 969 | 524 | 902 | 542 | 2170 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.57 | 0.85 | 0.69 | 0.89 | 1.58 | 0.26 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | | |

AECOM

Synchro 7 - Report

Queues
49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | NWT | NWR | NET |
|---|-------|------|------|
| Lane Group Flow (vph) | 3343 | 162 | 1106 |
| v/c Ratio | 1.38 | 0.20 | 0.89 |
| Control Delay | 198.5 | 4.4 | 18.4 |
| Queue Delay | 195.8 | 0.0 | 0.2 |
| Total Delay | 394.4 | 4.4 | 18.6 |
| Queue Length 50th (ft) | 826 | 9 | 151 |
| Queue Length 95th (ft) | 919 | 41 | 193 |
| Internal Link Dist (ft) | 378 | | 334 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 2415 | 818 | 2036 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 578 | 0 | 238 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.82 | 0.20 | 0.62 |
| Intersection Summary | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | |

AECOM

Synchro 7 - Report

Queues
50: MacArthur Blvd (WB) & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | NWL | NWT | SWT |
|---|-------|-------|-------|
| Lane Group Flow (vph) | 942 | 2909 | 1613 |
| v/c Ratio | 1.08 | 1.07 | 1.41 |
| Control Delay | 61.0 | 54.1 | 213.5 |
| Queue Delay | 190.7 | 215.2 | 0.0 |
| Total Delay | 251.7 | 269.3 | 213.5 |
| Queue Length 50th (ft) | 455 | ~462 | ~583 |
| Queue Length 95th (ft) | 309 | m306 | #718 |
| Internal Link Dist (ft) | | 191 | 1680 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 876 | 2731 | 1148 |
| Starvation Cap Reductn | 252 | 852 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.51 | 1.55 | 1.41 |
| Intersection Summary | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

AECOM

Synchro 7 - Report

Queues
2: Oakland Avenue & I-580 Off-ramp

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | SEL2 | SET | NET | NER |
|---|-------|-------|------|-------|
| Lane Group Flow (vph) | 741 | 754 | 1792 | 1049 |
| v/c Ratio | 1.50 | 1.48 | 0.86 | 2.95 |
| Control Delay | 257.8 | 248.0 | 15.6 | 899.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 257.8 | 248.0 | 15.6 | 899.7 |
| Queue Length 50th (ft) | 418 | ~423 | 232 | ~678 |
| Queue Length 95th (ft) | 621 | #627 | 331 | #886 |
| Internal Link Dist (ft) | | 880 | 451 | |
| Turn Bay Length (ft) | | | | |
| Base Capacity (vph) | 495 | 511 | 2153 | 356 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.50 | 1.48 | 0.83 | 2.95 |
| Intersection Summary | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | |
| Queue shown is maximum after two cycles. | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| Queue shown is maximum after two cycles. | | | | |

AECOM

Synchro 7 - Report

Queues
3: 27th Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|------|------|------|------|------|------|------|-------|-------|------|
| Lane Group Flow (vph) | 268 | 516 | 192 | 86 | 224 | 255 | 552 | 1577 | 277 | 827 |
| v/c Ratio | 0.81 | 0.51 | 0.42 | 0.48 | 0.67 | 0.52 | 0.97 | 1.44 | 1.28 | 0.93 |
| Control Delay | 58.6 | 30.2 | 30.0 | 46.6 | 43.6 | 8.1 | 68.7 | 232.6 | 192.6 | 50.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 58.6 | 30.2 | 30.0 | 46.6 | 43.6 | 8.1 | 68.7 | 232.6 | 192.6 | 50.2 |
| Queue Length 50th (ft) | 147 | 134 | 88 | 47 | 120 | 0 | 162 | ~653 | ~202 | 237 |
| Queue Length 95th (ft) | 349 | 189 | 156 | 92 | 179 | 57 | #264 | #790 | #355 | #354 |
| Internal Link Dist (ft) | | 1001 | | | 87 | | | 632 | | 676 |
| Turn Bay Length (ft) | 70 | | | | | | 90 | | 70 | |
| Base Capacity (vph) | 330 | 1015 | 460 | 216 | 559 | 641 | 572 | 1092 | 216 | 891 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.81 | 0.51 | 0.42 | 0.40 | 0.40 | 0.40 | 0.97 | 1.44 | 1.28 | 0.93 |
| Intersection Summary | | | | | | | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | | | | | |

AECOM

Synchro 7 - Report

Queues
5: 27th Street & Telegraph Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|-------------------------|------|------|------|------|-------|------|-------|------|------|------|
| Lane Group Flow (vph) | 260 | 505 | 170 | 79 | 798 | 142 | 259 | 692 | 167 | 1024 |
| v/c Ratio | 0.85 | 0.68 | 0.24 | 0.26 | 1.31 | 0.24 | 2.62 | 0.51 | 0.78 | 0.72 |
| Control Delay | 45.2 | 28.3 | 4.2 | 20.3 | 181.8 | 14.3 | 769.0 | 14.0 | 49.9 | 19.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.2 | 28.3 | 4.2 | 20.3 | 181.8 | 14.3 | 769.0 | 14.0 | 49.9 | 19.4 |
| Queue Length 50th (ft) | 86 | 226 | 0 | 27 | ~582 | 13 | ~241 | 91 | 76 | 177 |
| Queue Length 95th (ft) | #222 | #369 | 40 | m46m | #729 | m45m | #354 | m109 | #189 | 252 |
| Internal Link Dist (ft) | 468 | | | 962 | | | 1466 | | 318 | |
| Turn Bay Length (ft) | | | | 150 | | | 70 | | 80 | |
| Base Capacity (vph) | 311 | 741 | 720 | 391 | 611 | 589 | 99 | 1360 | 215 | 1427 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.84 | 0.68 | 0.24 | 0.20 | 1.31 | 0.24 | 2.62 | 0.51 | 0.78 | 0.72 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Queues
12: Grand Avenue & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBT | NBR | SBT |
|-------------------------|------|------|------|------|------|------|------|-------|------|
| Lane Group Flow (vph) | 426 | 795 | 180 | 429 | 1042 | 57 | 1710 | 1541 | 1017 |
| v/c Ratio | 0.82 | 0.66 | 0.34 | 0.83 | 0.84 | 0.11 | 1.01 | 2.00 | 0.62 |
| Control Delay | 55.2 | 31.7 | 21.2 | 55.5 | 38.0 | 20.2 | 56.9 | 474.3 | 26.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 55.2 | 31.7 | 21.2 | 55.5 | 38.0 | 20.2 | 56.9 | 474.3 | 26.0 |
| Queue Length 50th (ft) | 136 | 228 | 65 | 137 | 323 | 20 | ~402 | ~1396 | 176 |
| Queue Length 95th (ft) | #201 | 296 | 123 | #203 | #422 | 49 | #517 | #1660 | 224 |
| Internal Link Dist (ft) | 526 | | | 509 | | | 546 | | 632 |
| Turn Bay Length (ft) | 240 | | | 230 | | | | | |
| Base Capacity (vph) | 549 | 1199 | 530 | 549 | 1236 | 515 | 1693 | 770 | 1634 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 0.66 | 0.34 | 0.78 | 0.84 | 0.11 | 1.01 | 2.00 | 0.62 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
13: 21st Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | NBL | NBT | SBT |
|-------------------------|------|------|-------|------|
| Lane Group Flow (vph) | 1064 | 129 | 1867 | 1374 |
| v/c Ratio | 0.81 | 0.48 | 1.34 | 0.58 |
| Control Delay | 26.6 | 18.6 | 185.8 | 22.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.6 | 18.6 | 185.8 | 22.0 |
| Queue Length 50th (ft) | 225 | 34 | ~666 | 162 |
| Queue Length 95th (ft) | 286 | 70 | #825 | 211 |
| Internal Link Dist (ft) | 280 | | 400 | 546 |
| Turn Bay Length (ft) | 200 | 160 | | |
| Base Capacity (vph) | 1450 | 289 | 1390 | 2371 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.73 | 0.45 | 1.34 | 0.58 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
24: 20th Street & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL2 | EBL | NBT | SBT | SBR | SBR2 | SER | SER2 |
|-------------------------|------|------|-------|------|------|------|------|------|
| Lane Group Flow (vph) | 14 | 687 | 1492 | 452 | 208 | 124 | 166 | 212 |
| v/c Ratio | 0.14 | 0.58 | 1.87 | 0.71 | 0.31 | 0.16 | 0.92 | 0.44 |
| Control Delay | 34.6 | 23.2 | 418.8 | 45.3 | 23.8 | 11.8 | 83.4 | 7.3 |
| Queue Delay | 0.0 | 0.0 | 282.2 | 25.9 | 3.6 | 0.8 | 0.0 | 0.0 |
| Total Delay | 34.6 | 23.3 | 701.0 | 71.2 | 27.5 | 12.6 | 83.4 | 7.3 |
| Queue Length 50th (ft) | 6 | 81 | ~527 | 115 | 85 | 0 | 72 | 0 |
| Queue Length 95th (ft) | 22 | 115 | #653 | #165 | 160 | m54 | #179 | 51 |
| Internal Link Dist (ft) | 450 | 601 | 103 | | | | | |
| Turn Bay Length (ft) | 100 | 100 | | | 90 | 90 | 50 | 50 |
| Base Capacity (vph) | 101 | 1185 | 798 | 633 | 667 | 800 | 181 | 480 |
| Starvation Cap Reductn | 0 | 0 | 0 | 189 | 368 | 462 | 0 | 0 |
| Spillback Cap Reductn | 0 | 24 | 705 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.14 | 0.59 | 16.04 | 1.02 | 0.70 | 0.37 | 0.92 | 0.44 |

Intersection Summary
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Queues
32: 14th Street & Lakeside Dr.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBT | WBT | WBR | NBT | NBR |
|-------------------------|-------|------|------|------|------|
| Lane Group Flow (vph) | 1243 | 516 | 317 | 1067 | 53 |
| v/c Ratio | 1.40 | 0.49 | 0.60 | 0.58 | 0.07 |
| Control Delay | 209.7 | 19.1 | 16.3 | 11.0 | 6.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 3.5 | 0.0 |
| Total Delay | 209.7 | 19.1 | 16.3 | 14.5 | 6.7 |
| Queue Length 50th (ft) | 327 | 79 | 56 | 124 | 8 |
| Queue Length 95th (ft) | 442 | 120 | 130 | 174 | 21 |
| Internal Link Dist (ft) | 299 | 570 | | 197 | |
| Turn Bay Length (ft) | | | | | |
| Base Capacity (vph) | 888 | 1062 | 525 | 1852 | 813 |
| Starvation Cap Reductn | 0 | 0 | 0 | 670 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.40 | 0.49 | 0.60 | 0.90 | 0.07 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |

AECOM

Synchro 7 - Report

Queues
40: 7th St. & Oak St.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT |
|-------------------------|-------|--------|
| Lane Group Flow (vph) | 1798 | 2406 |
| v/c Ratio | 0.701 | 0.93dr |
| Control Delay | 9.4 | 158.0 |
| Queue Delay | 0.0 | 24.4 |
| Total Delay | 9.4 | 182.4 |
| Queue Length 50th (ft) | 88 | ~321 |
| Queue Length 95th (ft) | m91m | #412 |
| Internal Link Dist (ft) | 276 | 196 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 2553 | 1857 |
| Starvation Cap Reductn | 0 | 75 |
| Spillback Cap Reductn | 0 | 0 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 0.70 | 1.35 |

| Intersection Summary | |
|---|--|
| - Volume exceeds capacity, queue is theoretically infinite. | |
| Queue shown is maximum after two cycles. | |
| # 95th percentile volume exceeds capacity, queue may be longer. | |
| Queue shown is maximum after two cycles. | |
| m Volume for 95th percentile queue is metered by upstream signal. | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | |

AECOM

Synchro 7 - Report

Queues
42: I-880 NB On-ramp & Jackson Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | WBL | WBT | WBR | NBT | SBT | SBR |
|-------------------------|------|------|------|-------|------|-------|
| Lane Group Flow (vph) | 9 | 467 | 72 | 891 | 273 | 1955 |
| v/c Ratio | 0.02 | 1.04 | 0.18 | 1.18 | 0.25 | 2.12 |
| Control Delay | 17.6 | 79.4 | 6.7 | 111.2 | 7.1 | 523.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 17.6 | 79.4 | 6.7 | 111.2 | 7.1 | 523.4 |
| Queue Length 50th (ft) | 2 | ~188 | 0 | ~399 | 43 | ~1179 |
| Queue Length 95th (ft) | 12 | #345 | 26 | #596 | 77 | #1429 |
| Internal Link Dist (ft) | | 298 | | 747 | 581 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 417 | 450 | 410 | 757 | 1071 | 924 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.02 | 1.04 | 0.18 | 1.18 | 0.25 | 2.12 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |

AECOM

Synchro 7 - Report

Queues
44: 5th St. & Oak St.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBT | NBT | SBT |
|-------------------------|-------|-------|------|
| Lane Group Flow (vph) | 1237 | 769 | 89 |
| v/c Ratio | 2.36 | 1.20 | 0.20 |
| Control Delay | 634.7 | 122.8 | 1.7 |
| Queue Delay | 14.4 | 18.6 | 0.0 |
| Total Delay | 649.1 | 141.4 | 1.7 |
| Queue Length 50th (ft) | 208 | ~255 | 1 |
| Queue Length 95th (ft) | #282 | #429 | m2 |
| Internal Link Dist (ft) | 310 | 104 | 207 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 524 | 643 | 448 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 7 | 22 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 2.39 | 1.24 | 0.20 |

| Intersection Summary | | | |
|---|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

AECOM

Synchro 7 - Report

Queues
45: El Embarcadero (WB) & Grand Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | NWL | NWR | NET | SWL | SWT |
|-------------------------|------|------|-------|------|------|
| Lane Group Flow (vph) | 225 | 198 | 2604 | 232 | 1267 |
| v/c Ratio | 0.68 | 0.43 | 1.70 | 0.50 | 0.49 |
| Control Delay | 44.0 | 7.4 | 339.9 | 23.2 | 5.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| Total Delay | 44.0 | 7.4 | 339.9 | 23.2 | 5.5 |
| Queue Length 50th (ft) | 120 | 0 | 1139 | 66 | 64 |
| Queue Length 95th (ft) | 179 | 51 | 1281 | m139 | m195 |
| Internal Link Dist (ft) | 560 | | 322 | | 429 |
| Turn Bay Length (ft) | 150 | | | 150 | |
| Base Capacity (vph) | 511 | 598 | 1532 | 462 | 2562 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 611 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.44 | 0.33 | 1.70 | 0.50 | 0.65 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|-------|------|-------|-------|------|
| Lane Group Flow (vph) | 3100 | 661 | 936 | 802 | 1266 |
| v/c Ratio | 1.86 | 0.96 | 2.89 | 1.38 | 0.63 |
| Control Delay | 412.1 | 58.6 | 870.5 | 210.6 | 14.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 412.1 | 58.6 | 870.5 | 210.6 | 14.6 |
| Queue Length 50th (ft) | 969 | 213 | 950 | 612 | 234 |
| Queue Length 95th (ft) | m1061 | m140 | m557 | #833 | 300 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1668 | 688 | 324 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.86 | 0.96 | 2.89 | 1.38 | 0.63 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
|-------------------------|------|-------|-------|-------|-------|------|
| Lane Group Flow (vph) | 479 | 2459 | 1052 | 1685 | 653 | 334 |
| v/c Ratio | 0.96 | 2.48 | 2.30 | 1.91 | 2.77 | 0.16 |
| Control Delay | 27.5 | 685.6 | 602.5 | 166.1 | 825.8 | 8.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 27.5 | 685.6 | 602.5 | 166.1 | 825.8 | 8.6 |
| Queue Length 50th (ft) | 236 | 1359 | 1069 | 654 | 639 | 41 |
| Queue Length 95th (ft) | m84 | m551 | m416 | #793 | #847 | 61 |
| Internal Link Dist (ft) | 1206 | | | 1205 | | 1978 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 990 | 458 | 1298 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.96 | 2.48 | 2.30 | 1.30 | 2.77 | 0.16 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | |

APPENDIX G.8

Collision Summary Sheets

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Page 1

Location: Harrison St / Stanley Pl

Date Range Reported: 1/1/2006 - 12/31/2008

Total Number of Collisions: 2

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|-------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|------------------|------|-----|
| 3074212 | 3/2/07 | 08:51 | 25 | North | Hit Object | Fixed Object | South | Ran Off Road | | | Unsafe Speed | 0 | 0 |
| 3237011 | 6/15/07 | 18:30 | 48 | West | Sideswipe | Parked Motor Vehicle | West | Parked | West | Making Right Turn | Improper Turning | 0 | 0 |

Total Number of Collisions: 2

Settings Used For Query

Parameter

Setting

Street Name

HARRISON ST

Cross Street

STANLEY PL

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

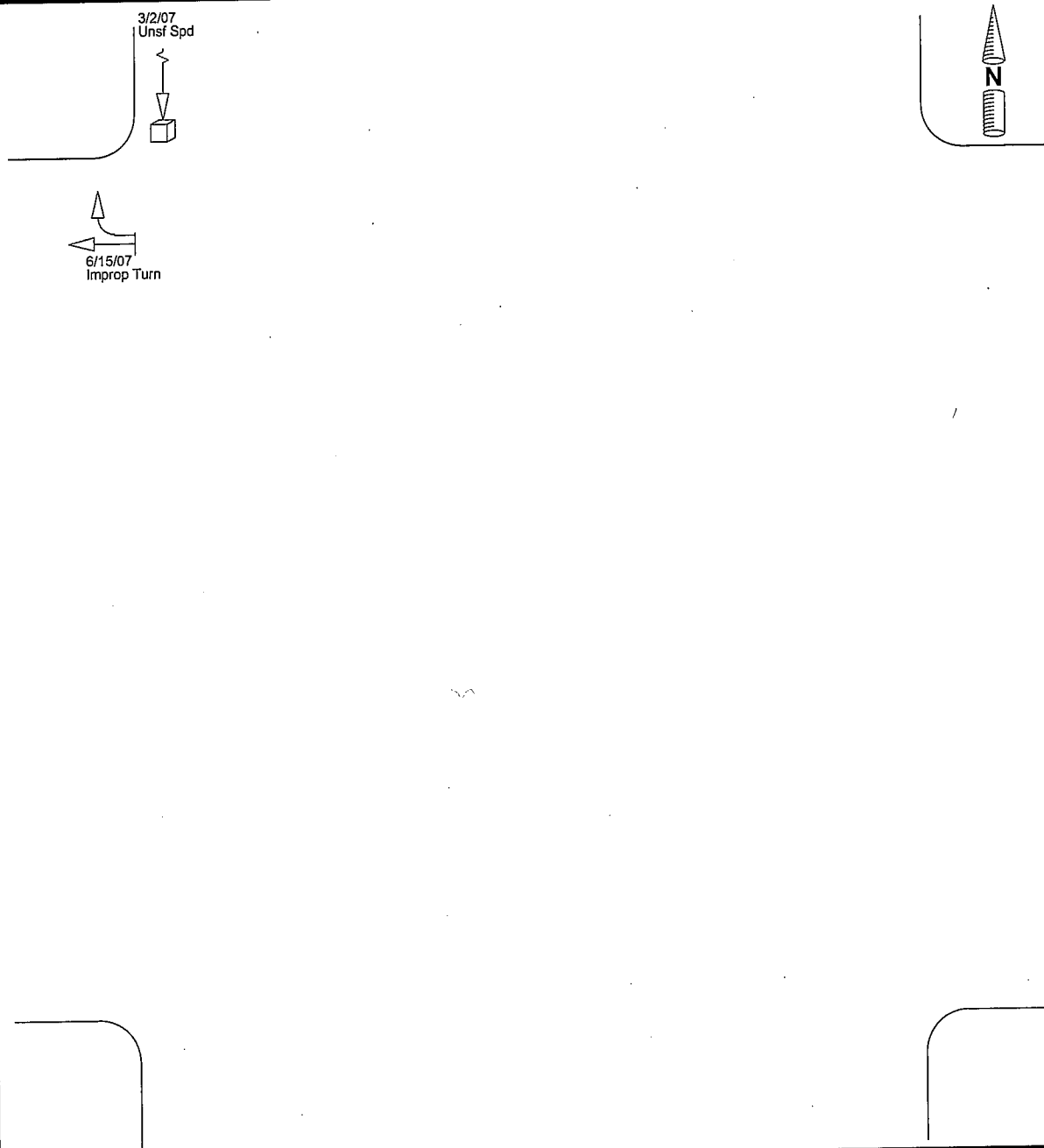
Collision Diagram

Horizontal Street: STANLEY PL

From: 1/1/2006 To: 12/31/2008

Vertical Street: HARRISON ST

Date Prepared: 8/27/2009



Number of Collisions

2 Property Damage Only
0 Injury Collisions
0 Fatal Collisions
2 Total Collisions

Legend

Moving Vehicle
 Stopped Vehicle
 Backing Vehicle
 Ran Off Road
 Movement Unknown

Right Turn
 Left Turn
 Sideswipe
 Day
 Night

Pedestrian
 Fixed Object
 Bicycle
 DUI
 Injury
 Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter

Setting

Street Name

HARRISON ST

Cross Street

STANLEY PL

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Oakland Avenue / Perry Place

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1200773 | 1/7/04 | 15:30 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1248805 | 1/30/04 | 16:36 | 100 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 1517020 | 7/11/04 | 13:15 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Making Left Turn | Improper Turning | 0 | 0 |
| 1999451 | 5/4/05 | 09:40 | 27 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2834308 | 10/5/06 | 07:10 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2903700 | 11/15/06 | 18:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | North | Making Left Turn | Improper Turning | 0 | 0 |
| 2988939 | 1/3/07 | 19:30 | 0 | In Int. | Hit Object | Fixed Object | North | Ran Off Road | | | Improper Turning | 0 | 0 |
| 3115732 | 2/25/07 | 10:50 | 55 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |

Total Number of Collisions: 8

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Harrison Street / 27th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1046002 | 10/3/03 | 14:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | North | Making Left Turn | Improper Turning | 0 | 0 |
| 1060881 | 10/15/03 | 18:30 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Unknown | 0 | 0 |
| 1097604 | 10/31/03 | 17:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Making Left Turn | Improper Turning | 0 | 0 |
| 1132411 | 11/12/03 | 17:12 | 0 | In Int. | Head-On | Other Motor Vehicle | South | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 2 | 0 |
| 1149390 | 11/27/03 | 23:00 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1158322 | 12/1/03 | 15:00 | 0 | In Int. | Hit Object | Fixed Object | South | Making Right Turn | | | Improper Turning | 0 | 0 |
| 1145710 | 12/3/03 | 20:19 | 0 | In Int. | Head-On | Other Motor Vehicle | South | Proceeding Straight | North | Making Left Turn | Other Hazardous Movement | 2 | 0 |
| 1145750 | 12/4/03 | 10:45 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Changing Lanes | West | Making Left Turn | Improper Turning | 0 | 0 |
| 1173795 | 12/13/03 | 09:45 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 1173845 | 12/17/03 | 08:33 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 1221913 | 1/12/04 | 06:46 | 0 | In Int. | Head-On | Other Motor Vehicle | North | Making Left Turn | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1248610 | 1/13/04 | 17:44 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

| | | | | | | icle | | ight | | ight | d Signs | | |
|---------|----------|-------|-----|---------|--------------|-----------------|-------|-----------------|----------|-----------------|--------------------|---|---|
| 1291052 | 2/10/04 | 05:55 | 150 | North | Rear-End | Other Motor Veh | South | Proceeding Stra | South | Parked | Improper Turning | 0 | 0 |
| 1383751 | 4/12/04 | 16:50 | 0 | In Int. | Hit Object | Fixed Object | East | Making Right Tu | | | Improper Turning | 0 | 0 |
| 1517024 | 7/11/04 | 14:36 | 0 | In Int. | Broadside | Motor Vehicle o | West | Making Left Tur | South | Proceeding Stra | Traffic Signals an | 0 | 0 |
| 1883768 | 11/14/04 | 13:00 | 0 | In Int. | Sideswipe | Other Motor Veh | South | Making Left Tur | South | Making Left Tur | Improper Turning | 0 | 0 |
| 1821604 | 12/29/04 | 18:00 | 0 | In Int. | Broadside | Other Motor Veh | North | Making Left Tur | West | Proceeding Stra | Auto R/W Violation | 0 | 0 |
| 2094580 | 6/20/05 | 11:46 | 0 | In Int. | Sideswipe | Other Motor Veh | West | Making Right Tu | West | Making Right Tu | Other | 0 | 0 |
| 2144795 | 7/25/05 | 15:30 | 0 | In Int. | Vehicle - Pe | Other Motor Veh | West | Making Right Tu | West | Proceeding Stra | Other | 1 | 0 |
| 2187871 | 8/19/05 | 07:30 | 0 | In Int. | Sideswipe | Other Motor Veh | East | Proceeding Stra | East | Making Left Tur | Improper Turning | 0 | 0 |
| 2484611 | 1/19/06 | 08:00 | 130 | North | Rear-End | Other Motor Veh | South | Proceeding Stra | South | Stopped in Road | Unsafe Speed | 1 | 0 |
| 2585853 | 4/20/06 | 05:40 | 0 | In Int. | Head-On | Other Motor Veh | North | Making Left Tur | South | Proceeding Stra | Auto R/W Violation | 0 | 0 |
| 2693292 | 6/26/06 | 13:00 | 0 | In Int. | Broadside | Other Motor Veh | East | Making Left Tur | North | Proceeding Stra | Auto R/W Violation | 0 | 0 |
| 2844261 | 10/17/06 | 19:51 | 0 | In Int. | Broadside | Other Motor Veh | East | Making Left Tur | West | Proceeding Stra | Auto R/W Violation | 0 | 0 |
| 2942472 | 12/8/06 | 23:00 | 25 | East | Rear-End | Other Motor Veh | East | Backing | East | Proceeding Stra | Unsafe Starting or | 0 | 0 |
| 2968574 | 12/27/06 | 18:50 | 0 | In Int. | Sideswipe | Other Motor Veh | North | Making Left Tur | West | Proceeding Stra | Auto R/W Violation | 0 | 0 |
| 2989635 | 1/9/07 | 13:12 | 30 | North | Sideswipe | Other Motor Veh | South | Changing Lanes | Not Stat | Proceeding Stra | Unsafe Lane Change | 0 | 0 |

| | | | | | | | | | | | | | |
|---------|---------|-------|---|---------|-----------|-----------------|------|-----------------|-------|-----------------|--------------------|---|---|
| 3098866 | 3/12/07 | 06:07 | 0 | In Int. | Broadside | Other Motor Veh | West | Proceeding Stra | South | Proceeding Stra | Traffic Signals an | 0 | 0 |
| | | | | | | icle | | ight | | ight | d Signs | | |
| 3092822 | 3/18/07 | 10:11 | 0 | In Int. | Broadside | Other Motor Veh | East | Proceeding Stra | North | Proceeding Stra | Traffic Signals an | 2 | 0 |
| | | | | | | icle | | ight | | ight | d Signs | | |

Total Number of Collisions: 29

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Broadway / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1687966 | 10/7/04 | 08:25 | 0 | In Int. | Other | Bicycle | East | Proceeding Straight | North | Proceeding Straight | Wrong Side of Road | 0 | 0 |
| 1821627 | 12/20/04 | 12:00 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Making Right Turn | Unsafe Speed | 0 | 0 |
| 2122641 | 7/1/05 | 14:45 | 20 | North | Sideswipe | Other Motor Vehicle | South | Making Right Turn | South | Stopped in Road | Improper Turning | 0 | 0 |
| 2205392 | 8/26/05 | 12:00 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2241168 | 9/9/05 | 08:30 | 30 | North | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Making Right Turn | Traffic Signals and Signs | 0 | 0 |
| 2361620 | 10/20/05 | 18:15 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2348692 | 11/28/05 | 17:57 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | East | Making Left Turn | West | Other | Ped R/W Violation | 1 | 0 |
| 2474880 | 1/27/06 | 19:50 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2515780 | 2/28/06 | 11:18 | 0 | In Int. | Head-On | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 1 | 0 |
| 2521738 | 3/4/06 | 15:50 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2515857 | 3/5/06 | 19:30 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | East | Making Left Turn | North | Proceeding Straight | Ped R/W Violation | 0 | 0 |
| 2985773 | 1/11/07 | 18:06 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Left Turn | East | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 3045750 | 1/27/07 | 06:37 | 6 | South | Hit Object | Fixed Object | South | Other Unsafe Turning | | | Unsafe Speed | 0 | 0 |
| 3092597 | 2/23/07 | 02:06 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Broadway / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 14

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Broadway |
| Cross Street | 27th Street |
| Starting Date | 10/1/2004 |
| Ending Date | 9/30/2008 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Telegraph Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1831302 | 12/2/04 | 11:20 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 1831336 | 12/11/04 | 06:57 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | North | Proceeding Straight | Not Stated | Making Left Turn | Pedestrian Violation | 1 | 0 |
| 1982840 | 4/13/05 | 05:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2179059 | 8/3/05 | 08:03 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2342288 | 10/20/05 | 11:40 | 9 | West | Broadside | Bicycle | East | Proceeding Straight | South | Proceeding Straight | Other Hazardous Movement | 1 | 0 |
| 2304455 | 10/23/05 | | 40 | East | Sideswipe | Parked Motor Vehicle | East | Proceeding Straight | Not Stated | Parked | Wrong Side of Road | 0 | 0 |
| 2342395 | 10/25/05 | 16:00 | 10 | West | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2386981 | 12/15/05 | 14:40 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2403381 | 12/27/05 | 09:30 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | West | Making Left Turn | Other Hazardous Movement | 0 | 0 |
| 2407359 | 1/3/06 | 22:45 | 0 | In Int. | Not Stated | Non-Collision | West | Making Right Turn | South | Making Right Turn | Improper Turning | 0 | 0 |
| 2458150 | 1/25/06 | 06:15 | 0 | In Int. | Broadside | Bicycle | West | Proceeding Straight | South | Making Right Turn | Traffic Signals and Signs | 0 | 0 |
| 2555890 | 3/19/06 | 18:55 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Making Right Turn | Unknown | 0 | 0 |
| 2844352 | 10/12/06 | 20:54 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Changing Lanes | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 2922096 | 12/4/06 | 10:48 | 17 | South | Broadside | Other Motor Vehicle | East | Making Right Turn | North | Stopped in Road | Improper Turning | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Telegraph Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2946032 | 12/16/06 | 01:51 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Not Stated | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3321511 | 8/1/07 | 10:53 | 20 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |

Total Number of Collisions: 16

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Telegraph Avenue |
| Cross Street | 27th Street |
| Starting Date | 10/1/2004 |
| Ending Date | 9/30/2008 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1708879 | 10/14/04 | 13:05 | 14 | North | Broadside | Other Motor Vehicle | West | Making Right Turn | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 1834061 | 12/30/04 | 15:49 | 0 | In Int. | Head-On | Other Motor Vehicle | Not Stated | Proceeding Straight | Not Stated | Making Left Turn | Traffic Signals and Signs | 1 | 0 |
| 1997496 | 4/19/05 | 18:00 | 0 | In Int. | Other | Bicycle | West | Proceeding Straight | North | Making Right Turn | Improper Turning | 0 | 0 |
| 2044284 | 5/4/05 | 15:50 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Making Right Turn | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 2044356 | 5/17/05 | 16:18 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Making Left Turn | South | Making Left Turn | Improper Turning | 0 | 0 |
| 2059288 | 5/24/05 | 07:15 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2058927 | 5/25/05 | 11:18 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 2 | 0 |
| 2061576 | 6/2/05 | 09:15 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2085069 | 6/10/05 | 17:45 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | South | Proceeding Straight | Improper Turning | 1 | 0 |
| 2094429 | 6/24/05 | 06:50 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Making Left Turn | Improper Turning | 1 | 0 |
| 2158397 | 7/11/05 | 07:35 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Making Left Turn | Traffic Signals and Signs | 1 | 0 |
| 2187878 | 7/13/05 | 16:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2225771 | 9/5/05 | 16:40 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 2257348 | 9/29/05 | 16:15 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2304405 | 9/30/05 | 18:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 2342344 | 10/24/05 | 09:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2348632 | 11/13/05 | 13:00 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Making Left Turn | Traffic Signals and Signs | 2 | 0 |
| 2388230 | 12/1/05 | 17:50 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 2394365 | 12/5/05 | 15:36 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2390572 | 12/20/05 | 16:45 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 2407327 | 1/2/06 | 13:55 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2422608 | 1/5/06 | 16:57 | 0 | In Int. | Not Stated | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2515820 | 3/4/06 | 11:40 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2523369 | 3/11/06 | 12:36 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2555859 | 3/24/06 | 17:57 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Other | 2 | 0 |
| 2615468 | 4/29/06 | 18:25 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 2632398 | 5/6/06 | 10:00 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2639614 | 5/23/06 | 18:06 | 0 | In Int. | Head-On | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 3

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2844398 | 10/17/06 | 17:05 | 5 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2855408 | 10/24/06 | 17:37 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2870549 | 10/27/06 | 17:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Making Right Turn | Unknown | 1 | 0 |
| 2906730 | 11/16/06 | 09:33 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2914037 | 11/19/06 | 19:25 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | East | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 2903732 | 11/21/06 | 15:59 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2942560 | 11/28/06 | 17:50 | 0 | In Int. | Overtured | Not Stated | East | Proceeding Straight | South | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 2922053 | 12/2/06 | 21:33 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Other Unsafe Turning | Not Stated | Parked | Improper Turning | 1 | 0 |
| 3054064 | 12/19/06 | 07:04 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 3056560 | 2/12/07 | 10:45 | 10 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3078694 | 3/10/07 | 09:37 | 0 | In Int. | Hit Object | Fixed Object | South | Other Unsafe Turning | | | Unsafe Speed | 0 | 0 |
| 3296863 | 7/29/07 | 17:51 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 3359543 | 8/30/07 | 09:00 | 10 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 4

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|--------------------------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
| Total Number of Collisions: 41 | | | | | | | | | | | | | |

Settings Used For Query

| <u>Parameter</u> | <u>Setting</u> |
|------------------|----------------------|
| Street Name | Northgate Avenue |
| Cross Street | 27th Street |
| Starting Date | 10/1/2004 |
| Ending Date | 9/30/2008 |
| Intersection | Intersection Related |

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009
Page 1

Location: W Grand Av / Northgate Av
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|------------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|--------------------|------|-----|
| 2586573 | 4/12/06 | 10:22 | 20 | Not Stated | Rear-End | Other Motor Vehicle | Not Stated | Stopped in Road | Not Stated | Slowing/Stopping | Unsafe Speed | 1 | 0 |
| 2901247 | 10/30/06 | 13:35 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Unsafe Speed | 1 | 0 |
| 3184262 | 5/1/07 | 13:45 | 50 | West | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Changing Lanes | Unsafe Lane Change | 0 | 0 |
| 3210728 | 6/5/07 | 09:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Making U Turn | Improper Turning | 0 | 0 |
| 3245802 | 6/29/07 | 13:03 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | West | Making U Turn | Auto R/W Violation | 1 | 0 |
| 3472139 | 8/30/07 | 18:10 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Making Left Turn | Improper Turning | 0 | 0 |

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Page 2

Location: W Grand Av / Northgate Av

Date Range Reported: 1/1/2006 - 12/31/2008

Total Number of Collisions: 6

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 6

Settings Used For Query

Parameter

Setting

Street Name

W GRAND AV

Cross Street

NORTHGATE AV

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

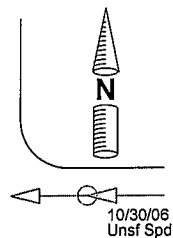
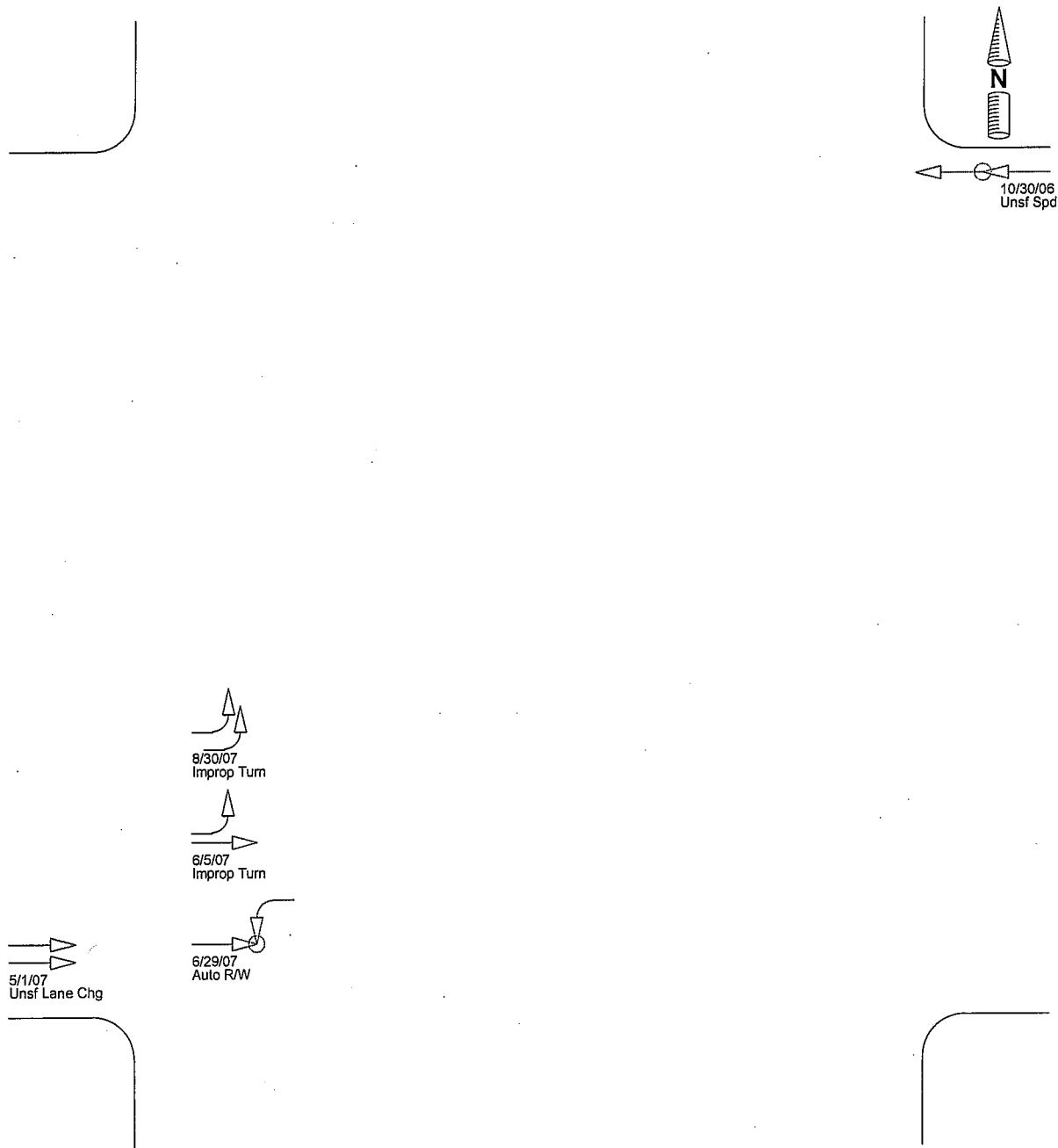
Collision Diagram

Horizontal Street: W GRAND AV

Vertical Street: NORTHGATE AV

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

- 3 Property Damage Only
- 3 Injury Collisions
- 0 Fatal Collisions
- 6 Total Collisions

Collisions Not Plotted: 1

Legend

- ➡ Moving Vehicle
- ➡| Stopped Vehicle
- ➡➡ Backing Vehicle
- ➡~ Ran Off Road
- ➡..... Movement Unknown

- ↗ Right Turn
- ↖ Left Turn
- ↔ Sideswipe
- ☀ Day
- ☀ Night

- 🚶 Pedestrian
- 📦 Fixed Object
- 🚲 Bicycle
- 🍷 DUI
- Injury
- ⊙ Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

| <u>Parameter</u> | <u>Setting</u> |
|------------------|----------------------|
| Street Name | W GRAND AV |
| Cross Street | NORTHGATE AV |
| Starting Date | 1/1/2006 |
| Ending Date | 12/31/2008 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Telegraph Avenue / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1893002 | 12/17/04 | 10:02 | 0 | In Int. | Broadside | Pedestrian | West | Making U Turn | South | Proceeding Straight | Ped R/W Violation | 0 | 0 |
| 1821607 | 12/20/04 | 18:30 | 0 | In Int. | Head-On | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1987251 | 4/9/05 | 19:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1999474 | 4/28/05 | 00:37 | 0 | In Int. | Head-On | Fixed Object | South | Making Left Turn | | | Improper Turning | 1 | 0 |
| 2059291 | 5/26/05 | 08:45 | 0 | In Int. | Head-On | Other Motor Vehicle | West | Making Left Turn | East | Proceeding Straight | Auto R/W Violation | 2 | 0 |
| 2119813 | 6/29/05 | 11:35 | 0 | In Int. | Head-On | Fixed Object | East | Making Right Turn | | | Improper Turning | 0 | 0 |
| 2152405 | 7/6/05 | 12:45 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | South | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2342325 | 10/29/05 | | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Right Turn | East | Proceeding Straight | Driving Under Influence | 0 | 0 |
| 2342084 | 10/29/05 | 00:55 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Right Turn | East | Proceeding Straight | Driving Under Influence | 0 | 0 |
| 2386985 | 12/14/05 | 02:20 | 20 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2396842 | 12/22/05 | 06:45 | 3 | North | Vehicle - Pedestrian | Pedestrian | West | Other | North | Proceeding Straight | Pedestrian Violation | 1 | 0 |
| 2508528 | 2/13/06 | 18:41 | 0 | In Int. | Not Stated | Bicycle | South | Stopped in Road | North | Stopped in Road | Unknown | 1 | 0 |
| 2548597 | 3/25/06 | 01:40 | 0 | In Int. | Head-On | Other Motor Vehicle | North | Making Left Turn | South | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2563239 | 4/4/06 | 22:25 | 2 | East | Hit Object | Fixed Object | East | Proceeding Straight | | | Improper Turning | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Telegraph Avenue / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2683080 | 6/3/06 | 02:10 | 30 | East | Not Stated | Bicycle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 1 | 0 |
| 2703707 | 6/25/06 | 12:17 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 3 | 0 |
| 3109029 | 3/26/07 | 00:23 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Making Left Turn | East | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 3282982 | 7/13/07 | 14:48 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Making Left Turn | East | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 3283192 | 7/20/07 | 09:03 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 3481255 | 9/9/07 | 18:04 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 3

Location: Telegraph Avenue / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 20

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Telegraph Avenue
Grand Avenue
10/1/2004
9/30/2008
Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Broadway / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1735155 | 11/5/04 | 06:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2059374 | 5/28/05 | 15:10 | 0 | In Int. | Broadside | Not Stated | North | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 1 | 0 |
| 2186169 | 8/17/05 | 18:10 | 0 | In Int. | Broadside | Bicycle | West | Making Left Turn | East | Proceeding Straight | Auto R/W Violation | 1 | 0 |
| 2265819 | 10/8/05 | 16:50 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 2496680 | 2/27/06 | 12:35 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Following Too Closely | 0 | 0 |
| 2555915 | 3/25/06 | 02:00 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2806372 | 9/20/06 | 20:20 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Driving Under Influence | 0 | 0 |
| 2965252 | 12/16/06 | 21:50 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 3067040 | 2/26/07 | 19:30 | 0 | In Int. | Head-On | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 3071252 | 3/3/07 | 22:35 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 4 | 0 |
| 3283022 | 7/17/07 | 11:05 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3346820 | 8/24/07 | 19:47 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 3 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Broadway / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 12

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Broadway
Grand Avenue
10/1/2004
9/30/2008
Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Webster Street / Grand Avenue
Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1393190 | 4/19/04 | 13:03 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1399293 | 5/6/04 | 11:00 | 30 | West | Sideswipe | Other Motor Vehicle | South | Making Left Turn | South | Parked | Improper Turning | 0 | 0 |
| 1472103 | 5/23/04 | 09:59 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1649206 | 8/24/04 | 18:26 | 0 | In Int. | Head-On | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2181236 | 8/16/05 | 16:03 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Right Turn | East | Proceeding Straight | Improper Turning | 0 | 0 |

Total Number of Collisions: 5

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Harrison Street / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1639671 | 10/4/04 | 20:07 | 0 | In Int. | Head-On | Other Motor Vehicle | South | Proceeding Straight | North | Making Left Turn | Other | 0 | 0 |
| 1687802 | 10/5/04 | 14:45 | 100 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 1 | 0 |
| 2329314 | 11/2/05 | 12:45 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2586664 | 4/9/06 | 10:00 | 30 | South | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2605543 | 4/26/06 | 20:25 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 2682938 | 6/6/06 | 13:09 | 30 | West | Sideswipe | Bicycle | East | Changing Lanes | East | Slowing/Stopping | Improper Turning | 1 | 0 |
| 2870510 | 10/28/06 | 23:15 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 3075980 | 2/23/07 | 07:38 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Left Turn | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3108962 | 3/23/07 | 08:51 | 18 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Unsafe Speed | 1 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Harrison Street / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 9

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Harrison Street
Grand Avenue
10/1/2004
9/30/2008
Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Harrison Street / 21st Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1288143 | 1/9/04 | 15:27 | 51 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Making Right Turn | Unknown | 0 | 0 |
| 1214704 | 1/9/04 | 17:25 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 1417465 | 5/6/04 | 13:59 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | East | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 2567432 | 4/6/06 | 08:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Changing Lanes | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 2632256 | 5/22/06 | 18:15 | 15 | North | Hit Object | Other Object | West | Proceeding Straight | | | Other | 0 | 0 |
| 2922144 | 12/3/06 | 02:26 | 12 | South | Rear-End | Other Motor Vehicle | North | Stopped in Road | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2926200 | 12/4/06 | 11:58 | 0 | In Int. | Head-On | Other Motor Vehicle | South | Proceeding Straight | East | Making Left Turn | Wrong Side of Road | 0 | 0 |

Total Number of Collisions: 7

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Webster Street / 21st Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|-------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|--------------------------|------|-----|
| 1339052 | 2/13/04 | 11:08 | 40 | North | Sideswipe | Parked Motor Vehicle | South | Proceeding Straight | South | Parked | Improper Turning | 0 | 0 |
| 2111291 | 7/1/05 | 02:25 | 15 | West | Other | Non-Collision | East | Stopped in Road | Not Stated | Other | Other Than Driver or Ped | 1 | 0 |
| 2181244 | 8/17/05 | 12:00 | 30 | North | Sideswipe | Other Motor Vehicle | South | Changing Lanes | South | Proceeding Straight | Improper Turning | 0 | 0 |

Total Number of Collisions: 3

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Franklin Street / 21st Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-------------------------|------|-----|
| 1200735 | 12/27/03 | 02:40 | 21 | West | Head-On | Fixed Object | North | Making Left Turn | | | Driving Under Influence | 1 | 0 |
| 1708844 | 11/3/04 | 10:38 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Changing Lanes | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 2012204 | 4/29/05 | 16:50 | 10 | South | Broadside | Other Motor Vehicle | North | Making Right Turn | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 2569721 | 3/29/06 | 13:15 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Changing Lanes | Not Stated | Making Left Turn | Improper Turning | 0 | 0 |
| 2871827 | 10/30/06 | 23:50 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 4 | 0 |
| 2993522 | 1/3/07 | 14:45 | 14 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Slowing/Stopping | Unsafe Speed | 0 | 0 |

Total Number of Collisions: 6

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Broadway / 21st Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1143484 | 11/19/03 | 14:00 | 0 | In Int. | Head-On | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 1517045 | 7/8/04 | 12:10 | 12 | East | Hit Object | Fixed Object | East | Ran Off Road | | | Improper Turning | 0 | 0 |
| 1783587 | 12/22/04 | 11:30 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2179115 | 8/2/05 | 21:20 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2241269 | 9/15/05 | 13:24 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2422564 | 1/4/06 | 17:15 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | East | Not Stated | North | Proceeding Straight | Pedestrian Violation | 1 | 0 |
| 2615487 | 4/27/06 | 08:44 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 3 | 0 |
| 2683005 | 6/1/06 | 07:13 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |

Total Number of Collisions: 8

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Telegraph Avenue / 20th Street
Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 1063970 | 10/20/03 | 16:00 | 10 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Following Too Closely | 0 | 0 |
| 1262697 | 2/1/04 | 00:15 | 35 | North | Broadside | Other Motor Vehicle | East | Making Left Turn | North | Proceeding Straight | Improper Turning | 1 | 0 |
| 1597213 | 7/14/04 | 20:30 | 25 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Following Too Closely | 0 | 0 |
| 1821635 | 12/20/04 | 14:00 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Improper Turning | 0 | 0 |
| 2458102 | 1/25/06 | 15:40 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2508495 | 2/9/06 | 08:15 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2584174 | 4/16/06 | 20:15 | 50 | North | Sideswipe | Other Motor Vehicle | South | Other Unsafe Turning | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 2687172 | 6/19/06 | 11:31 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Unknown | 0 | 0 |
| 2879876 | 11/3/06 | 11:42 | 0 | In Int. | Not Stated | Not Stated | South | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 1 | 0 |
| 3011336 | 1/25/07 | 16:40 | 36 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Making Right Turn | Unsafe Speed | 0 | 0 |
| 3077772 | 3/13/07 | 14:35 | 6 | East | Vehicle - Pedestrian | Pedestrian | South | Making Left Turn | North | Not Stated | Ped R/W Violation | 0 | 0 |
| 3332483 | 8/22/07 | 13:48 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Backing | North | Stopped in Road | Unsafe Starting or Backing | 0 | 0 |

Total Number of Collisions: 12

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Page 1

Location: Broadway / 20th St

Date Range Reported: 1/1/2006 - 12/31/2008

Total Number of Collisions: 6

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2409511 | 1/6/06 | 12:23 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | West | Making Left Turn | Auto R/W Violation | 2 | 0 |
| 2993585 | 1/3/07 | 11:49 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Stopped in Road | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 3071244 | 2/18/07 | 02:40 | 38 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Driving Under Influence | 0 | 0 |
| 3145303 | 4/24/07 | 16:38 | 20 | West | Broadside | Other Motor Vehicle | West | Proceeding Straight | East | Making Left Turn | Improper Turning | 0 | 0 |
| 3448744 | 10/23/07 | 09:15 | 0 | In Int. | Sideswipe | Parked Motor Vehicle | North | Parked | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 3596676 | 1/28/08 | 23:39 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Page 2

Location: Broadway / 20th St
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|-------------------------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
| Total Number of Collisions: 6 | | | | | | | | | | | | | |

Settings Used For Query

| <u>Parameter</u> | <u>Setting</u> |
|------------------|----------------------|
| Street Name | BROADWAY |
| Cross Street | 20TH ST |
| Starting Date | 1/1/2006 |
| Ending Date | 12/31/2008 |
| Intersection | Intersection Related |

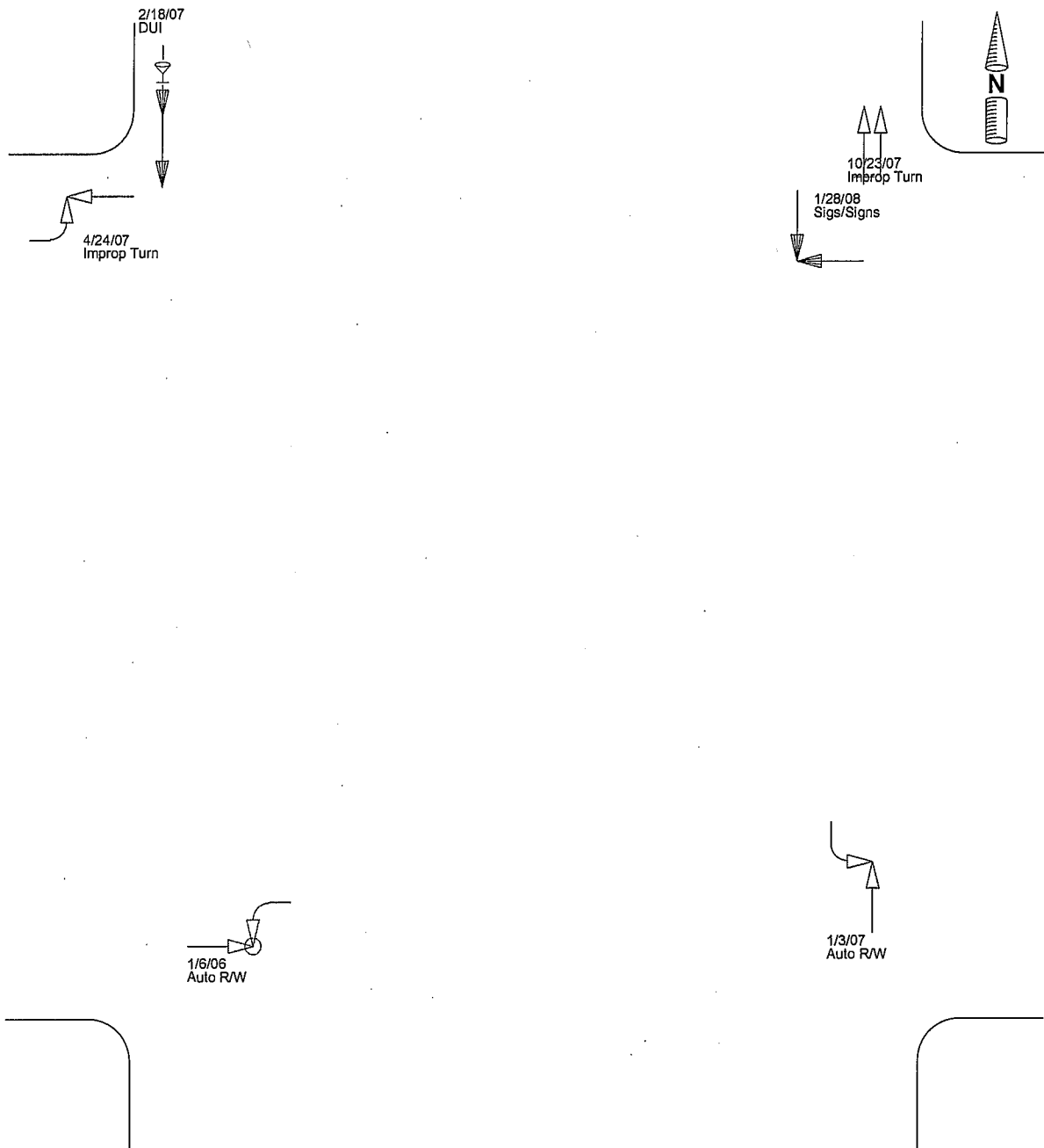
Collision Diagram

Horizontal Street: 20TH ST

Vertical Street: BROADWAY

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

- 5 Property Damage Only
- 1 Injury Collisions
- 0 Fatal Collisions
- 6 Total Collisions

Legend

- ← Moving Vehicle
- ←| Stopped Vehicle
- ↔ Backing Vehicle
- ←~ Ran Off Road
- ←..... Movement Unknown

- ↗ Right Turn
- ↖ Left Turn
- ↔ Sideswipe
- △ Day
- ◑ Night

- 🚶 Pedestrian
- 📦 Fixed Object
- 🚲 Bicycle
- 🚗 DUI
- Injury
- ⊙ Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter

Setting

Street Name

BROADWAY

Cross Street

20TH ST

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Franklin Street / 20th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1294180 | 2/27/04 | 15:05 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Stopped in Road | Improper Turning | 0 | 0 |
| 1294232 | 2/28/04 | 12:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 1373049 | 4/9/04 | 15:40 | 50 | South | Broadside | Other Motor Vehicle | North | Entering Traffic | North | Making Right Turn | Unknown | 0 | 0 |
| 1517755 | 6/13/04 | 16:50 | 0 | In Int. | Broadside | Not Stated | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1648933 | 8/28/04 | 09:55 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 1649190 | 9/11/04 | 10:50 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1695286 | 10/26/04 | 13:45 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Other | 0 | 0 |
| 1777486 | 12/13/04 | 15:17 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2682975 | 6/1/06 | 15:10 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Making Right Turn | Unknown | 0 | 0 |
| 2835916 | 10/12/06 | 15:41 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2906766 | 11/16/06 | 19:22 | 0 | In Int. | Broadside | Bicycle | East | Other Unsafe Turning | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 3388784 | 9/20/07 | 08:15 | 0 | In Int. | Broadside | Motor Vehicle on Other Roadway | West | Proceeding Straight | North | Proceeding Straight | Other | 1 | 0 |

Total Number of Collisions: 12

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Webster Street / 20th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1072812 | 10/21/03 | 10:05 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Stopped in Road | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2538166 | 3/17/06 | 08:25 | 15 | North | Sideswipe | Other Motor Vehicle | South | Making Right Turn | South | Proceeding Straight | Improper Turning | 0 | 0 |

Total Number of Collisions: 2

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Harrison Street / 20th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|--------------------------|------|-----|
| 1752223 | 11/22/04 | 08:00 | 0 | In Int. | Sideswipe | Parked Motor Vehicle | East | Proceeding Straight | East | Parked | Improper Turning | 0 | 0 |
| 2012227 | 5/1/05 | 06:23 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Other | 1 | 0 |
| 2202154 | 8/22/05 | 11:15 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | East | Proceeding Straight | Other Hazardous Movement | 1 | 0 |
| 2632288 | 5/18/06 | 17:00 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Following Too Closely | 0 | 0 |
| 3297003 | 7/25/07 | 09:45 | 10 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Harrison Street / 20th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 5

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Harrison Street
20th Street
10/1/2004
9/30/2008
Intersection Related

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009
Page 1

Location: Harrison St / Lakeside Dr (1)
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 8

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 2632288 | 5/18/06 | 17:00 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Following Too Closely | 0 | 0 |
| 2687144 | 6/19/06 | 12:29 | 15 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 3240692 | 6/21/07 | 09:00 | 50 | West | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 3297003 | 7/25/07 | 09:45 | 10 | North | Rear-End | Other Motor Vehicle | South | Stopped in Road | South | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 3472387 | 10/22/07 | 16:27 | 15 | South | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3451104 | 10/30/07 | 15:19 | 30 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 3 | 0 |
| 3472256 | 11/17/07 | 11:10 | 10 | North | Rear-End | Other Motor Vehicle | South | Backing | South | Stopped in Road | Unsafe Starting or Backing | 0 | 0 |
| 3795441 | 6/24/08 | 13:33 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Page 2

Location: Harrison St / Lakeside Dr (1)

Date Range Reported: 1/1/2006 - 12/31/2008

Total Number of Collisions: 8

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 8

Settings Used For Query

Parameter

Setting

Street Name

HARRISON ST

Cross Street

LAKESIDE DR (1)

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

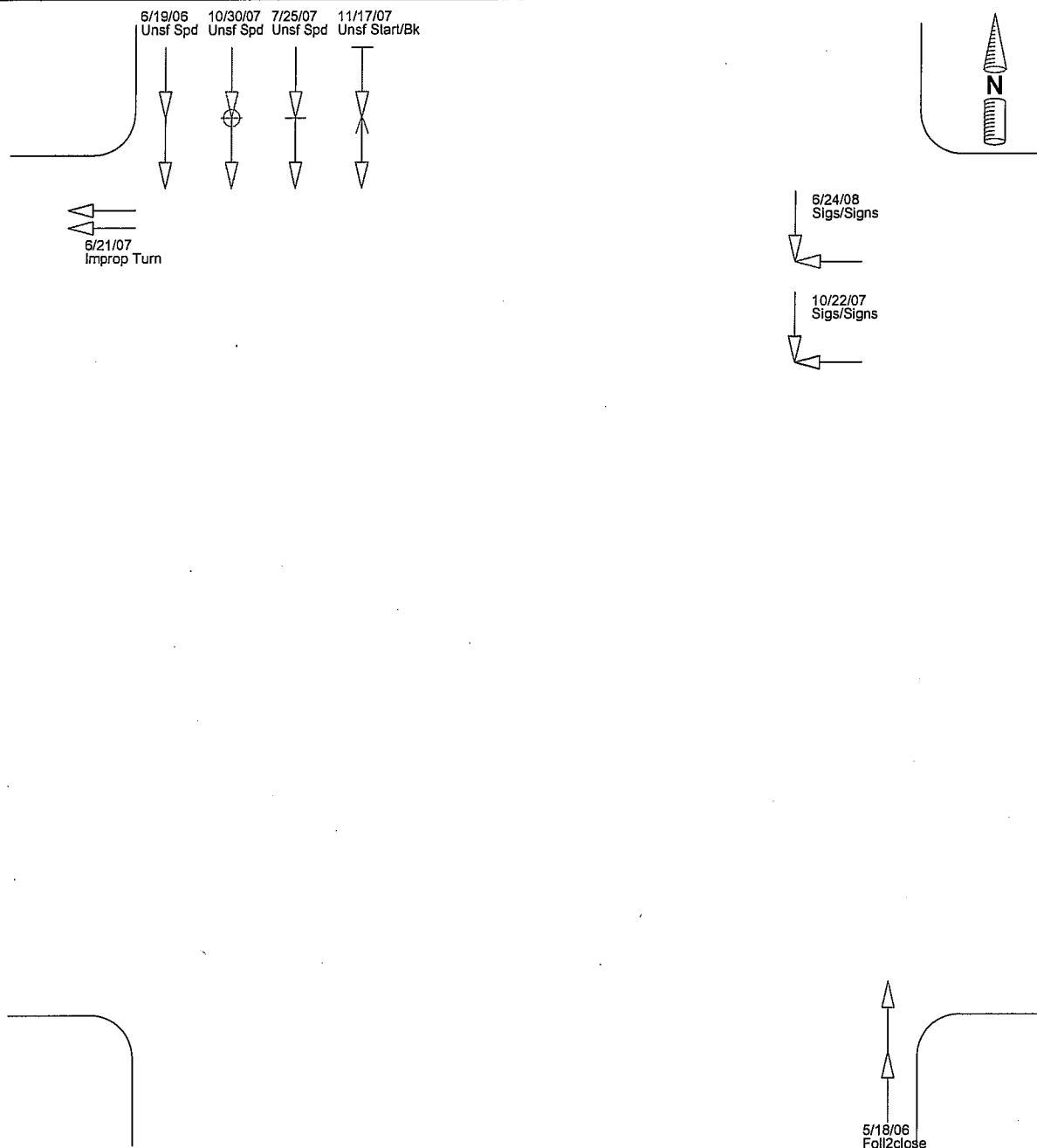
Collision Diagram

Horizontal Street: LAKESIDE DR (1)

Vertical Street: HARRISON ST

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

7 Property Damage Only
1 Injury Collisions
0 Fatal Collisions
8 Total Collisions

Legend

← Moving Vehicle
 ←| Stopped Vehicle
 ←→ Backing Vehicle
 ←~ Ran Off Road
 ←... Movement Unknown

↗ Right Turn
 ↖ Left Turn
 ↔ Sideswipe
 ← Day
 ← Night

🚶 Pedestrian
 📦 Fixed Object
 🚲 Bicycle
 🍷 DUI
 ○ Injury
 ⊙ Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter

Setting

Street Name

HARRISON ST

Cross Street

LAKE SIDE DR (1)

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009
Page 1

Location: Harrison St / Lakeside Dr (4)
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|--------------------|------|-----|
| 2567432 | 4/6/06 | 08:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Changing Lanes | Improper Turning | 0 | 0 |
| 2632256 | 5/22/06 | 18:15 | 15 | North | Hit Object | Other Object | West | Proceeding Straight | | | Other | 0 | 0 |
| 2922144 | 12/3/06 | 02:26 | 12 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2926200 | 12/4/06 | 11:58 | 0 | In Int. | Head-On | Other Motor Vehicle | East | Making Left Turn | South | Proceeding Straight | Wrong Side of Road | 0 | 0 |
| 3236458 | 6/20/07 | 23:19 | 10 | South | Rear-End | Other Motor Vehicle | North | Stopped in Road | North | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 3430124 | 10/13/07 | 01:35 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Stopped in Road | East | Proceeding Straight | Unsafe Speed | 0 | 0 |

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Page 2

Location: Harrison St / Lakeside Dr (4)

Date Range Reported: 1/1/2006 - 12/31/2008

Total Number of Collisions: 6

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 6

Settings Used For Query

Parameter

Setting

Street Name

HARRISON ST

Cross Street

LAKESIDE DR (4)

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

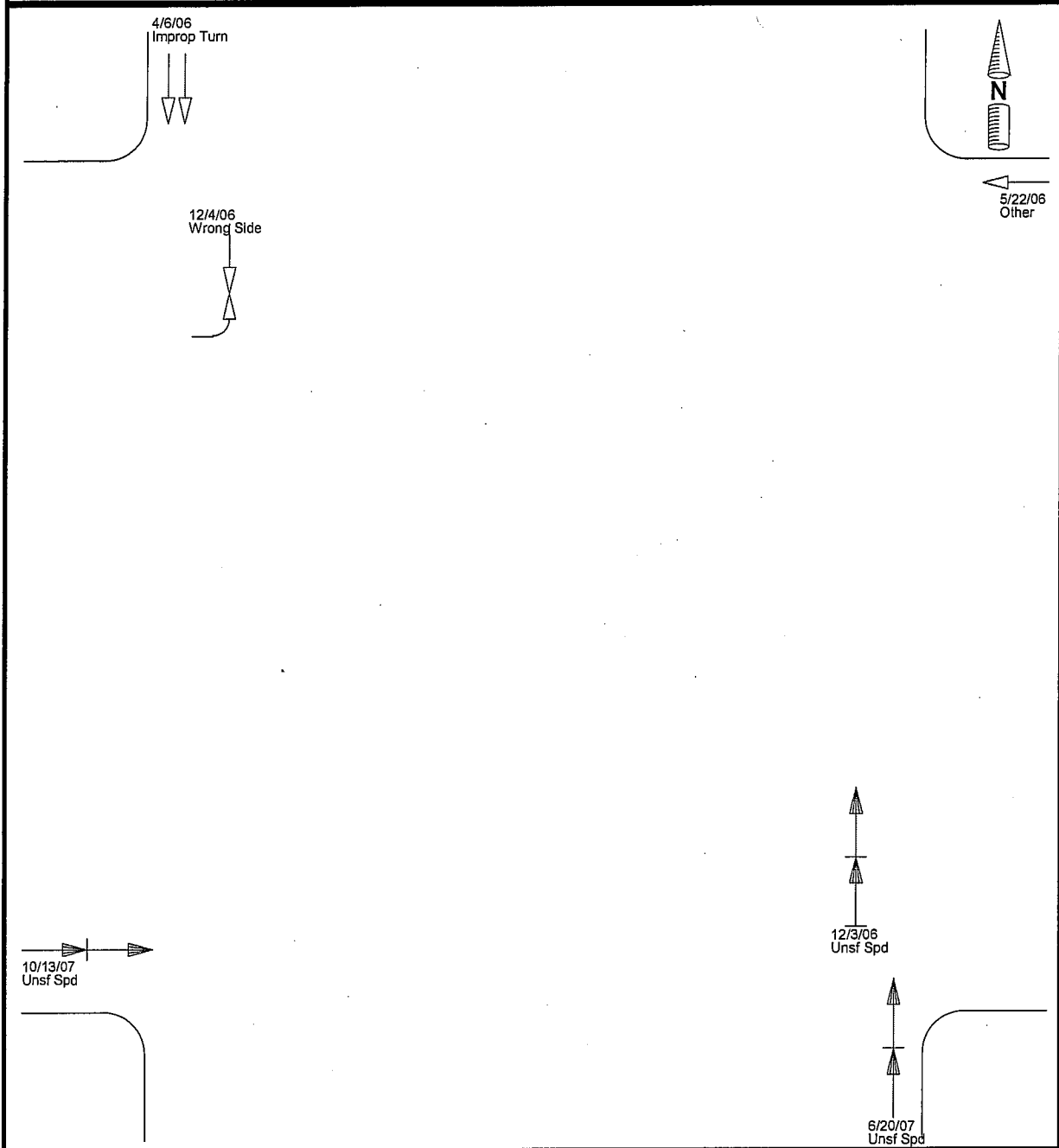
Collision Diagram

Horizontal Street: HARRISON ST

Vertical Street: LAKE SIDE DR (4)

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

6 Property Damage Only
0 Injury Collisions
0 Fatal Collisions
6 Total Collisions

Legend

Moving Vehicle
 Stopped Vehicle
 Backing Vehicle
 Ran Off Road
 Movement Unknown

Right Turn
 Left Turn
 Sideswipe
 Day
 Night

Pedestrian
 Fixed Object
 Bicycle
 DUI
 Injury
 Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter

Setting

Street Name

HARRISON ST

Cross Street

LAKESIDE DR (4)

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Lakeside Drive / 20th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|-------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|------------------|------|-----|
| 1447122 | 6/5/04 | 19:00 | 1 | South | Sideswipe | Other Motor Vehicle | North | Making Right Turn | North | Stopped in Road | Improper Turning | 0 | 0 |
| 1546029 | 7/29/04 | 11:00 | 40 | North | Rear-End | Other Motor Vehicle | South | Stopped in Road | South | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2687144 | 6/19/06 | 12:29 | 15 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Unsafe Speed | 0 | 0 |

Total Number of Collisions: 3

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Page 1

Location: Brush Street / 18th Street

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 0548257 | 12/8/02 | 11:00 | 0 | In Int. | Not Stated | Other Motor Vehicle | West | Making Left Turn | South | Proceeding Straight | Unknown | 0 | 0 |
| 0659880 | 2/3/03 | 14:25 | 10 | North | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Other | 0 | 0 |
| 0688743 | 2/8/03 | 10:10 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Unknown | 0 | 0 |
| 0696320 | 2/24/03 | 16:49 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 1 | 0 |
| 0688448 | 2/28/03 | 20:21 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 1046135 | 9/29/03 | 08:40 | 15 | South | Hit Object | Fixed Object | South | Not Stated | | | Unknown | 1 | 0 |
| 1058994 | 10/7/03 | 16:15 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Auto R/W Violation | 1 | 0 |
| 1063211 | 10/16/03 | 16:26 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1097697 | 10/30/03 | 17:45 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 1 | 0 |
| 1097694 | 11/2/03 | 11:28 | 0 | In Int. | Broadside | Motor Vehicle on Other | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1132356 | 11/8/03 | 23:10 | 0 | In Int. | Broadside | Pedestrian | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1305667 | 3/2/04 | 12:25 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1355821 | 3/12/04 | 08:45 | 22 | South | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Hazardous Parking | 1 | 0 |
| 1372983 | 4/7/04 | 10:59 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1390251 | 4/13/04 | 14:01 | 24 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Page 2

Location: Brush Street / 18th Street

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1528240 | 5/13/04 | 15:40 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1446900 | 5/29/04 | 23:45 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1466381 | 6/7/04 | 08:22 | 50 | North | Sideswipe | Other Motor Vehicle | South | Changing Lanes | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 1541997 | 7/18/04 | 12:25 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1652761 | 9/23/04 | 16:45 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | South | Making Left Turn | West | Other | Ped R/W Violation | 1 | 0 |
| 1795615 | 12/9/04 | 14:55 | 11 | West | Vehicle - Pedestrian | Pedestrian | West | Proceeding Straight | North | Proceeding Straight | Ped R/W Violation | 1 | 0 |
| 1987220 | 4/9/05 | 10:53 | 20 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Unsafe Speed | 1 | 0 |
| 2012200 | 4/29/05 | 17:05 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2014611 | 5/8/05 | 10:54 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 2058903 | 5/25/05 | 11:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Changing Lanes | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 2070723 | 6/6/05 | 13:25 | 0 | In Int. | Broadside | Non-Collision | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 3 | 0 |
| 2101260 | 6/17/05 | 11:55 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2241154 | 9/17/05 | 10:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Changing Lanes | South | Slowing/Stopping | Improper Turning | 0 | 0 |
| 2279151 | 9/24/05 | 14:21 | 10 | West | Broadside | Not Stated | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2388202 | 12/2/05 | 10:20 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Page 3

Location: Brush Street / 18th Street

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2484603 | 1/27/06 | 19:45 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2651068 | 5/13/06 | 13:32 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2687186 | 6/18/06 | 14:45 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2946019 | 12/15/06 | 16:30 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2985814 | 12/17/06 | 02:30 | 0 | In Int. | Hit Object | Fixed Object | South | Proceeding Straight | | | Unsafe Speed | 0 | 0 |
| 2985805 | 1/11/07 | 13:58 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3011385 | 1/23/07 | 15:32 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 3109001 | 3/19/07 | 11:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | South | Proceeding Straight | Improper Turning | 1 | 0 |
| 3346879 | 8/25/07 | 09:23 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3359577 | 8/30/07 | 14:08 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3353224 | 9/18/07 | 14:45 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Page 4

Location: Brush Street / 18th Street

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 41

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Brush Street |
| Cross Street | 18th Street |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Page 1

Location: Castro Street / 17th Street

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 0461031 | 10/10/02 | 16:10 | 0 | In Int. | Broadside | Bicycle | West | Proceeding Straight | East | Making Left Turn | Wrong Side of Road | 1 | 0 |
| 0558332 | 12/21/02 | 15:30 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 0776458 | 1/18/03 | 20:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Unknown | 0 | 0 |
| 0620514 | 1/21/03 | 18:25 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Right Turn | North | Making Right Turn | Unsafe Lane Change | 0 | 0 |
| 0665304 | 2/18/03 | 10:20 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | East | Making Left Turn | Unknown | 0 | 0 |
| 0688451 | 2/27/03 | 17:30 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 0840658 | 5/22/03 | 14:35 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Unknown | 0 | 0 |
| 1094254 | 9/18/03 | 21:42 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1149365 | 11/19/03 | 07:10 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Making Left Turn | Unknown | 1 | 0 |
| 1191533 | 12/19/03 | 14:25 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Entering Traffic | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1201017 | 1/1/04 | 14:30 | 20 | South | Sideswipe | Other Motor Vehicle | North | Making Right Turn | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 1377814 | 3/22/04 | 07:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1383265 | 4/3/04 | 00:00 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Right Turn | North | Not Stated | Traffic Signals and Signs | 1 | 0 |
| 1472121 | 4/3/04 | 23:46 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Right Turn | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1389348 | 4/21/04 | 22:45 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Other Hazardous Movement | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Page 2

Location: Castro Street / 17th Street

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1389426 | 4/22/04 | 14:50 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1525801 | 5/3/04 | 11:15 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Unknown | 3 | 0 |
| 1624837 | 9/13/04 | 08:50 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 1688050 | 10/10/04 | 06:20 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1810578 | 12/26/04 | 12:00 | 20 | West | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Improper Turning | 0 | 0 |
| 2043887 | 5/11/05 | 17:50 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | North | Making Left Turn | Improper Turning | 0 | 0 |
| 2077705 | 6/13/05 | 07:30 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2077738 | 6/14/05 | 23:30 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2342227 | 10/17/05 | 12:46 | 0 | In Int. | Sideswipe | Motor Vehicle on Other | North | Proceeding Straight | East | Proceeding Straight | Unknown | 1 | 0 |
| 2348295 | 11/11/05 | 07:32 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Proceeding Straight | Unknown | 0 | 0 |
| 2388223 | 12/3/05 | 10:54 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2489901 | 2/1/06 | 11:30 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2567375 | 4/6/06 | 13:44 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2687164 | 6/18/06 | 21:47 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2845868 | 10/14/06 | 00:40 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Page 3

Location: Castro Street / 17th Street

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2856514 | 10/21/06 | 14:12 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3298902 | 8/1/07 | 07:35 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |

Total Number of Collisions: 32

Settings Used For Query

Parameter

Setting

Street Name

Castro Street

Cross Street

17th Street

Starting Date

10/1/2002

Ending Date

9/30/2007

Intersection

Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Castro Street / 12th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 1056682 | 10/9/03 | 18:20 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Making Right Turn | Improper Turning | 0 | 0 |
| 1093232 | 10/27/03 | 11:29 | 50 | South | Rear-End | Other Motor Vehicle | South | Backing | North | Stopped in Road | Unsafe Starting or Backing | 0 | 0 |
| 1097616 | 10/31/03 | 15:22 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Making Right Turn | Unknown | 0 | 0 |
| 1191612 | 12/20/03 | 20:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | West | Making Right Turn | Other Hazardous Movement | 0 | 0 |
| 1191597 | 12/20/03 | 21:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Right Turn | North | Making Right Turn | Improper Turning | 0 | 0 |
| 1221905 | 1/6/04 | 16:45 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1248691 | 1/12/04 | 12:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Making Right Turn | Other Hazardous Movement | 0 | 0 |
| 1291767 | 2/14/04 | 14:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | West | Making Right Turn | Other | 0 | 0 |
| 1388292 | 3/22/04 | 08:05 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 1381098 | 3/29/04 | 16:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Making Right Turn | Other Hazardous Movement | 0 | 0 |
| 1472171 | 5/16/04 | 01:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Ran Off Road | West | Ran Off Road | Unknown | 0 | 0 |

| | | | | | | | | | | | | | |
|---------|----------|-------|----|---------|-----------|------------------------------------|------------|-------------------------|-------|-------------------------|-------------------------------|---|---|
| 1510616 | 6/18/04 | 11:30 | 0 | In Int. | Broadside | Other Motor Veh
icle | North | Proceeding Stra
ight | East | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 1647766 | 7/16/04 | 14:36 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | West | Making Right Tu
rn | West | Making Right Tu
rn | Improper Turning | 0 | 0 |
| 1590951 | 8/18/04 | 17:55 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 2 | 0 |
| 1714577 | 11/6/04 | 09:00 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | West | Proceeding Stra
ight | West | Making Right Tu
rn | Improper Turning | 0 | 0 |
| 1714881 | 11/9/04 | 14:32 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | West | Proceeding Stra
ight | West | Making Right Tu
rn | Improper Turning | 0 | 0 |
| 2043903 | 5/10/05 | 10:10 | 21 | North | Sideswipe | Other Motor Veh
icle | North | Changing Lanes | North | Proceeding Stra
ight | Unsafe Lane Change | 0 | 0 |
| 2059414 | 5/30/05 | 19:45 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2178977 | 8/4/05 | 17:30 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | West | Making Right Tu
rn | Improper Turning | 0 | 0 |
| 2178965 | 8/5/05 | 22:30 | 0 | In Int. | Broadside | Other Motor Veh
icle | North | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 1 | 0 |
| 2209408 | 8/31/05 | 16:45 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | West | Proceeding Stra
ight | West | Making Right Tu
rn | Other Hazardous Mo
vement | 0 | 0 |
| 2257345 | 9/30/05 | 15:00 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2361607 | 11/28/05 | 13:13 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | West | Proceeding Stra
ight | West | Making Right Tu
rn | Other Hazardous Mo
vement | 0 | 0 |
| 2467634 | 2/3/06 | 09:50 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | Not Stated | Proceeding Stra
ight | West | Proceeding Stra
ight | Improper Turning | 0 | 0 |
| 2683950 | 5/31/06 | 09:35 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2687209 | 6/21/06 | 07:09 | 0 | In Int. | Broadside | Motor Vehicle o
n Other Roadway | North | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 1 | 0 |
| 2703663 | 6/30/06 | 00:05 | 0 | In Int. | Broadside | Other Motor Veh
icle | North | Proceeding Stra
ight | West | Proceeding Stra
ight | Other Improper Dri
ving | 0 | 0 |

| | | | | | | | | | | | | | |
|---------|----------|-------|----|---------|-----------|-----------------|--------------|-----------------|---------------|-----------------|-------------------------------|---|---|
| 2971258 | 12/16/06 | 15:00 | 0 | In Int. | Sideswipe | Other Motor Veh | West
icle | Making Right Tu | West
rn | Making Right Tu | Unsafe Lane Change | 0 | 0 |
| 3010361 | 1/14/07 | 20:50 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North
ight | Proceeding Stra | Traffic Signals an
d Signs | 0 | 0 |
| 3011300 | 1/19/07 | 23:00 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North
ight | Proceeding Stra | Traffic Signals an
d Signs | 0 | 0 |
| 3092866 | 3/8/07 | 11:10 | 0 | In Int. | Sideswipe | Other Motor Veh | West
icle | Proceeding Stra | North
ight | Proceeding Stra | Auto R/W Violation | 0 | 0 |
| 3255844 | 7/3/07 | 16:40 | 0 | In Int. | Sideswipe | Other Motor Veh | West
icle | Proceeding Stra | West
ight | Making Right Tu | Improper Turning | 0 | 0 |
| 3283201 | 7/20/07 | 10:59 | 27 | West | Broadside | Other Motor Veh | West
icle | Making Right Tu | North
rn | Proceeding Stra | Auto R/W Violation | 0 | 0 |
| 3283205 | 7/20/07 | 14:00 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | West
ight | Making Right Tu | Improper Turning | 0 | 0 |
| 3325130 | 7/28/07 | 17:10 | 0 | In Int. | Sideswipe | Other Motor Veh | West
icle | Proceeding Stra | West
ight | Making Right Tu | Improper Turning | 0 | 0 |

Total Number of Collisions: 35

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Brush Street / 11th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 1058399 | 10/4/03 | 07:48 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1145720 | 11/18/03 | 09:25 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Making Left Turn | South | Making Left Turn | Other Hazardous Movement | 0 | 0 |
| 1356274 | 4/4/04 | 15:00 | 0 | In Int. | Broadside | Other Motor Vehicle | Not Stated | Proceeding Straight | South | Making Left Turn | Improper Turning | 0 | 0 |
| 1597234 | 7/6/04 | 10:05 | 25 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Starting or Backing | 0 | 0 |
| 1524963 | 7/13/04 | 19:57 | 0 | In Int. | Hit Object | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Other Hazardous Movement | 0 | 0 |
| 1624841 | 9/13/04 | 08:00 | 0 | In Int. | Broadside | Not Stated | Not Stated | Proceeding Straight | East | Making Left Turn | Improper Turning | 0 | 0 |
| 2205435 | 8/27/05 | 10:15 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Making Left Turn | South | Making Left Turn | Improper Turning | 0 | 0 |
| 2585836 | 4/20/06 | 10:23 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Making Left Turn | Improper Turning | 0 | 0 |
| 2671941 | 6/10/06 | 12:58 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Starting or Backing | 1 | 0 |
| 2688941 | 6/22/06 | 17:15 | 15 | East | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Making Left Turn | Improper Turning | 0 | 0 |
| 3317290 | 8/13/07 | 10:06 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |

Total Number of Collisions: 11

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Oak Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2005149 | 5/8/05 | 01:10 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2070731 | 6/6/05 | 14:22 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Making Left Turn | East | Proceeding Straight | Other Hazardous Movement | 1 | 0 |
| 2329313 | 11/5/05 | 17:21 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2537563 | 3/19/06 | 22:25 | 86 | West | Rear-End | Parked Motor Vehicle | East | Proceeding Straight | East | Parked | Improper Turning | 0 | 0 |
| 2830483 | 10/8/06 | 09:40 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 2 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Oak Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 5

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Oak Street |
| Cross Street | 14th Street |
| Starting Date | 10/1/2004 |
| Ending Date | 9/30/2008 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Madison Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|--------------------------|------|-----|
| 1993668 | 4/21/05 | 09:00 | 0 | In Int. | Hit Object | Fixed Object | South | Ran Off Road | | | Other Than Driver or Ped | 1 | 0 |
| 2074444 | 6/4/05 | 08:32 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Making Left Turn | Improper Turning | 0 | 0 |
| 2245931 | 9/23/05 | 02:15 | 30 | East | Head-On | Fixed Object | West | Ran Off Road | | | Improper Turning | 0 | 0 |
| 2337956 | 10/31/05 | | 0 | In Int. | Not Stated | Other Motor Vehicle | South | Making Left Turn | South | Making Left Turn | Unsafe Lane Change | 0 | 0 |
| 2308195 | 10/31/05 | | 0 | In Int. | Sideswipe | Parked Motor Vehicle | East | Proceeding Straight | East | Parked | Unsafe Speed | 0 | 0 |
| 2360042 | 11/27/05 | 15:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Making Left Turn | Other Hazardous Movement | 0 | 0 |
| 2632338 | 5/17/06 | 13:55 | 39 | East | Sideswipe | Parked Motor Vehicle | West | Proceeding Straight | West | Merging | Improper Turning | 0 | 0 |
| 3056526 | 2/21/07 | 11:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Making Left Turn | Other Hazardous Movement | 0 | 0 |
| 3095061 | 3/22/07 | 17:15 | 15 | East | Rear-End | Other Motor Vehicle | East | Slowing/Stopping | East | Slowing/Stopping | Unsafe Speed | 0 | 0 |
| 3346832 | 8/25/07 | 11:29 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Making Right Turn | Improper Turning | 0 | 0 |
| 3377718 | 9/10/07 | 00:11 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Making Left Turn | South | Proceeding Straight | Improper Turning | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Madison Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 11

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Madison Street
14th Street
10/1/2004
9/30/2008
Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Harrison Street / 14th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 1137150 | 11/6/03 | 08:25 | 0 | In Int. | Sideswipe | Non-Collision | East | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1137103 | 11/14/03 | 17:15 | 0 | In Int. | Broadside | Not Stated | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1149370 | 11/26/03 | 14:50 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 1173841 | 12/17/03 | 20:10 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1191593 | 12/20/03 | 09:30 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1103175 | 12/31/03 | 20:25 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1248773 | 1/20/04 | 13:20 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1291768 | 2/16/04 | 07:55 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 1735094 | 11/11/04 | 13:10 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Backing | South | Proceeding Straight | Unsafe Starting or Backing | 0 | 0 |
| 1752910 | 11/18/04 | 08:55 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1767078 | 12/2/04 | 17:23 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1997489 | 4/20/05 | 09:00 | 10 | Not Stationed | Broadside | Parked Motor Vehicle | North | Proceeding Straight | Not Stated | Parked | Improper Turning | 0 | 0 |

| | | | | | | | | | | | | | |
|---------|----------|-------|----|---------|--------------|-----------------|---------------|-----------------|-------|-----------------|--------------------|---|---|
| 2059367 | 5/30/05 | 15:32 | 0 | In Int. | Broadside | Other Motor Veh | East
icle | Proceeding Stra | North | Proceeding Stra | Traffic Signals an | 2 | 0 |
| 2195034 | 8/24/05 | 08:02 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North | Proceeding Stra | Other | 1 | 0 |
| 2329309 | 11/5/05 | 15:41 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North | Proceeding Stra | Traffic Signals an | 0 | 0 |
| 2467605 | 2/3/06 | 09:55 | 0 | In Int. | Head-On | Other Motor Veh | West
icle | Proceeding Stra | South | Proceeding Stra | Traffic Signals an | 0 | 0 |
| 2467617 | 2/3/06 | 18:24 | 0 | In Int. | Broadside | Other Motor Veh | East
icle | Making Left Tur | North | Proceeding Stra | Auto R/W Violation | 1 | 0 |
| 2515604 | 3/6/06 | 14:20 | 10 | East | Vehicle - Pe | Pedestrian | East | Making Left Tur | South | Other | Ped R/W Violation | 1 | 0 |
| 2591342 | 4/20/06 | 12:40 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North | Proceeding Stra | Traffic Signals an | 0 | 0 |
| 2835884 | 10/11/06 | 00:32 | 0 | In Int. | Rear-End | Other Motor Veh | West
icle | Proceeding Stra | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2891469 | 11/11/06 | 14:40 | 0 | In Int. | Broadside | Other Motor Veh | South
icle | Proceeding Stra | East | Proceeding Stra | Traffic Signals an | 3 | 0 |
| 2946059 | 12/17/06 | 10:10 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North | Proceeding Stra | Traffic Signals an | 3 | 0 |
| 2968528 | 12/24/06 | 09:58 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North | Proceeding Stra | Traffic Signals an | 0 | 0 |
| 3302810 | 7/29/07 | 21:30 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | South | Proceeding Stra | Traffic Signals an | 0 | 0 |
| 3298961 | 7/30/07 | 20:08 | 45 | East | Sideswipe | Parked Motor Ve | West
hicle | Proceeding Stra | West | Parked | Improper Turning | 0 | 0 |
| 3322565 | 8/1/07 | 20:55 | 30 | South | Sideswipe | Other Motor Veh | North
icle | Changing Lanes | North | Proceeding Stra | Unsafe Lane Change | 0 | 0 |

Total Number of Collisions: 26

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Madison Street / 12th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2059421 | 5/27/05 | 11:40 | 0 | In Int. | Broadside | Motor Vehicle on Other | South | Proceeding Straight | West | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 2057934 | 5/31/05 | 08:15 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 2870504 | 10/28/06 | 02:11 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Making Left Turn | Traffic Signals and Signs | 1 | 0 |
| 3020396 | 1/24/07 | 13:48 | 20 | South | Sideswipe | Parked Motor Vehicle | South | Making Left Turn | South | Parked | Improper Turning | 0 | 0 |
| 3056498 | 2/23/07 | 12:43 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | West | Making Left Turn | North | Not Stated | Ped R/W Violation | 1 | 0 |
| 3330321 | 8/23/07 | 19:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Madison Street / 12th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 6

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Madison Street
12th Street
10/1/2004
9/30/2008
Intersection Related

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009
Page 1

Location: Oak St / 12th St
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 17

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2579363 | 4/12/06 | 11:27 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2688917 | 6/15/06 | 12:11 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | South | Traveling Wrong Way | East | Not Stated | Other Hazardous Movement | 2 | 0 |
| 2693331 | 6/26/06 | 22:34 | 0 | In Int. | Overtaken | Motor Vehicle on Other | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 3042957 | 2/18/07 | 09:00 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | North | Not Stated | North | Making Left Turn | Ped R/W Violation | 1 | 0 |
| 3179786 | 4/20/07 | 09:20 | 6 | West | Sideswipe | Other Motor Vehicle | West | Making Left Turn | West | Stopped in Road | Improper Turning | 4 | 0 |
| 3467809 | 11/2/07 | 16:00 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3446072 | 11/13/07 | 07:07 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3488152 | 12/3/07 | 18:30 | 0 | In Int. | Vehicle - Pedestrian | Pedestrian | North | Proceeding Straight | North | Making Left Turn | Ped R/W Violation | 1 | 0 |
| 3518505 | 12/14/07 | 14:45 | 44 | East | Rear-End | Other Motor Vehicle | West | Stopped in Road | West | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 3569495 | 1/6/08 | 13:58 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3569455 | 1/15/08 | 11:20 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Stopped in Road | West | Stopped in Road | Traffic Signals and Signs | 1 | 0 |
| 3603741 | 1/29/08 | 17:40 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3610647 | 2/26/08 | 15:35 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Making Left Turn | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3657107 | 3/18/08 | 07:05 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Page 2

Location: Oak St / 12th St

Date Range Reported: 1/1/2006 - 12/31/2008

Total Number of Collisions: 17

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 3716578 | 4/16/08 | 08:23 | 0 | In Int. | Broadside | Motor Vehicle on Other | North | Making Left Turn | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3737244 | 5/7/08 | 10:00 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3744899 | 5/23/08 | 17:51 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |

Total Number of Collisions: 17

Settings Used For Query

Parameter

Setting

Street Name

OAK ST

Cross Street

12TH ST

Starting Date

1/1/2006

Ending Date

12/31/2008

Intersection

Intersection Related

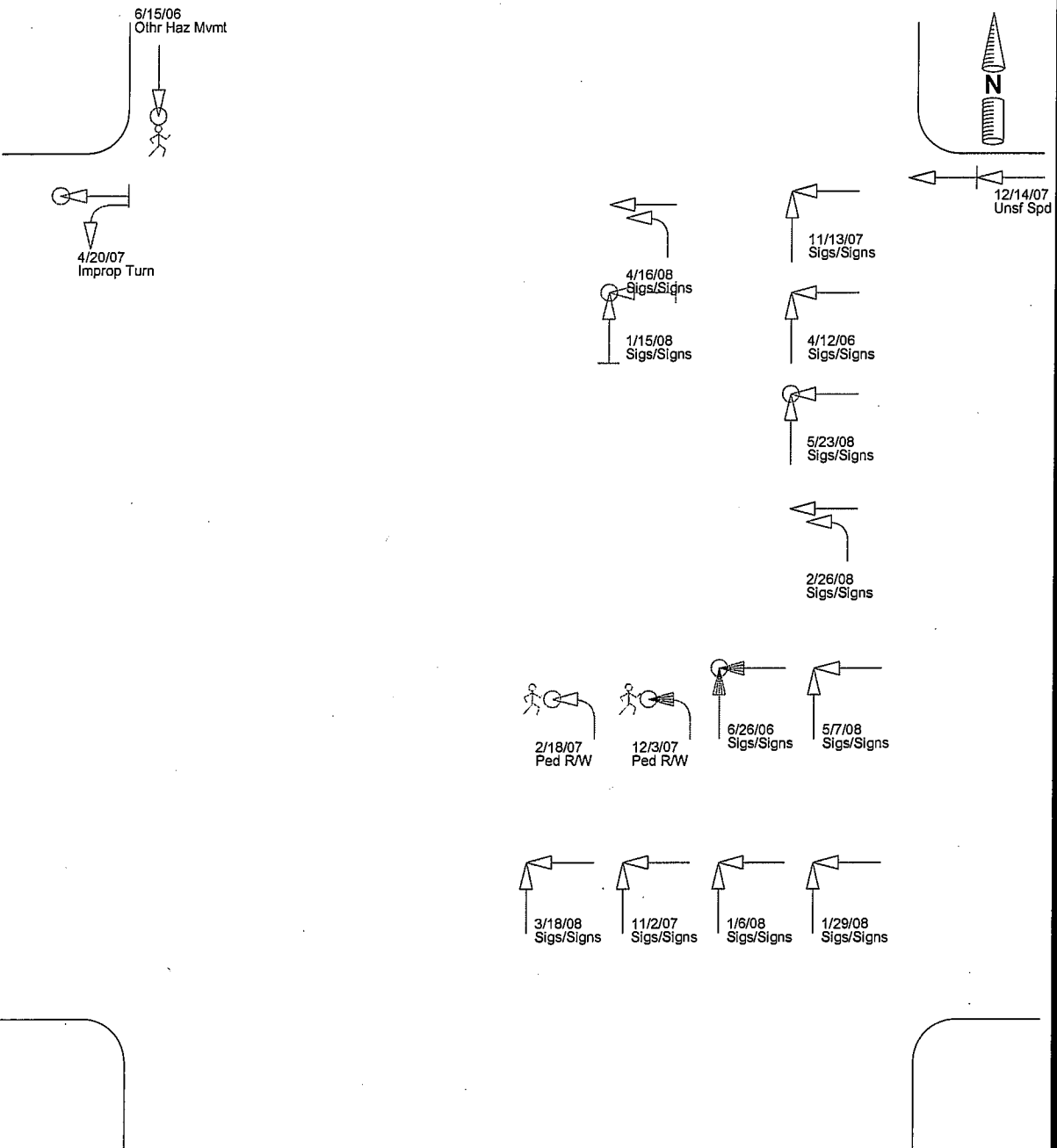
Collision Diagram

Horizontal Street: 12TH ST

Vertical Street: OAK ST

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

10 Property Damage Only
7 Injury Collisions
0 Fatal Collisions
17 Total Collisions

Legend

Moving Vehicle
 Stopped Vehicle
 Backing Vehicle
 Ran Off Road
 Movement Unknown

Right Turn
 Left Turn
 Sideswipe
 Day
 Night

Pedestrian
 Fixed Object
 Bicycle
 DUI
 Injury
 Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

| <u>Parameter</u> | <u>Setting</u> |
|------------------|----------------------|
| Street Name | OAK ST |
| Cross Street | 12TH ST |
| Starting Date | 1/1/2006 |
| Ending Date | 12/31/2008 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Oak Street / 11th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|------------------|------|-----|
| 1735090 | 11/11/04 | 23:00 | 0 | In Int. | Sideswipe | Fixed Object | East | Proceeding Straight | | | Improper Turning | 0 | 0 |

Total Number of Collisions: 1

Settings Used For Query

Parameter

Setting

Street Name

Oak Street

Cross Street

11th Street

Starting Date

10/1/2004

Ending Date

9/30/2008

Intersection

Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Madison Street / 11th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2515430 | 2/26/06 | 18:41 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2817432 | 10/2/06 | 18:45 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 2871787 | 10/30/06 | 19:53 | 0 | In Int. | Broadside | Motor Vehicle on Other | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

Total Number of Collisions: 3

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Madison Street
11th Street
10/1/2004
9/30/2008
Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Franklin Street / 11th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1590952 | 8/18/04 | 16:35 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 1649022 | 9/9/04 | 11:10 | 8 | East | Vehicle - Pedestrian | Not Stated | North | Other | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1993603 | 4/14/05 | 16:55 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Other | 0 | 0 |
| 2268629 | 10/10/05 | 08:30 | 20 | East | Sideswipe | Other Motor Vehicle | East | Changing Lanes | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 2692800 | 6/27/06 | 13:45 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2942441 | 12/12/06 | 15:25 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3373628 | 9/18/07 | 03:35 | 36 | North | Head-On | Fixed Object | North | Proceeding Straight | | | Unsafe Speed | 0 | 0 |

Total Number of Collisions: 7

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Oak Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1821655 | 12/29/04 | 15:55 | 0 | In Int. | Not Stated | Not Stated | East | Making Left Turn | East | Proceeding Straight | Improper Turning | 1 | 0 |
| 2122698 | 7/1/05 | 23:20 | 20 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 1 | 0 |
| 2225794 | 9/2/05 | 13:10 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2438546 | 10/15/05 | 14:45 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2494133 | 2/22/06 | 10:42 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2660526 | 5/15/06 | 06:00 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2822896 | 10/3/06 | 04:50 | 0 | In Int. | Broadside | Motor Vehicle on Other | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 3002151 | 1/20/07 | 10:05 | 0 | In Int. | Sideswipe | Other Motor Vehicle | Not Stated | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Oak Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 8

Settings Used For Query

Parameter

Setting

Street Name

Oak Street

Cross Street

7th Street

Starting Date

10/1/2004

Ending Date

9/30/2008

Intersection

Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Madison Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1703391 | 10/29/04 | 18:25 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2121534 | 6/23/05 | 18:09 | 45 | West | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 1 | 0 |
| 2205406 | 8/28/05 | 04:03 | 15 | South | Rear-End | Parked Motor Vehicle | South | Proceeding Straight | South | Parked | Improper Turning | 0 | 0 |
| 2265787 | 10/9/05 | 11:40 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2359984 | 11/25/05 | 10:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Merging | East | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 2511822 | 2/18/06 | 20:13 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2511801 | 2/21/06 | 16:45 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Making Left Turn | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 2544572 | 3/22/06 | 01:14 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2703719 | 6/25/06 | 11:29 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2985892 | 1/13/07 | 14:26 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3042915 | 2/3/07 | 12:53 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Changing Lanes | East | Proceeding Straight | Unsafe Lane Change | 0 | 0 |
| 3260257 | 7/7/07 | 07:40 | 30 | South | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 3388414 | 9/22/07 | 15:49 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 4 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Madison Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 13

Settings Used For Query

Parameter

Setting

Street Name
Cross Street
Starting Date
Ending Date
Intersection

Madison Street
7th Street
10/1/2004
9/30/2008
Intersection Related

**City of Oakland
Transportation Services Division**

Traffic Collision History Report

8/8/2008
Page 1

Location: Jackson Street / 6th Street

Date Range Reported: 10/1/2003 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1097681 | 10/30/03 | 14:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1137117 | 11/15/03 | 11:29 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1160662 | 12/8/03 | 10:30 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Not Stated | West | Not Stated | Traffic Signals and Signs | 0 | 0 |
| 1173814 | 12/14/03 | 17:10 | 0 | In Int. | Head-On | Other Motor Vehicle | West | Making Left Turn | South | Proceeding Straight | Improper Turning | 2 | 0 |
| 1103226 | 12/29/03 | 19:20 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1214642 | 1/7/04 | 11:34 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1291020 | 2/7/04 | 10:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1291799 | 2/15/04 | 08:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1417460 | 5/7/04 | 11:53 | 0 | In Int. | Head-On | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1473896 | 6/15/04 | 12:30 | 75 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 0 | 0 |
| 1485243 | 6/17/04 | 15:45 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |

| | | | | | | | | | | | | | |
|---------|----------|-------|---|---------|-----------|------------------------------------|-------|-------------------------|-------|-------------------------|-------------------------------|---|---|
| 1514259 | 6/25/04 | 16:45 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 1572137 | 7/27/04 | 08:40 | 0 | In Int. | Broadside | Other Motor Veh
icle | South | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 1652652 | 9/22/04 | 20:55 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | South | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 1659043 | 10/3/04 | 11:45 | 0 | In Int. | Broadside | Other Motor Veh
icle | South | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 1703379 | 10/28/04 | 17:00 | 0 | In Int. | Broadside | Other Motor Veh
icle | South | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 1764700 | 12/6/04 | 17:50 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 1 | 0 |
| 1987243 | 4/7/05 | 13:35 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 1997470 | 4/18/05 | 21:50 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | South | Making Left Tur
n | North | Proceeding Stra
ight | Auto R/W Violation | 0 | 0 |
| 1998192 | 5/2/05 | 13:25 | 0 | In Int. | Broadside | Other Motor Veh
icle | South | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2031905 | 5/19/05 | 18:20 | 0 | In Int. | Sideswipe | Other Motor Veh
icle | West | Slowing/Stoppin
g | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2186166 | 8/18/05 | 20:05 | 0 | In Int. | Broadside | Other Motor Veh
icle | North | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2304430 | 10/2/05 | 15:42 | 0 | In Int. | Broadside | Other Motor Veh
icle | South | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2396867 | 12/26/05 | 19:00 | 0 | In Int. | Broadside | Motor Vehicle o
n Other Roadway | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Unknown | 0 | 0 |
| 2563542 | 4/3/06 | 06:40 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 1 | 0 |
| 2687202 | 6/22/06 | 12:25 | 0 | In Int. | Broadside | Other Motor Veh
icle | South | Proceeding Stra
ight | West | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |
| 2845846 | 10/13/06 | 01:00 | 0 | In Int. | Broadside | Other Motor Veh
icle | West | Proceeding Stra
ight | North | Proceeding Stra
ight | Traffic Signals an
d Signs | 0 | 0 |

| | | | | | | | | | | | | | |
|---------|----------|-------|----|---------|-----------|-----------------|---------------|-----------------|---------------|-----------------|-------------------------------|---|---|
| 2845916 | 10/15/06 | 14:00 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North
ight | Proceeding Stra | Traffic Signals an
d Signs | 1 | 0 |
| 3009851 | 1/3/07 | 22:55 | 60 | East | Rear-End | Other Motor Veh | West
icle | Proceeding Stra | West
ight | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3026970 | 1/30/07 | 13:49 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | North
ight | Proceeding Stra | Traffic Signals an
d Signs | 0 | 0 |
| 3078715 | 3/10/07 | 11:25 | 0 | In Int. | Broadside | Other Motor Veh | West
icle | Proceeding Stra | South
ight | Proceeding Stra | Traffic Signals an
d Signs | 1 | 0 |
| 3092653 | 3/16/07 | 18:45 | 0 | In Int. | Sideswipe | Other Motor Veh | North
icle | Proceeding Stra | West
ight | Proceeding Stra | Traffic Signals an
d Signs | 0 | 0 |

Total Number of Collisions: 32

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Oak Street / Route 880 Wb Offramp
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2409483 | 1/8/06 | 16:13 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Right Turn | North | Making Right Turn | Improper Turning | 0 | 0 |
| 2513696 | 3/8/06 | 15:55 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Making Right Turn | Other Hazardous Movement | 0 | 0 |
| 2674224 | 5/27/06 | 23:25 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | West | Entering Traffic | Traffic Signals and Signs | 0 | 0 |
| 2871807 | 10/31/06 | 19:00 | 0 | In Int. | Broadside | Not Stated | West | Proceeding Straight | North | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 3331298 | 8/17/07 | 10:45 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Right Turn | North | Making Right Turn | Unknown | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Oak Street / Route 880 Wb Offramp
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 5

Settings Used For Query

Parameter

Setting

Street Name

Oak Street

Cross Street

Route 880 Wb Offramp

Starting Date

10/1/2004

Ending Date

9/30/2008

Intersection

Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 1

Location: Oak Street / 5th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1757723 | 11/25/04 | 00:09 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2074443 | 5/31/05 | 12:00 | 0 | In Int. | Not Stated | Other Motor Vehicle | East | Making Left Turn | East | Proceeding Straight | Unknown | 0 | 0 |
| 2086245 | 6/18/05 | 21:30 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2211417 | 9/3/05 | 14:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2241221 | 9/10/05 | 09:30 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2342208 | 10/18/05 | 09:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2348279 | 11/11/05 | 18:30 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2484635 | 1/30/06 | 14:02 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2660495 | 5/13/06 | 14:15 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Proceeding Straight | Improper Turning | 1 | 0 |
| 2671937 | 6/10/06 | 15:28 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2687233 | 6/21/06 | 13:18 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 2871796 | 10/23/06 | 09:14 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2942459 | 12/1/06 | 12:40 | 0 | In Int. | Hit Object | Fixed Object | South | Proceeding Straight | | | Other Hazardous Movement | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008
Page 2

Location: Oak Street / 5th Street
Date Range Reported: 10/1/2004 - 9/30/2008

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 13

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Oak Street |
| Cross Street | 5th Street |
| Starting Date | 10/1/2004 |
| Ending Date | 9/30/2008 |
| Intersection | Intersection Related |

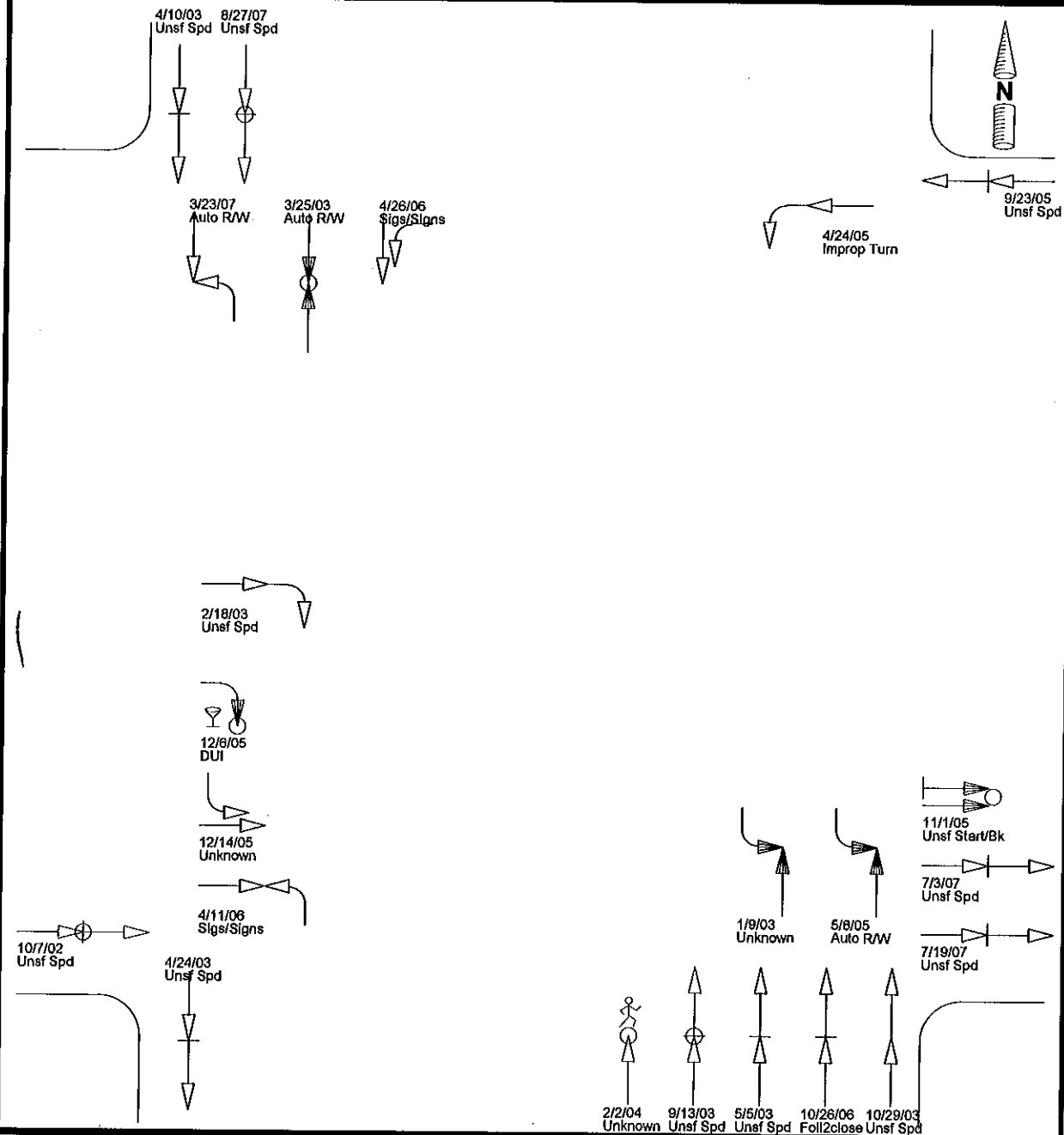
Collision Diagram

Horizontal Street: GRAND AVENUE

Vertical Street: EL EMBARCADERO

From: 10/1/2002 To: 9/30/2007

Date Prepared: 4/22/2009



Number of Collisions

18 Property Damage Only
7 Injury Collisions
0 Fatal Collisions
25 Total Collisions

Collisions Not Plotted: 2

Legend

Moving Vehicle
 Stopped Vehicle
 Backing Vehicle
 Ran Off Road
 Movement Unknown

Right Turn
 Left Turn
 Sideswipe
 Day
 Night

Pedestrian
 Fixed Object
 Bicycle
 DUI
 Injury
 Fatal

Color Legend - Highest Degree of Injury

Medium Blue = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter

Setting

Street Name

Grand Avenue

Cross Street

El Embarcadero

Starting Date

10/1/2002

Ending Date

9/30/2007

Intersection

Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 2

Location: Grand Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|------------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 2308183 | 11/1/05 | 20:50 | 0 | In Int. | Sideswipe | Parked Motor Vehicle | East | Proceeding Straight | East | Parked | Unsafe Starting or Backing | 1 | 0 |
| 2563245 | 12/6/05 | 21:25 | 0 | In Int. | Overtuned | Not Stated | East | Making Right Turn | | | Driving Under Influence | 1 | 0 |
| 2394212 | 12/14/05 | 10:05 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | East | Proceeding Straight | Unknown | 0 | 0 |
| 2577957 | 4/11/06 | 13:40 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | North | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 2605346 | 4/26/06 | 14:37 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | West | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 2864340 | 10/26/06 | 17:01 | 20 | Not Stated | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Following Too Closely | 0 | 0 |
| 3097379 | 3/23/07 | 08:45 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Making Left Turn | South | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 3312631 | 7/3/07 | 15:14 | 40 | East | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3284029 | 7/19/07 | 11:10 | 20 | East | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3359587 | 8/27/07 | 11:15 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 1 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 3

Location: Grand Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 25

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Grand Avenue |
| Cross Street | El Embarcadero |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 1

Location: Lakeshore Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 0469031 | 10/16/02 | 20:02 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | North | Making Left Turn | Unknown | 0 | 0 |
| 0953736 | 8/10/03 | 08:30 | 0 | In Int. | Head-On | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1018428 | 9/15/03 | 18:15 | 30 | West | Vehicle - Pedestrian | Pedestrian | West | Making Right Turn | North | Not Stated | Ped R/W Violation | 1 | 0 |
| 1093222 | 10/23/03 | 08:25 | 15 | North | Rear-End | Other Motor Vehicle | South | Slowing/Stopping | South | Stopped in Road | Traffic Signals and Signs | 0 | 0 |
| 1191901 | 12/18/03 | 17:49 | 0 | In Int. | Rear-End | Other Motor Vehicle | South | Stopped in Road | South | Merging | Unknown | 0 | 0 |
| 1388316 | 4/13/04 | 17:07 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Right Turn | South | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1417473 | 5/8/04 | 19:09 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Unknown | 0 | 0 |
| 1560835 | 6/30/04 | 22:10 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1764704 | 12/4/04 | 16:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1997461 | 4/18/05 | 18:51 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Making Left Turn | Unsafe Speed | 0 | 0 |
| 2205383 | 8/28/05 | 15:15 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2361672 | 11/22/05 | 20:10 | 0 | In Int. | Broadside | Motor Vehicle on Other | East | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2422669 | 1/6/06 | 17:00 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2479248 | 1/19/06 | 07:58 | 10 | West | Rear-End | Other Motor Vehicle | East | Merging | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2687205 | 6/21/06 | 13:45 | 0 | In Int. | Rear-End | Bicycle | North | Making Left Turn | North | Proceeding Straight | Improper Turning | 1 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 2

Location: Lakeshore Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|---------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 3002138 | 1/16/07 | 18:52 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | North | Making Left Turn | Traffic Signals and Signs | 0 | 0 |
| 3042882 | 2/19/07 | 15:25 | 15 | West | Rear-End | Other Motor Vehicle | East | Making Right Turn | East | Stopped in Road | Unsafe Speed | 0 | 0 |

Total Number of Collisions: 17

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Lakeshore Avenue |
| Cross Street | El Embarcadero |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 1

Location: Grand Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 0585056 | 12/13/02 | 16:40 | 120 | West | Rear-End | Other Motor Vehicle | East | Slowing/Stopping | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 0651140 | 2/6/03 | 14:28 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 0688549 | 3/9/03 | 16:05 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 0769874 | 4/22/03 | 22:23 | 0 | In Int. | Not Stated | Other Motor Vehicle | West | Making U Turn | West | Parked | Improper Turning | 0 | 0 |
| 0774406 | 4/30/03 | 16:15 | 20 | West | Rear-End | Other Motor Vehicle | Not Stated | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 0857369 | 6/16/03 | 09:55 | 10 | West | Vehicle - Pedestrian | Pedestrian | North | Proceeding Straight | East | Proceeding Straight | Pedestrian Violation | 1 | 0 |
| 1031594 | 9/26/03 | 09:45 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 1058359 | 10/4/03 | 15:32 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1060880 | 10/9/03 | 15:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 1137773 | 11/17/03 | 11:20 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | North | Making Left Turn | Improper Turning | 0 | 0 |
| 1142114 | 11/18/03 | 10:00 | 24 | West | Rear-End | Other Motor Vehicle | East | Slowing/Stopping | East | Stopped in Road | Unsafe Speed | 1 | 0 |
| 1248198 | 1/22/04 | 11:20 | 20 | West | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Starting or Backing | 0 | 0 |
| 1283715 | 2/17/04 | 16:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 2101185 | 6/18/05 | 09:50 | 50 | East | Rear-End | Other Motor Vehicle | East | Proceeding Straight | West | Proceeding Straight | Following Too Closely | 0 | 0 |
| 2154092 | 7/6/05 | 18:52 | 5 | South | Rear-End | Other Motor Vehicle | North | Making Right Turn | North | Making Right Turn | Unsafe Speed | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 2

Location: Grand Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2225782 | 9/2/05 | 11:30 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2304317 | 10/4/05 | 09:00 | 100 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Following Too Closely | 0 | 0 |
| 2389166 | 12/7/05 | 16:00 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Making Left Turn | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 2466005 | 1/25/06 | 22:10 | 10 | South | Vehicle - Pedestrian | Pedestrian | South | Making Right Turn | East | Proceeding Straight | Ped R/W Violation | 0 | 0 |
| 2515377 | 2/23/06 | 08:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Making Left Turn | East | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2623750 | 4/22/06 | 12:29 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Proceeding Straight | Unsafe Speed | 0 | 0 |
| 2914072 | 11/20/06 | 18:06 | 30 | West | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Making Left Turn | Other | 0 | 0 |
| 2917439 | 11/28/06 | 22:52 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3039517 | 2/8/07 | 22:44 | 10 | North | Hit Object | Fixed Object | Not Stated | Other Unsafe Turning | | | Unsafe Speed | 0 | 0 |
| 3296983 | 7/26/07 | 14:40 | 20 | West | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Improper Turning | 0 | 0 |
| 3370269 | 9/14/07 | 14:10 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Improper Turning | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 3

Location: Grand Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 26

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Grand Avenue |
| Cross Street | Macarthur Boulevard |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 2

Location: Lakeshore Avenue / Macarthur Boulevard

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1262684 | 2/5/04 | 14:35 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1311623 | 3/6/04 | 13:45 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1570183 | 4/9/04 | 19:59 | 25 | East | Sideswipe | Other Motor Vehicle | East | Making Right Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1389965 | 4/20/04 | 21:50 | 40 | West | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 1419707 | 4/29/04 | 08:05 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Making Left Turn | Traffic Signals and Signs | 1 | 0 |
| 1421638 | 4/30/04 | 14:00 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Making Left Turn | North | Stopped in Road | Other | 2 | 0 |
| 1364225 | 5/5/04 | 07:50 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 1 | 0 |
| 1472083 | 5/21/04 | 11:50 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Changing Lanes | North | Proceeding Straight | Unsafe Lane Change | 0 | 0 |
| 1570210 | 8/12/04 | 16:55 | 0 | In Int. | Sideswipe | Other Motor Vehicle | South | Making Left Turn | North | Proceeding Straight | Unknown | 0 | 0 |
| 1649217 | 8/23/04 | 08:30 | 0 | In Int. | Sideswipe | Parked Motor Vehicle | North | Changing Lanes | Not Stated | Parked | Improper Turning | 0 | 0 |
| 1648944 | 8/24/04 | 10:29 | 20 | North | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Proceeding Straight | Improper Turning | 0 | 0 |
| 1831397 | 11/26/04 | 14:05 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Not Stated | East | Not Stated | Traffic Signals and Signs | 0 | 0 |
| 1777509 | 12/14/04 | 20:53 | 0 | In Int. | Head-On | Bicycle | North | Making Right Turn | South | Proceeding Straight | Ped R/W Violation | 0 | 0 |
| 2012191 | 4/30/05 | 19:30 | 6 | North | Sideswipe | Other Motor Vehicle | North | Making Left Turn | North | Making Left Turn | Unknown | 0 | 0 |
| 2059427 | 5/28/05 | 07:45 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 3

Location: Lakeshore Avenue / Macarthur Boulevard

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|----------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|----------------------------|------|-----|
| 2119696 | 7/8/05 | 21:30 | 10 | South | Other | Other Motor Vehicle | Not Stated | Backing | North | Stopped in Road | Improper Turning | 0 | 0 |
| 2213443 | 9/4/05 | 01:00 | 15 | West | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2265791 | 10/9/05 | 16:23 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2304454 | 10/15/05 | 21:00 | 0 | In Int. | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2392505 | 12/21/05 | 14:20 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Making Left Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2444804 | 1/23/06 | 19:24 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2532018 | 2/10/06 | 12:15 | 35 | East | Sideswipe | Other Motor Vehicle | East | Other Unsafe Turning | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 2591325 | 4/23/06 | 10:10 | 45 | South | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Slowing/Stopping | Unsafe Starting or Backing | 0 | 0 |
| 2626405 | 5/3/06 | 07:57 | 0 | In Int. | Head-On | Other Motor Vehicle | East | Making Left Turn | North | Proceeding Straight | Other Hazardous Movement | 0 | 0 |
| 2687159 | 6/7/06 | 16:00 | 0 | In Int. | Broadside | Other Motor Vehicle | South | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2687229 | 6/21/06 | 17:23 | 0 | In Int. | Vehicle - Pedestrian | Bicycle | North | Making Right Turn | Not Stated | Proceeding Straight | Unknown | 0 | 0 |
| 2686689 | 6/28/06 | 10:44 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2822939 | 10/4/06 | 08:45 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Making U Turn | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2916365 | 11/19/06 | 04:29 | 0 | In Int. | Other | Bicycle | Not Stated | Other | Not Stated | Other | Other | 1 | 0 |
| 2903684 | 11/20/06 | 18:05 | 20 | West | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Auto R/W Violation | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 4

Location: Lakeshore Avenue / Macarthur Boulevard

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2946035 | 12/15/06 | 09:32 | 0 | In Int. | Sideswipe | Other Motor Vehicle | East | Proceeding Straight | East | Proceeding Straight | Improper Turning | 0 | 0 |
| 2968626 | 12/27/06 | 11:48 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Making Right Turn | Unsafe Speed | 0 | 0 |
| 2985777 | 1/4/07 | 19:15 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Making Right Turn | East | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3033651 | 2/10/07 | 21:41 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | East | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3104909 | 3/26/07 | 21:40 | 10 | West | Rear-End | Other Motor Vehicle | East | Proceeding Straight | East | Stopped in Road | Following Too Closely | 0 | 0 |
| 3250371 | 7/1/07 | 15:09 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3325399 | 8/17/07 | 08:48 | 0 | In Int. | Other | Other Object | West | Making Left Turn | | | Improper Turning | 0 | 0 |
| 3360079 | 9/17/07 | 15:05 | 0 | In Int. | Broadside | Other Motor Vehicle | East | Proceeding Straight | South | Making Left Turn | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 5

Location: Lakeshore Avenue / Macarthur Boulevard

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 53

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Lakeshore Avenue |
| Cross Street | Macarthur Boulevard |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 1

Location: Oakland Avenue / Macarthur Boulevard (W)

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|------------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 0507369 | 11/16/02 | 12:41 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 0518883 | 11/25/02 | 14:50 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 2 | 0 |
| 0599129 | 1/8/03 | 18:51 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | North | Proceeding Straight | Improper Turning | 0 | 0 |
| 0657135 | 1/24/03 | 23:00 | 60 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 2 | 0 |
| 0665266 | 2/16/03 | 14:45 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 0739652 | 4/2/03 | 09:24 | 0 | In Int. | Broadside | Non-Collision | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 0833299 | 5/4/03 | 15:11 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 0908748 | 7/13/03 | 14:27 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 0937465 | 8/4/03 | 16:48 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Making Left Turn | West | Making Left Turn | Improper Turning | 0 | 0 |
| 1006758 | 9/14/03 | 17:23 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1103128 | 12/31/03 | 12:05 | 50 | West | Broadside | Bicycle | East | Entering Traffic | West | Making Right Turn | Other Hazardous Movement | 1 | 0 |
| 1393143 | 4/20/04 | 18:40 | 5 | Not Stated | Broadside | Other Motor Vehicle | West | Making Left Turn | West | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 1428133 | 5/13/04 | 18:50 | 20 | West | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 1472115 | 5/14/04 | 07:59 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1514397 | 6/28/04 | 11:11 | 0 | In Int. | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Stopped in Road | Unsafe Speed | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 2

Location: Oakland Avenue / Macarthur Boulevard (W)

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 1597194 | 8/30/04 | 17:10 | 0 | In Int. | Sideswipe | Other Motor Vehicle | Not Stated | Proceeding Straight | West | Stopped in Road | Traffic Signals and Signs | 0 | 0 |
| 1735059 | 11/9/04 | 14:39 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1738147 | 11/15/04 | 11:55 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1831460 | 12/18/04 | 20:15 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Unknown | 1 | 0 |
| 1797638 | 12/22/04 | 08:50 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1993634 | 4/26/05 | 19:26 | 30 | North | Rear-End | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Following Too Closely | 0 | 0 |
| 2085053 | 6/10/05 | 18:40 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2152423 | 7/9/05 | 17:00 | 0 | In Int. | Not Stated | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2158693 | 7/31/05 | 18:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2179185 | 8/13/05 | 14:45 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2186176 | 8/22/05 | 16:45 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2304509 | 10/1/05 | 12:00 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Making Left Turn | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2474941 | 2/2/06 | 12:00 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | North | Proceeding Straight | Auto R/W Violation | 0 | 0 |
| 2522320 | 3/10/06 | 17:35 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2682949 | 5/22/06 | 09:20 | 21 | West | Sideswipe | Other Motor Vehicle | West | Passing Other Vehicle | West | Stopped in Road | Unsafe Lane Change | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 3

Location: Oakland Avenue / Macarthur Boulevard (W)
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2965236 | 12/22/06 | 21:10 | 0 | In Int. | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3283038 | 7/18/07 | 12:24 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3359259 | 9/7/07 | 11:04 | 0 | In Int. | Broadside | Other Motor Vehicle | Not Stated | Proceeding Straight | Not Stated | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

Total Number of Collisions: 33

Settings Used For Query

Parameter

Setting

| | |
|---------------|-------------------------|
| Street Name | Oakland Avenue |
| Cross Street | Macarthur Boulevard (W) |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 1

Location: Oakland Avenue / Santa Clara Avenue

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 0947410 | 8/9/03 | 15:16 | 0 | In Int. | Not Stated | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1132371 | 11/9/03 | 15:00 | 20 | East | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 1114546 | 11/13/03 | 12:09 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1262681 | 2/5/04 | 08:00 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | North | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1510674 | 6/22/04 | 18:30 | 0 | In Int. | Broadside | Motor Vehicle on Other | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2043889 | 5/11/05 | 17:35 | 20 | East | Sideswipe | Other Motor Vehicle | West | Changing Lanes | West | Proceeding Straight | Unknown | 0 | 0 |
| 2178667 | 8/4/05 | 13:30 | 8 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Unsafe Speed | 1 | 0 |
| 2225789 | 9/2/05 | 17:40 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Left Turn | West | Proceeding Straight | Unknown | 1 | 0 |
| 2268630 | 10/6/05 | 06:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | North | Making Right Turn | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 2494109 | 2/9/06 | 00:30 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Driving Under Influence | 0 | 0 |
| 2523435 | 3/10/06 | 14:30 | 8 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Improper Turning | 1 | 0 |
| 2660538 | 5/15/06 | 02:20 | 0 | In Int. | Broadside | Other Motor Vehicle | North | Proceeding Straight | West | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 2631289 | 5/21/06 | 20:30 | 50 | East | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Unsafe Speed | 1 | 0 |
| 2926249 | 11/27/06 | 12:20 | 20 | East | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 2926281 | 12/4/06 | 14:01 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Proceeding Straight | Improper Turning | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 2

Location: Oakland Avenue / Santa Clara Avenue

Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 15

Settings Used For Query

Parameter

Setting

Street Name

Oakland Avenue

Cross Street

Santa Clara Avenue

Starting Date

10/1/2002

Ending Date

9/30/2007

Intersection

Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 1

Location: Harrison Street / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 0490854 | 10/29/02 | 18:04 | 123 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Following Too Closely | 0 | 0 |
| 0519694 | 11/25/02 | 12:30 | 50 | West | Sideswipe | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 0 | 0 |
| 0610619 | 1/7/03 | 09:05 | 20 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Slowing/Stopping | Unsafe Speed | 0 | 0 |
| 0857425 | 6/16/03 | 07:40 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Changing Lanes | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 0989019 | 9/2/03 | 10:15 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1424851 | 5/11/04 | 14:40 | 25 | West | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Following Too Closely | 0 | 0 |
| 1735183 | 11/11/04 | 11:23 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1831382 | 11/24/04 | 08:30 | 0 | In Int. | Broadside | Non-Collision | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1831389 | 11/24/04 | 09:32 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 1 | 0 |
| 1795651 | 12/19/04 | 02:50 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1795719 | 12/26/04 | 18:30 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 1821663 | 12/30/04 | 09:11 | 15 | West | Broadside | Other Motor Vehicle | West | Making Right Turn | West | Proceeding Straight | Other | 1 | 0 |
| 2241143 | 9/23/05 | 20:15 | 15 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 2397429 | 12/14/05 | 23:15 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Making Right Turn | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 2409496 | 1/5/06 | 09:00 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Page 2

Location: Harrison Street / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------------|------|-----|
| 2489893 | 2/7/06 | 09:50 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2586660 | 4/15/06 | 01:30 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | West | Proceeding Straight | Improper Turning | 0 | 0 |
| 2605519 | 4/25/06 | 09:26 | 0 | In Int. | Sideswipe | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 2980878 | 12/24/06 | 10:33 | 15 | East | Rear-End | Other Motor Vehicle | West | Proceeding Straight | West | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3009894 | 1/27/07 | 10:33 | 6 | North | Rear-End | Other Motor Vehicle | South | Proceeding Straight | South | Stopped in Road | Unsafe Speed | 0 | 0 |
| 3063617 | 2/26/07 | 13:17 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3063607 | 2/28/07 | 09:31 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3348936 | 7/14/07 | 18:15 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |
| 3308994 | 7/20/07 | 09:40 | 0 | In Int. | Broadside | Other Motor Vehicle | West | Proceeding Straight | South | Proceeding Straight | Traffic Signals and Signs | 0 | 0 |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 3

Location: Harrison Street / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 24

Settings Used For Query

| <u>Parameter</u> | <u>Setting</u> |
|------------------|----------------------|
| Street Name | Harrison Street |
| Cross Street | Macarthur Boulevard |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 1

Location: Harrison Street / Santa Clara Avenue
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|----------|-------|-------|---------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|------------------|------|-----|
| 1831362 | 11/23/04 | 21:30 | 0 | In Int. | Hit Object | Fixed Object | West | Changing Lanes | | | Improper Turning | 0 | 0 |

Total Number of Collisions: 1

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Harrison Street |
| Cross Street | Santa Clara Avenue |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 1

Location: Oakland Avenue / Monte Vista Avenue
Date Range Reported: 10/1/2002 - 9/30/2007

| Report No. | Date | Time | Dist. | Dir. | Type of Collision | Motor Veh. Involved With | Direct. of Travel 1 | Movement Prec. Coll. 1 | Direct. of Travel 2 | Movement Prec. Coll. 2 | PCF | Inj. | Kil |
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|
|------------|------|------|-------|------|-------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|-----|------|-----|

Total Number of Collisions: 0

Settings Used For Query

Parameter

Setting

| | |
|---------------|----------------------|
| Street Name | Oakland Avenue |
| Cross Street | Monte Vista Avenue |
| Starting Date | 10/1/2002 |
| Ending Date | 9/30/2007 |
| Intersection | Intersection Related |

APPENDIX G.9

Roadway LOS Calculations

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | Existing | | | | | |
|-----------|--|-----------|---------------------|-------|-------------------|--------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| CMP | SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880 | NB | 1,700 | 2 | 3,400 | E | 3,081 | 0.91 | D | 2,478 | 0.73 |
| | | SB | 1,700 | 2 | 3,400 | B | 1,575 | 0.46 | C | 2,347 | 0.69 |
| | I-880 West of I-980 / Market Street | EB | 2,000 | 4 | 8,000 | B | 3,070 | 0.38 | B | 3,164 | 0.40 |
| | | WB | 2,000 | 4 | 8,000 | B | 3,720 | 0.47 | B | 3,426 | 0.43 |
| | I-880 East of Oak Street | EB | 2,000 | 4 | 8,000 | C | 4,968 | 0.62 | D | 5,737 | 0.72 |
| | | WB | 2,000 | 4 | 8,000 | C | 5,606 | 0.70 | C | 5,075 | 0.63 |
| | I-980 North of 27th Street | NB | 2,000 | 3 | 6,000 | A | 1,611 | 0.27 | C | 3,609 | 0.60 |
| | | SB | 2,000 | 3 | 6,000 | D | 4,679 | 0.78 | B | 1,858 | 0.31 |
| Other MTS | Broadway between 19th St. and Grand Ave. | NB | 900 | 2 | 1,800 | A | 513 | 0.29 | B | 876 | 0.49 |
| | | SB | 900 | 2 | 1,800 | A | 438 | 0.24 | B | 597 | 0.33 |
| | Telegraph between 20th St. and 27th St. | NB | 900 | 2 | 1,800 | A | 464 | 0.26 | B | 678 | 0.38 |
| | | SB | 900 | 2 | 1,800 | B | 661 | 0.37 | B | 565 | 0.31 |
| | Grand between San Pablo and Telegraph | EB | 900 | 2 | 1,800 | C | 1,054 | 0.59 | B | 719 | 0.40 |
| | | WB | 900 | 2 | 1,800 | B | 672 | 0.37 | B | 862 | 0.48 |
| | Grand between Broadway and Harrison St. | EB | 900 | 2 | 1,800 | B | 682 | 0.38 | B | 762 | 0.42 |
| | | WB | 900 | 2 | 1,800 | B | 644 | 0.36 | B | 783 | 0.44 |
| | Grand between Harrison St. and El Embarcadero | EB | 900 | 2 | 1,800 | B | 751 | 0.42 | E | 1,700 | 0.94 |
| | | WB | 900 | 2 | 1,800 | E | 1,531 | 0.85 | C | 968 | 0.54 |
| | Harrison between I-580 and 27th St. | NB | 900 | 2 | 1,800 | C | 1,189 | 0.66 | E | 1,536 | 0.85 |
| | | SB | 900 | 2 | 1,800 | C | 1,041 | 0.58 | B | 686 | 0.38 |
| | Harrison between 27th St. and Grand Ave. | NB | 900 | 3 | 2,700 | A | 784 | 0.29 | B | 1,236 | 0.46 |
| | | SB | 900 | 3 | 2,700 | B | 899 | 0.33 | A | 556 | 0.21 |
| | Harrison between 20th St. and 14th St. | NB | 900 | 2 | 1,800 | A | 475 | 0.26 | B | 745 | 0.41 |
| | | SB | 900 | 2 | 1,800 | A | 444 | 0.25 | A | 286 | 0.16 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | Existing + Project | | | | | |
|-----------|--|-----------|---------------------|-------|-------------------|--------------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| CMP | SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880 | NB | 1,700 | 2 | 3,400 | E | 3,086 | 0.91 | D | 2,479 | 0.73 |
| | | SB | 1,700 | 2 | 3,400 | B | 1,577 | 0.46 | C | 2,363 | 0.70 |
| | I-880 West of I-980 / Market Street | EB | 2,000 | 4 | 8,000 | B | 3,164 | 0.40 | B | 3,181 | 0.40 |
| | | WB | 2,000 | 4 | 8,000 | B | 3,733 | 0.47 | B | 3,512 | 0.44 |
| | I-880 East of Oak Street | EB | 2,000 | 4 | 8,000 | C | 4,983 | 0.62 | D | 5,831 | 0.73 |
| | | WB | 2,000 | 4 | 8,000 | D | 5,710 | 0.71 | C | 5,095 | 0.64 |
| | I-980 North of 27th Street | NB | 2,000 | 3 | 6,000 | A | 1,647 | 0.27 | C | 3,842 | 0.64 |
| | | SB | 2,000 | 3 | 6,000 | D | 4,832 | 0.81 | B | 1,885 | 0.31 |
| Other MTS | Broadway between 19th St. and Grand Ave. | NB | 900 | 2 | 1,800 | B | 553 | 0.31 | C | 1,029 | 0.57 |
| | | SB | 900 | 2 | 1,800 | A | 503 | 0.28 | B | 611 | 0.34 |
| | Telegraph between 20th St. and 27th St. | NB | 900 | 2 | 1,800 | A | 470 | 0.26 | B | 712 | 0.40 |
| | | SB | 900 | 2 | 1,800 | B | 675 | 0.38 | B | 573 | 0.32 |
| | Grand between San Pablo and Telegraph | EB | 900 | 2 | 1,800 | C | 1,181 | 0.66 | B | 726 | 0.40 |
| | | WB | 900 | 2 | 1,800 | B | 685 | 0.38 | C | 945 | 0.53 |
| | Grand between Broadway and Harrison St. | EB | 900 | 2 | 1,800 | B | 851 | 0.47 | B | 782 | 0.43 |
| | | WB | 900 | 2 | 1,800 | B | 660 | 0.37 | B | 785 | 0.44 |
| | Grand between Harrison St. and El Embarcadero | EB | 900 | 2 | 1,800 | B | 755 | 0.42 | F | 1,841 | 1.02 |
| | | WB | 900 | 2 | 1,800 | E | 1,759 | 0.98 | C | 1,015 | 0.56 |
| | Harrison between I-580 and 27th St. | NB | 900 | 2 | 1,800 | C | 1,247 | 0.69 | F | 1,808 | 1.00 |
| | | SB | 900 | 2 | 1,800 | D | 1,278 | 0.71 | B | 726 | 0.40 |
| | Harrison between 27th St. and Grand Ave. | NB | 900 | 3 | 2,700 | B | 857 | 0.32 | C | 1,590 | 0.59 |
| | | SB | 900 | 3 | 2,700 | B | 1,155 | 0.43 | A | 599 | 0.22 |
| | Harrison between 20th St. and 14th St. | NB | 900 | 2 | 1,800 | A | 497 | 0.28 | B | 755 | 0.42 |
| | | SB | 900 | 2 | 1,800 | A | 459 | 0.26 | A | 286 | 0.16 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2015 | | | | | |
|-----------|--|-----------|---------------------|-------|-------------------|--------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| CMP | SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880 | NB | 1,700 | 2 | 3,400 | E | 3,386 | 1.00 | D | 2,906 | 0.85 |
| | | SB | 1,700 | 2 | 3,400 | C | 2,108 | 0.62 | D | 2,950 | 0.87 |
| | I-880 West of I-980 / Market Street | EB | 2,000 | 4 | 8,000 | B | 3,303 | 0.41 | B | 3,234 | 0.40 |
| | | WB | 2,000 | 4 | 8,000 | B | 3,939 | 0.49 | B | 3,610 | 0.45 |
| | I-880 East of Oak Street | EB | 2,000 | 4 | 8,000 | D | 5,705 | 0.71 | D | 6,401 | 0.80 |
| | | WB | 2,000 | 4 | 8,000 | D | 6,312 | 0.79 | D | 5,727 | 0.72 |
| | I-980 North of 27th Street | NB | 2,000 | 3 | 6,000 | B | 1,821 | 0.30 | C | 3,973 | 0.66 |
| | | SB | 2,000 | 3 | 6,000 | D | 5,280 | 0.88 | B | 2,208 | 0.37 |
| Other MTS | Broadway between 19th St. and Grand Ave. | NB | 900 | 2 | 1,800 | B | 606 | 0.34 | C | 1,042 | 0.58 |
| | | SB | 900 | 2 | 1,800 | A | 517 | 0.29 | B | 710 | 0.39 |
| | Telegraph between 20th St. and 27th St. | NB | 900 | 2 | 1,800 | B | 576 | 0.32 | B | 879 | 0.49 |
| | | SB | 900 | 2 | 1,800 | B | 779 | 0.43 | B | 672 | 0.37 |
| | Grand between Telegraph and San Pablo | EB | 900 | 2 | 1,800 | C | 1,241 | 0.69 | B | 841 | 0.47 |
| | | WB | 900 | 2 | 1,800 | B | 791 | 0.44 | C | 1,011 | 0.56 |
| | Grand between Broadway and Harrison St. | EB | 900 | 2 | 1,800 | B | 803 | 0.45 | B | 891 | 0.49 |
| | | WB | 900 | 2 | 1,800 | B | 758 | 0.42 | C | 917 | 0.51 |
| | Grand between Harrison St. and El Embarcadero | EB | 900 | 2 | 1,800 | B | 807 | 0.45 | F | 1,998 | 1.11 |
| | | WB | 900 | 2 | 1,800 | D | 1,455 | 0.81 | C | 1,014 | 0.56 |
| | Harrison between I-580 and 27th St. | NB | 900 | 2 | 1,800 | D | 1,453 | 0.81 | F | 1,939 | 1.08 |
| | | SB | 900 | 2 | 1,800 | C | 1,225 | 0.68 | B | 821 | 0.46 |
| | Harrison between 27th St. and Grand Ave. | NB | 900 | 3 | 2,700 | B | 922 | 0.34 | B | 1,326 | 0.49 |
| | | SB | 900 | 3 | 2,700 | B | 1,057 | 0.39 | A | 666 | 0.25 |
| | Harrison between 20th St. and 14th St. | NB | 900 | 2 | 1,800 | B | 559 | 0.31 | C | 947 | 0.53 |
| | | SB | 900 | 2 | 1,800 | B | 570 | 0.32 | A | 342 | 0.19 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2030 | | | | | |
|-----------|--|-----------|---------------------|-------|-------------------|--------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| CMP | SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880 | NB | 1,700 | 2 | 3,400 | F | 4,084 | 1.20 | F | 3,885 | 1.14 |
| | | SB | 1,700 | 2 | 3,400 | E | 3,327 | 0.98 | F | 4,329 | 1.27 |
| | I-880 West of I-980 / Market Street | EB | 2,000 | 4 | 8,000 | B | 3,835 | 0.48 | B | 3,394 | 0.42 |
| | | WB | 2,000 | 4 | 8,000 | C | 4,441 | 0.56 | C | 4,031 | 0.50 |
| | I-880 East of Oak Street | EB | 2,000 | 4 | 8,000 | E | 7,390 | 0.92 | E | 7,920 | 0.99 |
| | | WB | 2,000 | 4 | 8,000 | E | 7,925 | 0.99 | E | 7,217 | 0.90 |
| | I-980 North of 27th Street | NB | 2,000 | 3 | 6,000 | B | 2,300 | 0.38 | D | 4,806 | 0.80 |
| | | SB | 2,000 | 3 | 6,000 | F | 6,653 | 1.11 | C | 3,009 | 0.50 |
| Other MTS | Broadway between 19th St. and Grand Ave. | NB | 900 | 2 | 1,800 | B | 699 | 0.39 | C | 1,207 | 0.67 |
| | | SB | 900 | 2 | 1,800 | B | 595 | 0.33 | B | 823 | 0.46 |
| | Telegraph between 20th St. and 27th St. | NB | 900 | 2 | 1,800 | B | 688 | 0.38 | C | 1,080 | 0.60 |
| | | SB | 900 | 2 | 1,800 | B | 897 | 0.50 | B | 779 | 0.43 |
| | Grand between Telegraph and San Pablo | EB | 900 | 2 | 1,800 | D | 1,427 | 0.79 | C | 962 | 0.53 |
| | | WB | 900 | 2 | 1,800 | C | 910 | 0.51 | C | 1,160 | 0.64 |
| | Grand between Broadway and Harrison St. | EB | 900 | 2 | 1,800 | C | 924 | 0.51 | D | 1,269 | 0.71 |
| | | WB | 900 | 2 | 1,800 | D | 1,393 | 0.77 | C | 1,199 | 0.67 |
| | Grand between Harrison St. and El Embarcadero | EB | 900 | 2 | 1,800 | C | 936 | 0.52 | F | 2,284 | 1.27 |
| | | WB | 900 | 2 | 1,800 | E | 1,782 | 0.99 | D | 1,326 | 0.74 |
| | Harrison between I-580 and 27th St. | NB | 900 | 2 | 1,800 | E | 1,718 | 0.95 | F | 2,342 | 1.30 |
| | | SB | 900 | 2 | 1,800 | E | 1,571 | 0.87 | C | 987 | 0.55 |
| | Harrison between 27th St. and Grand Ave. | NB | 900 | 3 | 2,700 | B | 1,276 | 0.47 | C | 1,650 | 0.61 |
| | | SB | 900 | 3 | 2,700 | C | 1,361 | 0.50 | B | 924 | 0.34 |
| | Harrison between 20th St. and 14th St. | NB | 900 | 2 | 1,800 | B | 643 | 0.36 | D | 1,362 | 0.76 |
| | | SB | 900 | 2 | 1,800 | B | 720 | 0.40 | A | 399 | 0.22 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2015 + Phase 1 | | | | | |
|-----------|--|-----------|---------------------|-------|-------------------|----------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| CMP | SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880 | NB | 1,700 | 2 | 3,400 | E | 3,389 | 1.00 | D | 2,907 | 0.86 |
| | | SB | 1,700 | 2 | 3,400 | C | 2,109 | 0.62 | D | 2,958 | 0.87 |
| | I-880 West of I-980 / Market Street | EB | 2,000 | 4 | 8,000 | B | 3,344 | 0.42 | B | 3,241 | 0.41 |
| | | WB | 2,000 | 4 | 8,000 | B | 3,944 | 0.49 | B | 3,646 | 0.46 |
| | I-880 East of Oak Street | EB | 2,000 | 4 | 8,000 | D | 5,711 | 0.71 | D | 6,441 | 0.81 |
| | | WB | 2,000 | 4 | 8,000 | D | 6,357 | 0.79 | D | 5,735 | 0.72 |
| | I-980 North of 27th Street | NB | 2,000 | 3 | 6,000 | B | 1,836 | 0.31 | C | 4,070 | 0.68 |
| | | SB | 2,000 | 3 | 6,000 | D | 5,333 | 0.89 | B | 2,218 | 0.37 |
| Other MTS | Broadway between 19th St. and Grand Ave. | NB | 900 | 2 | 1,800 | B | 617 | 0.34 | C | 1,114 | 0.62 |
| | | SB | 900 | 2 | 1,800 | B | 551 | 0.31 | B | 717 | 0.40 |
| | Telegraph between 20th St. and 27th St. | NB | 900 | 2 | 1,800 | B | 578 | 0.32 | B | 890 | 0.49 |
| | | SB | 900 | 2 | 1,800 | B | 779 | 0.43 | B | 674 | 0.37 |
| | Grand between Telegraph and San Pablo | EB | 900 | 2 | 1,800 | D | 1,300 | 0.72 | B | 844 | 0.47 |
| | | WB | 900 | 2 | 1,800 | B | 796 | 0.44 | C | 1,046 | 0.58 |
| | Grand between Broadway and Harrison St. | EB | 900 | 2 | 1,800 | B | 877 | 0.49 | B | 891 | 0.49 |
| | | WB | 900 | 2 | 1,800 | B | 758 | 0.42 | C | 917 | 0.51 |
| | Grand between Harrison St. and El Embarcadero | EB | 900 | 2 | 1,800 | B | 807 | 0.45 | F | 2,060 | 1.14 |
| | | WB | 900 | 2 | 1,800 | E | 1,584 | 0.88 | C | 1,038 | 0.58 |
| | Harrison between I-580 and 27th St. | NB | 900 | 2 | 1,800 | D | 1,480 | 0.82 | F | 2,054 | 1.14 |
| | | SB | 900 | 2 | 1,800 | D | 1,301 | 0.72 | B | 835 | 0.46 |
| | Harrison between 27th St. and Grand Ave. | NB | 900 | 3 | 2,700 | B | 957 | 0.35 | C | 1,490 | 0.55 |
| | | SB | 900 | 3 | 2,700 | B | 1,144 | 0.42 | A | 682 | 0.25 |
| | Harrison between 20th St. and 14th St. | NB | 900 | 2 | 1,800 | B | 569 | 0.32 | C | 952 | 0.53 |
| | | SB | 900 | 2 | 1,800 | B | 570 | 0.32 | A | 351 | 0.20 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2015 + Project | | | | | |
|-----------|--|-----------|---------------------|-------|-------------------|----------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| CMP | SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880 | NB | 1,700 | 2 | 3,400 | E | 3,391 | 1.00 | D | 2,909 | 0.86 |
| | | SB | 1,700 | 2 | 3,400 | C | 2,110 | 0.62 | D | 2,951 | 0.87 |
| | I-880 West of I-980 / Market Street | EB | 2,000 | 4 | 8,000 | B | 3,397 | 0.42 | B | 3,251 | 0.41 |
| | | WB | 2,000 | 4 | 8,000 | B | 3,952 | 0.49 | B | 3,696 | 0.46 |
| | I-880 East of Oak Street | EB | 2,000 | 4 | 8,000 | D | 5,720 | 0.72 | D | 6,495 | 0.81 |
| | | WB | 2,000 | 4 | 8,000 | D | 6,416 | 0.80 | D | 5,747 | 0.72 |
| | I-980 North of 27th Street | NB | 2,000 | 3 | 6,000 | B | 1,857 | 0.31 | C | 4,206 | 0.70 |
| | | SB | 2,000 | 3 | 6,000 | E | 5,433 | 0.91 | B | 2,235 | 0.37 |
| Other MTS | Broadway between 19th St. and Grand Ave. | NB | 900 | 2 | 1,800 | B | 646 | 0.36 | C | 1,195 | 0.66 |
| | | SB | 900 | 2 | 1,800 | B | 582 | 0.32 | B | 724 | 0.40 |
| | Telegraph between 20th St. and 27th St. | NB | 900 | 2 | 1,800 | B | 582 | 0.32 | C | 913 | 0.51 |
| | | SB | 900 | 2 | 1,800 | B | 793 | 0.44 | B | 680 | 0.38 |
| | Grand between Telegraph and San Pablo | EB | 900 | 2 | 1,800 | D | 1,368 | 0.76 | B | 848 | 0.47 |
| | | WB | 900 | 2 | 1,800 | B | 804 | 0.45 | C | 1,094 | 0.61 |
| | Grand between Broadway and Harrison St. | EB | 900 | 2 | 1,800 | C | 972 | 0.54 | C | 911 | 0.51 |
| | | WB | 900 | 2 | 1,800 | B | 774 | 0.43 | C | 919 | 0.51 |
| | Grand between Harrison St. and El Embarcadero | EB | 900 | 2 | 1,800 | B | 811 | 0.45 | F | 2,139 | 1.19 |
| | | WB | 900 | 2 | 1,800 | E | 1,683 | 0.93 | C | 1,061 | 0.59 |
| | Harrison between I-580 and 27th St. | NB | 900 | 2 | 1,800 | D | 1,511 | 0.84 | F | 2,211 | 1.23 |
| | | SB | 900 | 2 | 1,800 | D | 1,462 | 0.81 | B | 861 | 0.48 |
| | Harrison between 27th St. and Grand Ave. | NB | 900 | 3 | 2,700 | B | 995 | 0.37 | C | 1,680 | 0.62 |
| | | SB | 900 | 3 | 2,700 | B | 1,313 | 0.49 | A | 709 | 0.26 |
| | Harrison between 20th St. and 14th St. | NB | 900 | 2 | 1,800 | B | 581 | 0.32 | C | 958 | 0.53 |
| | | SB | 900 | 2 | 1,800 | B | 585 | 0.33 | A | 360 | 0.20 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2030 + Project | | | | | |
|-----------|--|-----------|---------------------|-------|-------------------|----------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| CMP | SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880 | NB | 1,700 | 2 | 3,400 | F | 4,089 | 1.20 | F | 3,888 | 1.14 |
| | | SB | 1,700 | 2 | 3,400 | E | 3,329 | 0.98 | F | 4,330 | 1.27 |
| | I-880 West of I-980 / Market Street | EB | 2,000 | 4 | 8,000 | B | 3,929 | 0.49 | B | 3,411 | 0.43 |
| | | WB | 2,000 | 4 | 8,000 | C | 4,454 | 0.56 | C | 4,117 | 0.51 |
| | I-880 East of Oak Street | EB | 2,000 | 4 | 8,000 | E | 7,405 | 0.93 | F | 8,014 | 1.00 |
| | | WB | 2,000 | 4 | 8,000 | F | 8,029 | 1.00 | E | 7,237 | 0.90 |
| | I-980 North of 27th Street | NB | 2,000 | 3 | 6,000 | B | 2,336 | 0.39 | D | 5,039 | 0.84 |
| | | SB | 2,000 | 3 | 6,000 | F | 6,806 | 1.13 | C | 3,036 | 0.51 |
| Other MTS | Broadway between 19th St. and Grand Ave. | NB | 900 | 2 | 1,800 | B | 739 | 0.41 | D | 1,360 | 0.76 |
| | | SB | 900 | 2 | 1,800 | B | 660 | 0.37 | B | 837 | 0.46 |
| | Telegraph between 20th St. and 27th St. | NB | 900 | 2 | 1,800 | B | 694 | 0.39 | C | 1,114 | 0.62 |
| | | SB | 900 | 2 | 1,800 | C | 911 | 0.51 | B | 787 | 0.44 |
| | Grand between Telegraph and San Pablo | EB | 900 | 2 | 1,800 | E | 1,554 | 0.86 | C | 969 | 0.54 |
| | | WB | 900 | 2 | 1,800 | C | 923 | 0.51 | C | 1,243 | 0.69 |
| | Grand between Broadway and Harrison St. | EB | 900 | 2 | 1,800 | C | 1,093 | 0.61 | D | 1,289 | 0.72 |
| | | WB | 900 | 2 | 1,800 | D | 1,409 | 0.78 | C | 1,201 | 0.67 |
| | Grand between Harrison St. and El Embarcadero | EB | 900 | 2 | 1,800 | C | 940 | 0.52 | F | 2,425 | 1.35 |
| | | WB | 900 | 2 | 1,800 | F | 2,010 | 1.12 | D | 1,373 | 0.76 |
| | Harrison between I-580 and 27th St. | NB | 900 | 2 | 1,800 | E | 1,776 | 0.99 | F | 2,614 | 1.45 |
| | | SB | 900 | 2 | 1,800 | F | 1,808 | 1.00 | C | 1,027 | 0.57 |
| | Harrison between 27th St. and Grand Ave. | NB | 900 | 3 | 2,700 | B | 1,349 | 0.50 | D | 2,004 | 0.74 |
| | | SB | 900 | 3 | 2,700 | C | 1,617 | 0.60 | B | 967 | 0.36 |
| | Harrison between 20th St. and 14th St. | NB | 900 | 2 | 1,800 | B | 665 | 0.37 | D | 1,373 | 0.76 |
| | | SB | 900 | 2 | 1,800 | B | 735 | 0.41 | A | 417 | 0.23 |

APPENDIX G.10

Supplemental Analysis of Planned Transportation Improvements

Supplementary Analyses of Planned Transportation Improvements

This section summarizes the supplementary analyses of future-year traffic operations at the study intersections and on the study roadway segments assuming the planned AC Transit Bus Rapid Transit (BRT) project and Franklin-Webster bike lanes are completed. The final sections briefly discuss other planned improvements which may affect transportation facilities analyzed as part of this EIR. No supplementary analyses have been conducted for these additional planned improvements, which include the Harrison Street / Oakland Avenue Community Transportation Plan, Broadway Retail Corridor Specific Plan, and I-880 Broadway / Jackson Street Interchange.

It should be noted that none of these improvements are fully funded and approved, and the analysis results presented here only to inform decision makers and the public.

AC Transit East Bay BRT Project

AC Transit has proposed converting the existing 1R-International Rapid into a full BRT service. The 1R currently operates with some BRT features, such as widely-spaced stops at key destinations and transfer points, vehicles designed for easy boarding and alighting, real-time schedules, and transit signal priority. However, AC Transit plans on implementing additional features for the service in the near future, including bus-only median and side-running transitways and stations along the line, completing BRT treatments for a corridor stretching from Berkeley through Downtown Oakland to San Leandro via Telegraph Avenue and International Boulevard.

In the vicinity of the Project, these improvements would generally require the removal of one through lane in each direction along Telegraph Avenue, narrowing the roadway to one vehicular lane in each direction. Buses would run in a protected median, with left turn pockets for autos provided at key intersections. Along Broadway, no travel lanes would be removed and buses would operate in mixed flow. Along 11th and 12th Streets in Downtown Oakland, the BRT service would operate in a side-running configuration, removing one lane of through traffic and eliminating some parking to allow for bulbouts at stations.

Although the BRT is expected to be in service in 2015, the project is only partially funded and not yet approved. As a result, implementation has not been assumed under Near-Term (2015) and Cumulative (2030) analysis scenarios as presented in this Environmental Impact Report (EIR). However, supplementary analysis is provided below for Near-Term (2015) and Cumulative (2030) analysis scenarios assuming the proposed BRT is in service, at study intersections located along the BRT corridor.

It should be noted that the supplementary analysis presented here conservatively assumes the following effects to be negligible:

- Reduction in traffic volumes along the BRT corridor as a result of drivers switching to other parallel corridors due to reduced roadway capacity;

- Reduction in traffic volumes along the BRT corridor and parallel corridors as a result of drivers opting to make trips to other destinations outside of the area or deciding not to make a trip at all; and,
- Reduction in traffic volumes along the BRT corridor as a result of drivers switching to other modes, primarily the new BRT service.

Although the BRT Draft Environmental Impact Statement / Environmental Impact Report (DEIS / DEIR) provide basic screenline volume changes for the BRT corridor and adjacent parallel arterials, the actual volume changes as a result of the BRT are dependent on a multitude of factors including but not limited to roadway and intersection configurations and BRT service characteristics. As a result, the BRT's net effect on trip-making characteristics and driver behavior along the corridor is difficult to estimate at the microscopic level of intersections. In addition, the BRT DEIS / DEIR did not analyze all intersections being analyzed in this EIR.

Given the above considerations, no changes to volumes were assumed after implementation of the BRT. This is a conservative assumption, as it is expected that the BRT would result in decreased volumes along Telegraph Avenue (and a corresponding increase in volumes along most parallel arterials in the corridor).

Intersection Operations

Table 1 summarizes intersection LOS results for Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions. **Table 2** summarizes intersection LOS results for Near-Term (2015) plus Project (Phase I and II) Conditions. **Table 3** summarizes intersection LOS results for Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and II) Conditions.

Based on the intersection analysis results, the Project would result in significant impacts at Intersection #5 (Telegraph Avenue / 27th Street) under all Project scenarios. Under Near-Term (2015) plus Project (Phase I) Conditions and Near-Term (2015) plus Project (Phase I and II) Conditions, the Project would cause an increase in intersection average delay above the two (2) second threshold. Under Cumulative (2030) plus Project (Phase I and II) Conditions, the Project would cause an increase in v/c ratio above the three (3) percent threshold.

Without the BRT, a Project impact was identified at this intersection for Cumulative (2030) plus Project (Phase I and II) Conditions only; no Project impact was identified under Near-Term (2015) plus Project (Phase I) Conditions or Near-Term (2015) plus Project (Phase I and II) Conditions. As a result, assuming construction and implementation of the BRT, the Project would result in two additional impacts.

Average delay at some intersections would decrease under Project scenarios due to the Project adding traffic to movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

TABLE 1
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE – WITH BRT

| No. | Intersection | Traffic Control | Near-Term (2015) without Project Conditions | | | | Near-Term (2015) plus Project (Phase I) Conditions | | | |
|------------------|----------------------------------|-----------------|---|--------------------|------------|--------------------|--|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a |
| Outside Downtown | | | | | | | | | | |
| 5 | Telegraph Ave. / 27th St. | Signal | C | 22.8 | F | 100.3 | C | 23.4 | F | 110.4 |
| Within Downtown | | | | | | | | | | |
| 9 | Telegraph Ave. / West Grand Ave. | Signal | C | 31.3 | D | 39.5 | C | 32.2 | D | 45.9 |
| 20 | Telegraph Ave. / 20th St. | Signal | B | 14.7 | B | 18.6 | B | 15.5 | B | 19.0 |
| 21 | Broadway / 20th St. | Signal | B | 14.2 | B | 19.3 | B | 14.4 | B | 19.6 |
| 35 | Madison St. / 12th St. | Signal | B | 11.5 | A | 8.6 | B | 11.5 | A | 8.8 |
| 36 | Oak St. / 12th St. | Signal | B | 14.5 | B | 13.6 | B | 14.6 | B | 13.6 |
| 38 | Madison St. / 11th St. | Signal | B | 11.6 | A | 9.6 | B | 11.5 | A | 9.5 |
| 39 | Franklin St. / 11th St. | Signal | B | 14.4 | B | 14.5 | B | 14.3 | B | 14.5 |

^a The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.
SOURCE: AECOM, 2009.

TABLE 2
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE – WITH BRT

| No. | Intersection | Traffic Control | Near-Term (2015) without Project Conditions | | | | Near-Term (2015) plus Project (Phase I and II) Conditions | | | |
|------------------|----------------------------------|-----------------|---|--------------------|------------|--------------------|---|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a |
| Outside Downtown | | | | | | | | | | |
| 5 | Telegraph Ave. / 27th St. | Signal | C | 22.8 | F | 100.3 | C | 24.2 | F | >120.0 |
| Within Downtown | | | | | | | | | | |
| 9 | Telegraph Ave. / West Grand Ave. | Signal | C | 31.3 | D | 39.5 | C | 34.1 | E | 55.7 |
| 20 | Telegraph Ave. / 20th St. | Signal | B | 14.7 | B | 18.6 | B | 16.0 | B | 19.9 |
| 21 | Broadway / 20th St. | Signal | B | 14.2 | B | 19.3 | B | 14.6 | C | 20.1 |
| 35 | Madison St. / 12th St. | Signal | B | 11.5 | A | 8.6 | B | 11.5 | A | 9.0 |
| 36 | Oak St. / 12th St. | Signal | B | 14.5 | B | 13.6 | B | 14.6 | B | 13.6 |
| 38 | Madison St. / 11th St. | Signal | B | 11.6 | A | 9.6 | B | 11.4 | A | 9.4 |
| 39 | Franklin St. / 11th St. | Signal | B | 14.4 | B | 14.5 | B | 14.0 | B | 14.5 |

^a The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.
SOURCE: AECOM, 2009.

TABLE 3
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE
– WITH BRT

| No. | Intersection | Traffic Control | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) plus Project (Phase I and II) Conditions | | | |
|------------------|----------------------------------|-----------------|--|--------------------|------------|--------------------|--|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a |
| Outside Downtown | | | | | | | | | | |
| 5 | Telegraph Ave. / 27th St. | Signal | C | 29.0 | F | >120.0 | C | 31.6 | F | >120.0 |
| Within Downtown | | | | | | | | | | |
| 9 | Telegraph Ave. / West Grand Ave. | Signal | D | 37.9 | E | 59.2 | D | 46.8 | E | 78.7 |
| 20 | Telegraph Ave. / 20th St. | Signal | B | 18.3 | D | 38.0 | B | 19.7 | D | 41.2 |
| 21 | Broadway / 20th St. | Signal | B | 15.1 | C | 34.0 | B | 15.5 | D | 35.9 |
| 35 | Madison St. / 12th St. | Signal | C | 25.3 | B | 10.9 | C | 25.6 | B | 11.2 |
| 36 | Oak St. / 12th St. | Signal | B | 16.1 | B | 16.3 | B | 16.2 | B | 16.3 |
| 38 | Madison St. / 11th St. | Signal | B | 10.8 | B | 11.2 | B | 10.8 | B | 11.1 |
| 39 | Franklin St. / 11th St. | Signal | B | 14.5 | B | 14.0 | B | 14.2 | B | 14.0 |

^a The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

Roadway Segment Operations

As the BRT would also result in the elimination of one travel lane in each direction along Telegraph Avenue, the roadway analysis results were recalculated for Telegraph Avenue between 20th Street and 27th Street. The results of that analysis are summarized in **Table 4** for Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, **Table 5** for Near-Term (2015) plus Project (Phase I and II) Conditions, and **Table 6** for Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and II) Conditions.

Based on the roadway analysis results, the Project would result in a significant impact on Segment #6 (Telegraph Avenue from 20th Street to 27th Street) in the PM peak hour northbound direction under Near-Term (2015) plus Project (Phase I and II) Conditions and in the AM peak hour southbound and PM peak hour northbound directions under Cumulative (2030) plus Project (Phase I and II) Conditions. Under Near-Term (2015) plus Project (Phase I and II) Conditions, the Project causes the segment to degrade from LOS E to LOS F. Under Cumulative (2030) plus Project (Phase I and II) Conditions, the Project causes the segment to degrade from LOS E to LOS F in the AM peak hour causes an increase in v/c ratio above the three (3) percent threshold in the PM peak hour. These would represent new Project impacts, as no impacts were identified on this segment without the BRT.

TABLE 4
NEAR-TERM (2015) PLUS PROJECT (PHASE I) ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT

| No. | Roadway Segment | Dir. | Ln. | Cap.
(veh/h) | Near-Term (2015) without Project Conditions | | | | | | Near-Term (2015) plus Project (Phase I) Conditions | | | | | |
|-----|--|------|-----|-----------------|---|------|------|--------------|------|------|--|------|------|--------------|------|------|
| | | | | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c |
| 6 | Telegraph Avenue
from 20th Street to 27th Street | NB | 1 | 900 | C | 576 | 0.64 | E | 879 | 0.98 | C | 578 | 0.64 | E | 890 | 0.99 |
| | | SB | 1 | 900 | E | 779 | 0.87 | D | 672 | 0.75 | E | 779 | 0.87 | D | 674 | 0.75 |

Bold indicates segments operating at LOS F.

SOURCE: AECOM, 2009.

TABLE 5
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND II) ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT

| No. | Roadway Segment | Dir. | Ln. | Cap.
(veh/h) | Near-Term (2015) without Project Conditions | | | | | | Near-Term (2015) plus Project (Phase I and II) Conditions | | | | | |
|-----|--|------|-----|-----------------|---|------|------|--------------|------|------|---|------|------|--------------|------------|-------------|
| | | | | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c |
| 6 | Telegraph Avenue
from 20th Street to 27th Street | NB | 1 | 900 | C | 576 | 0.64 | E | 879 | 0.98 | C | 582 | 0.65 | F | 913 | 1.01 |
| | | SB | 1 | 900 | E | 779 | 0.87 | D | 672 | 0.75 | E | 793 | 0.88 | D | 680 | 0.76 |

Bold indicates segments operating at LOS F.

SOURCE: AECOM, 2009.

TABLE 6
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND II) ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT

| No. | Roadway Segment | Dir. | Ln. | Cap.
(veh/h) | Cumulative (2030) without Project Conditions | | | | | | Cumulative (2030) plus Project (Phase I and II) Conditions | | | | | |
|-----|--|------|-----|-----------------|--|------|------|--------------|--------------|-------------|--|------------|-------------|--------------|--------------|-------------|
| | | | | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c |
| 6 | Telegraph Avenue
from 20th Street to 27th Street | NB | 1 | 900 | D | 688 | 0.76 | F | 1,080 | 1.20 | D | 694 | 0.77 | F | 1,114 | 1.24 |
| | | SB | 1 | 900 | E | 897 | 1.00 | E | 779 | 0.87 | F | 911 | 1.01 | E | 787 | 0.87 |

Bold indicates segments operating at LOS F.

SOURCE: AECOM, 2009.

Franklin / Webster Bikeway Project

Currently in the design stage, the Franklin / Webster Bikeway project would install bike lanes on Franklin Street and Webster Street between Broadway and 14th Street. Installation of the bike lanes would generally require removal of one through lane along both Franklin Street and Webster Street.

Table 7 summarizes intersection LOS results for Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions. **Table 8** summarizes intersection LOS results for Near-Term (2015) plus Project (Phase I and II) Conditions. **Table 9** summarizes intersection LOS results for Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and II) Conditions.

As shown in **Table 7**, **Table 8**, and **Table 9**, all intersections would operate at acceptable conditions, as there is sufficient capacity on these streets and the Project would not result in any significant impacts.

Average delay at some intersections would decrease under Project scenarios due to the Project adding traffic to movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

TABLE 7
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE – WITH BIKEWAY

| No. | Intersection | Traffic Control | Near-Term (2015) without Project Conditions | | | | Near-Term (2015) plus Project (Phase I) Conditions | | | |
|-----------------|-------------------------|-----------------|---|--------------------|------------|--------------------|--|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a |
| Within Downtown | | | | | | | | | | |
| 17 | Webster St. / 21st St. | Signal | B | 13.7 | B | 19.1 | B | 14.5 | B | 19.1 |
| 18 | Franklin St. / 21st St. | Signal | B | 10.4 | B | 11.8 | B | 10.1 | B | 11.6 |
| 22 | Franklin St. / 20th St. | Signal | B | 11.7 | B | 15.0 | B | 14.1 | B | 14.7 |
| 23 | Webster St. / 20th St. | Signal | C | 25.1 | C | 23.8 | C | 22.6 | C | 23.7 |

^a The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

TABLE 8
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE
– WITH BIKEWAY

| No. | Intersection | Traffic Control | Near-Term (2015) without Project Conditions | | | | Near-Term (2015) plus Project (Phase I and II) Conditions | | | |
|-----------------|-------------------------|-----------------|---|--------------------|------------|--------------------|---|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a |
| Within Downtown | | | | | | | | | | |
| 17 | Webster St. / 21st St. | Signal | B | 13.7 | B | 19.1 | B | 15.3 | B | 19.1 |
| 18 | Franklin St. / 21st St. | Signal | B | 10.4 | B | 11.8 | B | 10.0 | B | 11.6 |
| 22 | Franklin St. / 20th St. | Signal | B | 11.7 | B | 15.0 | B | 14.8 | B | 14.8 |
| 23 | Webster St. / 20th St. | Signal | C | 25.1 | C | 23.8 | C | 21.8 | C | 24.1 |

^a The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

TABLE 9
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE
– WITH BIKEWAY

| No. | Intersection | Traffic Control ^a | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) plus Project (Phase I and II) Conditions | | | |
|-----------------|-------------------------|------------------------------|--|--------------------|------------|--------------------|--|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Within Downtown | | | | | | | | | | |
| 17 | Webster St. / 21st St. | Signal | B | 14.7 | B | 19.9 | B | 16.1 | B | 19.8 |
| 18 | Franklin St. / 21st St. | Signal | B | 10.4 | B | 12.0 | B | 10.3 | B | 11.9 |
| 22 | Franklin St. / 20th St. | Signal | B | 11.7 | B | 14.9 | B | 14.5 | B | 14.6 |
| 23 | Webster St. / 20th St. | Signal | C | 24.6 | C | 25.9 | C | 21.7 | C | 26.1 |

SOURCE: AECOM, 2009.

Other Planned Transportation Improvements

In addition to the above improvements for which a separate supplementary analysis was conducted, other transportation improvements in various stages of planning are discussed below.

Harrison Street / Oakland Avenue Community Transportation Plan (CTP)

This planning effort proposes a series of multi-modal improvements to the Harrison Street / Oakland Avenue Corridor. Included are pedestrian improvements (bulbouts, sidewalk, improved crossings), bicycle improvements, and transit improvements (bus bulbouts, bus stop relocations), as well as possible roadway closures and road diets. These improvements could affect study intersections in this EIR located along the corridor, including the following intersections:

- Intersection #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp;
- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps;
- Intersection #3: Harrison Street / 27th Street / 24th Street; and,
- Intersection #12: Harrison Street / Grand Avenue.

Because a finalized design is not yet approved or funded and the Notice of Preparation (NOP) for the CTP was released after the NOP for this EIR, potential effects as a result of the Harrison-Oakland CTP were not assumed under Near-Term (2015) and Cumulative (2030) scenarios. As a result, any mitigation measures proposed at intersections where the CTP is proposing changes may ultimately be deemed in conflict with the goals of the CTP and therefore infeasible.

Broadway Retail Corridor Specific Plan

This planning effort will outline the details for rezoning and redevelopment of the Broadway Auto Row along Broadway between 23rd Street and 29th Street. Currently occupied primarily by car dealerships and surface parking, the plan proposes to transform this stretch of Broadway into a mixed-use corridor with residential units above ground-floor retail uses. The plan would likely result in substantial changes to traffic volumes and circulation, as well as intersection, roadway, pedestrian, and transit facilities in the area. Possible transportation-related improvements being considered are improved pedestrian and bicycle facilities to improve access to transit stops and stations and enhance circulation within the area by non-auto modes. Opportunities to redesign existing transit services or implement new services such as special shuttles will also be considered and the possibility of improvements to bus stops such as shelters, information, and signage will also be evaluated. These improvements could affect the following study intersections in this EIR:

- Intersection #4: Broadway / 27th Street; and,
- Intersection #10: Broadway / Grand Avenue.

Because a finalized plan has not yet approved or funded, potential effects as a result of the Broadway Retail Corridor Specific Plan were not assumed under Near-Term (2015) and Cumulative (2030) scenarios.

I-880 Broadway / Jackson Street Interchange

A Caltrans Project Study Report (PSR) is currently being prepared by the Alameda County Transportation Improvement Authority (ACTIA) and the City of Alameda, improving traffic operations and circulation in the area around the I-880 Broadway / Jackson Street Interchange. Although the project is not yet fully funded, it could include any of the following elements:

- Construction of a new I-880 southbound off-ramp at Martin Luther King, Jr. Way, relieving traffic using the southbound off-ramp at Broadway;
- Reconstruction of the I-880 northbound off-ramp at Broadway to allow vehicles to directly access the Webster Tube ;
- Improvements to the existing Traffic Operations System (TOS) at the Posey / Webster Tubes, I-880, and I-980; and,

- Improvements along 6th Street leading to a new I-880 northbound on-ramp at Market Street.













These elements would affect circulation patterns in the area and could affect the following study intersection in this EIR:

- Intersection #42: Jackson Street / 6th Street / I-880 NB Ramp.

Caltrans have submitted its comments on the Draft PSR to ACTIA, with the final PSR set for completion by late 2009. Since the project is not fully funded nor approved and it is currently unclear how the various improvements would affect operations at study intersections in this EIR located in the vicinity of the interchange, this improvement project was not assumed under Near-Term (2015) and Cumulative (2030) scenarios.

HCM Signalized Intersection Capacity Analysis
5: 27th Street & Telegraph Avenue

Near-Term AM
Kaiser Center Transportation Study













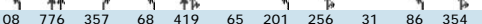
| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 343 | 354 | 134 | 43 | 244 | 107 | 81 | 360 | 22 | 46 | 327 | 133 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.99 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1546 | 1762 | 1863 | 1520 | 1763 | 1842 | | 1765 | 1770 | |
| Flt Permitted | 0.43 | 1.00 | 1.00 | 0.53 | 1.00 | 1.00 | 0.18 | 1.00 | | 0.29 | 1.00 | |
| Satd. Flow (perm) | 809 | 1863 | 1546 | 976 | 1863 | 1520 | 336 | 1842 | | 540 | 1770 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 373 | 385 | 146 | 47 | 265 | 116 | 84 | 391 | 24 | 50 | 355 | 145 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 0 | 72 | 0 | 3 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 373 | 385 | 70 | 47 | 265 | 44 | 84 | 412 | 0 | 50 | 481 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | | Permp | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | | 6 | | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 49.0 | 40.7 | 40.7 | 36.4 | 32.6 | 32.6 | 27.0 | 27.0 | | 27.0 | 27.0 | |
| Effective Green, g (s) | 49.0 | 40.7 | 40.7 | 36.4 | 32.6 | 32.6 | 27.0 | 27.0 | | 27.0 | 27.0 | |
| Actuated g/C Ratio | 0.58 | 0.48 | 0.48 | 0.43 | 0.38 | 0.38 | 0.32 | 0.32 | | 0.32 | 0.32 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 601 | 892 | 740 | 453 | 715 | 583 | 107 | 585 | | 172 | 562 | |
| v/s Ratio Prot | c0.09 | 0.21 | | 0.00 | 0.14 | | | 0.22 | | c0.27 | | |
| v/s Ratio Perm | c0.27 | | 0.05 | 0.04 | | 0.03 | 0.25 | | 0.09 | | | |
| v/c Ratio | 0.62 | 0.43 | 0.09 | 0.10 | 0.37 | 0.08 | 0.79 | 0.70 | | 0.29 | 0.86 | |
| Uniform Delay, d1 | 10.6 | 14.6 | 12.1 | 14.3 | 18.8 | 16.6 | 26.4 | 25.5 | | 21.8 | 27.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.72 | 0.66 | 0.31 | 1.02 | 1.01 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.4 | 1.5 | 0.3 | 0.0 | 1.5 | 0.3 | 27.1 | 3.0 | | 0.3 | 11.7 | |
| Delay (s) | 12.0 | 16.1 | 12.3 | 10.3 | 13.8 | 5.4 | 54.0 | 28.7 | | 22.1 | 38.9 | |
| Level of Service | B | B | B | B | B | A | D | C | | C | D | |
| Approach Delay (s) | 13.8 | | | 11.2 | | | 33.0 | | | 37.4 | | |
| Approach LOS | B | | | B | | | C | | | D | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 22.8 | | | HCM Level of Service | | | C | | | | | |
| HCM Volume to Capacity ratio | 0.70 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | 10.0 | | | | | |
| Intersection Capacity Utilization | 83.1% | | | ICU Level of Service | | | E | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

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HCM Signalized Intersection Capacity Analysis
9: West Grand Avenue & Telegraph Avenue

Near-Term AM
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









| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 108 | 776 | 357 | 68 | 419 | 65 | 201 | 256 | 31 | 86 | 354 | 77 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.92 | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3427 | 1553 | 1768 | 3341 | | 1770 | 1826 | | 1757 | 1805 | |
| Flt Permitted | 0.32 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.95 | 1.00 | | 0.58 | 1.00 | |
| Satd. Flow (perm) | 599 | 3427 | 1553 | 304 | 3341 | | 1770 | 1826 | | 1064 | 1805 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 117 | 808 | 388 | 74 | 455 | 71 | 218 | 269 | 34 | 93 | 385 | 84 |
| RTOR Reduction (vph) | 0 | 0 | 276 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 117 | 808 | 112 | 74 | 512 | 0 | 218 | 298 | 0 | 93 | 460 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | | Prot | 5 | 2 | Perm | | 6 |
| Protected Phases | 4 | | 4 | | 4 | | 5 | | | 6 | | 6 |
| Permitted Phases | 4 | | 4 | | 4 | | | | | 6 | | |
| Actuated Green, G (s) | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | | 12.3 | 50.0 | | 33.2 | 33.2 | |
| Effective Green, g (s) | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | | 12.3 | 50.0 | | 33.2 | 33.2 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | | 0.14 | 0.59 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 173 | 988 | 448 | 88 | 963 | | 256 | 1074 | | 416 | 705 | |
| v/s Ratio Prot | 0.20 | 0.24 | 0.07 | | 0.15 | | c0.12 | 0.16 | | | c0.25 | |
| v/s Ratio Perm | 0.20 | | 0.07 | c0.24 | | | | | | 0.09 | | |
| v/c Ratio | 0.68 | 0.82 | 0.25 | 0.84 | 0.53 | | 0.85 | 0.28 | | 0.22 | 0.65 | |
| Uniform Delay, d1 | 26.7 | 28.2 | 23.2 | 28.4 | 25.4 | | 35.5 | 8.6 | | 17.3 | 21.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.94 | 1.03 | |
| Incremental Delay, d2 | 19.2 | 7.5 | 1.3 | 59.2 | 2.1 | | 22.1 | 0.6 | | 1.1 | 4.1 | |
| Delay (s) | 46.0 | 35.7 | 24.5 | 87.6 | 27.5 | | 57.6 | 9.3 | | 17.3 | 25.9 | |
| Level of Service | D | D | C | F | | | E | A | | B | C | |
| Approach Delay (s) | 33.3 | | 34.9 | | | | 29.5 | | | 24.5 | | |
| Approach LOS | C | | C | | | | C | | | C | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 31.3 | | | HCM Level of Service | | | C | | | | | |
| HCM Volume to Capacity ratio | 0.75 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | 15.0 | | | | | |
| Intersection Capacity Utilization | 76.5% | | | ICU Level of Service | | | D | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
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Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
20: 20th Street & Telegraph Avenue

Near-Term AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 19 | 77 | | 20 | 12 | 196 | 99 | 34 | 458 | 24 | 158 | 163 |
| Ideal Flow (vphpl) | 1900 | 1900 | | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 |
| Lane Util. Factor | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 0.99 | | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 0.99 | 1.00 | | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 |
| Flt Protected | 0.95 | 1.00 | | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1759 | 1789 | | | | 1855 | 1537 | 1758 | 1845 | | 1769 | 1774 |
| Flt Permitted | 0.51 | 1.00 | | | | 0.98 | 1.00 | 0.61 | 1.00 | | 0.30 | 1.00 |
| Satd. Flow (perm) | 953 | 1789 | | | | 1824 | 1537 | 1128 | 1845 | | 553 | 1774 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 21 | 84 | 22 | 13 | 209 | 108 | 37 | 467 | 26 | 172 | 177 | 63 |
| RTOR Reduction (vph) | 0 | 17 | 0 | 0 | 0 | 85 | 0 | 3 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 21 | 89 | 0 | 0 | 222 | 23 | 37 | 490 | 0 | 172 | 224 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | | |
| Protected Phases | | 4 | | | 8 | | 8 | | 2 | | 1 | 6 |
| Permitted Phases | 4 | | | 8 | | | | | | 6 | | |
| Actuated Green, G (s) | 12.7 | 12.7 | | | 12.7 | 12.7 | 27.4 | 27.4 | | 38.3 | 38.3 | |
| Effective Green, g (s) | 12.7 | 12.7 | | | 12.7 | 12.7 | 27.4 | 27.4 | | 38.3 | 38.3 | |
| Actuated g/C Ratio | 0.21 | 0.21 | | | 0.21 | 0.21 | 0.46 | 0.46 | | 0.64 | 0.64 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 202 | 379 | | | 386 | 325 | 515 | 843 | | 483 | 1132 | |
| v/s Ratio Prot | | 0.05 | | | | | | 0.27 | | c0.04 | 0.13 | |
| v/s Ratio Perm | 0.02 | | | | c0.12 | 0.01 | 0.03 | | | 0.19 | | |
| v/c Ratio | 0.10 | 0.23 | | | 0.58 | 0.07 | 0.07 | 0.58 | | 0.36 | 0.20 | |
| Uniform Delay, d1 | 19.1 | 19.6 | | | 21.2 | 18.9 | 9.2 | 12.1 | | 5.9 | 4.5 | |
| Progression Factor | 1.00 | 1.00 | | | 1.01 | 1.36 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.3 | | | 1.9 | 0.1 | 0.3 | 2.9 | | 0.5 | 0.4 | |
| Delay (s) | 19.3 | 19.9 | | | 23.4 | 25.9 | 9.4 | 15.0 | | 6.4 | 4.9 | |
| Level of Service | B | B | | | C | C | A | B | | A | A | |
| Approach Delay (s) | | 19.8 | | | 24.2 | | | 14.6 | | | 5.5 | |
| Approach LOS | | B | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 14.7 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.55 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 13.5 | | |
| Intersection Capacity Utilization | 63.2% | | | ICU Level of Service | | | | | | B | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 415 | 1502 | 0 | 0 | 0 | 0 | 0 | 372 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.91 | 0.97 | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | 0.99 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 0.97 | | | | | | 0.97 | |
| Flt Protected | | | | 0.99 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 4993 | 4912 | | | | | | 4912 | |
| Flt Permitted | | | | 0.99 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 4993 | 4912 | | | | | | 4912 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 451 | 1548 | 0 | 0 | 0 | 0 | 0 | 380 | 83 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1911 | 0 | 0 | 0 | 0 | 0 | 460 | 0 |
| Confl. Peds. (#/hr) | 48 | | | 48 | 30 | 30 | 54 | | | 54 | 27 | 27 |
| Confl. Bikes (#/hr) | | | | 9 | | 5 | | | | 4 | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2164 | | | | | | 2169 | |
| v/s Ratio Prot | | | | | | | | | | | c0.09 | |
| v/s Ratio Perm | | | | | 0.38 | | | | | | 0.21 | |
| v/c Ratio | | | | | 0.88 | | | | | | 0.21 | |
| Uniform Delay, d1 | | | | | 15.6 | | | | | | 10.3 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 4.3 | | | | | | 0.2 | |
| Delay (s) | | | | | 11.8 | | | | | | 10.5 | |
| Level of Service | | | | | B | | | | | | B | |
| Approach Delay (s) | 0.0 | | | | 11.8 | | 0.0 | | | | 10.5 | |
| Approach LOS | A | | | | B | | A | | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 11.5 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.54 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | | 60.0% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 36: 12th St. & Oak St.

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1684 | 78 | 324 | 786 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.93 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1467 | | 6163 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1467 | | 6163 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 85 | 348 | 854 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 75 | 0 | 1199 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | 102 | 84 | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | 1 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 731 | | 2116 | | | | |
| v/s Ratio Prot | | | | | c0.34 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.05 | | 0.19 | | | | |
| v/c Ratio | | | | | 0.69 | 0.10 | | 0.57 | | | | |
| Uniform Delay, d1 | | | | | 11.5 | 8.0 | | 16.1 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 1.5 | 0.3 | | 1.1 | | | | |
| Delay (s) | | | | | 13.0 | 8.2 | | 17.2 | | | | |
| Level of Service | | | | | B | A | | B | | | | |
| Approach Delay (s) | 0.0 | | | | 12.8 | | | 17.2 | | | 0.0 | |
| Approach LOS | A | | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 14.5 | | | | | | | |
| HCM Volume to Capacity ratio | | | | | 0.64 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 60.0 | | | | | | 9.5 | |
| Intersection Capacity Utilization | | | | | 65.1% | | | | | | | |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 398 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 772 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.95 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1503 | | | | | | | | 5074 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1503 | | | | | | | | 5074 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 433 | 154 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 813 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 0 | 433 | 104 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 835 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 21 | | 21 | 23 | | 23 | 17 | 17 |
| Confl. Bikes (#/hr) | | | | 10 | | 10 | | | | 2 | | 3 |
| Turn Type | | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 576 | | | | | | | | 2199 | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | 0.16 | |
| v/s Ratio Perm | | | 0.07 | | | | | | | | 0.38 | |
| v/c Ratio | | 0.22 | 0.18 | | | | | | | | 11.5 | |
| Uniform Delay, d1 | | 12.5 | 12.3 | | | | | | | | 1.09 | |
| Progression Factor | | 0.76 | 0.71 | | | | | | | | 0.4 | |
| Incremental Delay, d2 | | 0.3 | 0.7 | | | | | | | | 12.9 | |
| Delay (s) | | 9.8 | 9.4 | | | | | | | | B | |
| Level of Service | | A | A | | | | | | | | B | |
| Approach Delay (s) | 9.7 | | | | 0.0 | | 0.0 | | | | 12.9 | |
| Approach LOS | A | | | | A | | A | | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 11.6 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.31 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 11.0 | |
| Intersection Capacity Utilization | | | | 38.8% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report
















HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 86 | 402 | 0 | 0 | 0 | 0 | 0 | 328 | 59 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.91 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 5004 | | | | | | 6232 | | | | |

HCM Signalized Intersection Capacity Analysis
5: 27th Street & Telegraph Avenue

Near-Term PM
Kaiser Center Transportation Study














| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|---|--|--|---|--|--|--|--|---|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | | | |  | | |
| Volume (vph) | 210 | 403 | 136 | 64 | 530 | 114 | 175 | 479 | 46 | 133 | 459 | 350 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1534 | 1769 | 1863 | 1531 | 1770 | 1832 | | 1765 | 1714 | |
| Flt Permitted | 0.2 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | 0.12 | 1.00 | | 0.20 | 1.00 | |
| Satd. Flow (perm) | 226 | 1863 | 1534 | 664 | 1863 | 1531 | 226 | 1832 | | 363 | 1714 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 228 | 438 | 148 | 70 | 576 | 124 | 190 | 521 | 50 | 145 | 499 | 380 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 83 | 0 | 4 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 228 | 438 | 58 | 70 | 576 | 41 | 190 | 567 | 0 | 145 | 847 | 0 |
| Confl. Peds. (#/hr) | 4 | | | 4 | 1 | | 1 | 17 | | 17 | 10 | |
| Confl. Bikes (#/hr) | | | | | | | 10 | | | | | 28 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | 2 | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | | 6 | |
| Actuated Green, G (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.40 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 298 | 725 | 597 | 334 | 622 | 512 | 88 | 711 | | 141 | 665 | |
| v/s Ratio Prot | c0.09 | 0.24 | | 0.01 | c0.31 | | | 0.31 | | | 0.49 | |
| v/s Ratio Perm | 0.30 | | 0.04 | 0.07 | | 0.03 | c0.84 | | | 0.40 | | |
| v/c Ratio | 0.77 | 0.60 | 0.10 | 0.21 | 0.93 | 0.08 | 2.16 | 0.80 | | 1.03 | 1.27 | |
| Uniform Delay, d1 | 17.4 | 20.7 | 16.5 | 16.5 | 27.3 | 19.4 | 26.0 | 23.0 | | 26.0 | 26.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.52 | 1.39 | 2.65 | 0.70 | 0.66 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.1 | 3.7 | 0.3 | 0.1 | 21.2 | 0.3 | 550.2 | 4.6 | | 83.5 | 134.4 | |
| Delay (s) | 27.5 | 24.4 | 16.8 | 25.2 | 59.1 | 51.6 | 568.4 | 19.9 | | 109.5 | 160.4 | |
| Level of Service | C | C | B | C | E | D | F | B | | F | C | |
| Approach Delay (s) | | 23.9 | | | 54.8 | | | 156.8 | | | 153.2 | |
| Approach LOS | | C | | | D | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 100.3 | | | HCM Level of Service | | | | | F | | | |
| HCM Volume to Capacity ratio | 1.48 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 13.5 | | | |
| Intersection Capacity Utilization | 111.5% | | | ICU Level of Service | | | | | H | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
9: West Grand Avenue & Telegraph Avenue

Near-Term PM
Kaiser Center Transportation Study






















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 27 | 677 | 32 | 19 | 810 | 116 | 95 | 531 | 33 | 137 | 429 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1760 | 3336 | | 1770 | 1844 | | 1760 | 1792 | |
| Flt Permitted | | 0.17 | 1.00 | | 0.17 | 1.00 | | 0.95 | 1.00 | | 0.43 | 1.00 |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 315 | 3336 | | 1770 | 1844 | | 801 | 1792 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 29 | 736 | 35 | 21 | 880 | 126 | 103 | 577 | 36 | 149 | 452 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 13 | 0 | 0 | 2 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 29 | 736 | 10 | 21 | 993 | 0 | 103 | 611 | 0 | 149 | 558 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | 10 | | | | 28 |
| Turn Type | Perm | | Perm | Perm | | Prot | 5 | 2 | | Perm | | 6 |
| Protected Phases | 4 | 4 | | 4 | 4 | | | | | 6 | | |
| Permitted Phases | 4 | 4 | | 4 | | | | | | 6 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.2 | 50.3 | | 37.6 | 37.6 | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.2 | 50.3 | | 37.6 | 37.6 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | | 0.10 | 0.59 | | 0.44 | 0.44 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 90 | 950 | | 171 | 1091 | | 354 | 793 | |
| v/s Ratio Prot | | 0.21 | | | c0.30 | | 0.06 | c0.33 | | | c0.31 | |
| v/s Ratio Perm | 0.09 | | 0.01 | 0.07 | | | | | | 0.19 | | |
| v/c Ratio | 0.33 | 0.75 | 0.02 | 0.23 | 1.05 | | 0.60 | 0.56 | | 0.42 | 0.70 | |
| Uniform Delay, d1 | 24.0 | 27.7 | 21.9 | 23.3 | 30.4 | | 36.8 | 10.6 | | 16.2 | 19.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.18 | 1.22 | |
| Incremental Delay, d2 | 9.7 | 5.4 | 0.1 | 6.0 | 41.8 | | 4.1 | 2.1 | | 1.3 | 1.9 | |
| Delay (s) | 33.7 | 33.1 | 22.0 | 29.3 | 72.2 | | 40.9 | 12.7 | | 20.5 | 25.3 | |
| Level of Service | C | C | C | C | E | | D | B | | C | C | |
| Approach Delay (s) | | 32.6 | | | 71.3 | | | 16.7 | | | 24.3 | |
| Approach LOS | | C | | | E | | | B | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 39.5 | | | HCM Level of Service | | | | | D | | | |
| HCM Volume to Capacity ratio | 0.84 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 16.5 | | | |
| Intersection Capacity Utilization | 77.6% | | | ICU Level of Service | | | | | D | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
20: 20th Street & Telegraph Avenue

Near-Term PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  |  |  |  | |  |  |  |
| Volume (vph) | 29 | 165 | 30 | 12 | 196 | 193 | 26 | 657 | 27 | 40 | 180 | 64 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.98 | 1.00 | | | 1.00 | 1.00 | 0.98 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1736 | 1798 | | | 1855 | 1526 | 1735 | 1847 | | 1770 | 1764 | |
| Flt Permitted | 0.51 | 1.00 | | | 0.98 | 1.00 | 0.60 | 1.00 | | 0.16 | 1.00 | |
| Satd. Flow (perm) | 936 | 1798 | | | 1814 | 1526 | 1087 | 1847 | | 296 | 1764 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 32 | 179 | 33 | 13 | 213 | 210 | 28 | 714 | 29 | 41 | 196 | 70 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 164 | 0 | 2 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 32 | 199 | 0 | 0 | 226 | 46 | 28 | 741 | 0 | 41 | 250 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | 25 | | | | 3 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | pm+pt | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | 1 | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | | | 6 | | | |
| Actuated Green, G (s) | 13.1 | 13.1 | | | 13.1 | 13.1 | 30.7 | 30.7 | | 37.9 | 37.9 | |
| Effective Green, g (s) | 13.1 | 13.1 | | | 13.1 | 13.1 | 30.7 | 30.7 | | 37.9 | 37.9 | |
| Actuated g/C Ratio | 0.22 | 0.22 | | | 0.22 | 0.22 | 0.51 | 0.51 | | 0.63 | 0.63 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 204 | 393 | | | 396 | 333 | 556 | 945 | | 253 | 1114 | |
| v/s Ratio Prot | | 0.11 | | | | | | c0.40 | | 0.01 | c0.14 | |
| v/s Ratio Perm | 0.03 | | | | c0.12 | 0.03 | 0.03 | | | 0.09 | | |
| v/c Ratio | 0.16 | 0.51 | | | 0.57 | 0.14 | 0.05 | 0.78 | | 0.16 | 0.22 | |
| Uniform Delay, d1 | 19.0 | 20.6 | | | 20.9 | 18.9 | 7.3 | 11.9 | | 7.9 | 4.7 | |
| Progression Factor | 1.00 | 1.00 | | | 1.05 | 1.67 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 4.0 | 1.0 | | | 1.4 | 0.1 | 0.2 | 6.5 | | 0.3 | 0.5 | |
| Delay (s) | 19.3 | 21.6 | | | 23.4 | 31.6 | 7.5 | 18.4 | | 8.2 | 5.2 | |
| Level of Service | B | C | | | C | C | A | B | | A | A | |
| Approach Delay (s) | | 21.3 | | | 27.4 | | | 18.0 | | | 5.6 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 18.6 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.70 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 13.5 | | |
| Intersection Capacity Utilization | 78.8% | | | ICU Level of Service | | | | | | D | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 249 | 941 | 0 | 0 | 0 | 0 | 0 | 697 | 46 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 0.99 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 0.99 | | | | | | 1.00 | |
| Flt Protected | | | | 0.99 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 4976 | 5024 | | | | | | 5024 | |
| Flt Permitted | | | | 0.99 | 1.00 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 4976 | 5024 | | | | | | 5024 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 271 | 970 | 0 | 0 | 0 | 0 | 0 | 758 | 50 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1188 | 0 | 0 | 0 | 0 | 0 | 796 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 47 | | 47 | 36 | | 36 | 29 | 29 |
| Confl. Bikes (#/hr) | | | | 3 | | | 13 | | | 9 | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2156 | | | | | | 2219 | |
| v/s Ratio Prot | | | | | | | | | | | c0.16 | |
| v/s Ratio Perm | | | | | 0.24 | | | | | | | |
| v/c Ratio | | | | | 0.55 | | | | | | 0.36 | |
| Uniform Delay, d1 | | | | | 12.7 | | | | | | 11.1 | |
| Progression Factor | | | | | 0.45 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.9 | | | | | | 0.5 | |
| Delay (s) | | | | | 6.7 | | | | | | 11.6 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | 0.0 | | | | 6.7 | | 0.0 | | | | 11.6 | |
| Approach LOS | A | | | | A | | A | | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 8.6 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.45 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | 46.7% | | | | ICU Level of Service | | | | | | A | |
| Analysis Period (min) | | | | 15 | | | | | | | | |

c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 36: 12th Street & Oak St.

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|-------|----------------------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1015 | 60 | 178 | 984 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.94 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1484 | | 6239 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1484 | | 6239 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 65 | 193 | 1025 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 28 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 61 | 0 | 1190 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | | 121 | 69 | | 69 | 118 | | 118 | 84 | 84 |
| Confl. Bikes (#/hr) | | | | | 3 | | | | | | | 15 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 740 | | 2142 | | | | |
| v/s Ratio Prot | | | | | c0.21 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.04 | | 0.19 | | | | |
| v/c Ratio | | | | | 0.42 | 0.08 | | 0.56 | | | | |
| Uniform Delay, d1 | | | | | 9.6 | 7.9 | | 16.0 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.5 | 0.2 | | 1.0 | | | | |
| Delay (s) | | | | | 10.1 | 8.1 | | 17.0 | | | | |
| Level of Service | | | | | B | A | | B | | | | |
| Approach Delay (s) | 0.0 | | | | 10.0 | | | 17.0 | | | 0.0 | |
| Approach LOS | A | | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 13.6 | | | | | | B | |
| HCM Volume to Capacity ratio | | | | | 0.48 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 60.0 | | | | | | 9.5 | |
| Intersection Capacity Utilization | 46.5% | | | | | ICU Level of Service | | | | | A | |
| Analysis Period (min) | | | | | 15 | | | | | | | |

c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 910 | 194 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 873 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.96 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1527 | | | | | | | | 5066 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1527 | | | | | | | | 5066 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 948 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 939 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 948 | 178 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 983 | 0 |
| Confl. Peds. (#/hr) | 20 | | | 20 | 30 | | 30 | 12 | | 12 | 17 | 17 |
| Confl. Bikes (#/hr) | | | | 5 | | | 7 | | | 3 | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 585 | | | | | | | | 2195 | |
| v/s Ratio Prot | | c0.19 | | | | | | | | | 0.19 | |
| v/s Ratio Perm | | | 0.12 | | | | | | | | | |
| v/c Ratio | | 0.49 | 0.30 | | | | | | | | 0.45 | |
| Uniform Delay, d1 | | 14.0 | 12.9 | | | | | | | | 12.0 | |
| Progression Factor | | 0.78 | 0.64 | | | | | | | | 0.58 | |
| Incremental Delay, d2 | | 0.8 | 1.3 | | | | | | | | 0.6 | |
| Delay (s) | | 11.8 | 9.6 | | | | | | | | 7.6 | |
| Level of Service | | B | A | | | | | | | | A | |
| Approach Delay (s) | 11.4 | | | | | 0.0 | | 0.0 | | | 7.6 | |
| Approach LOS | B | | | | | A | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 9.6 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.47 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 11.0 | |
| Intersection Capacity Utilization | 44.7% | | | | ICU Level of Service | | | | | | A | |
| Analysis Period (min) | | | | 15 | | | | | | | | |

c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|-------|------|------|------|------|
| Lane Configurations | | 4T4T | | | | | | 4T4T | | | | |
| Volume (vph) | 24 | 724 | 0 | 0 | 0 | 0 | 0 | 319 | 134 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.91 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 5070 | | | | | | 6032 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 5070 | | | | | | 6032 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 26 | 787 | 0 | 0 | 0 | 0 | 0 | 347 | 138 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 806 | 0 | 0 | 0 | 0 | 0 | 463 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | | 17 | 53 | | 53 | 68 | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | | 1 | | | 6 | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 15.3 | | | | | | 37.7 | | | | |
| Effective Green, g (s) | | 15.3 | | | | | | 37.7 | | | | |
| Actuated g/C Ratio | | 0.26 | | | | | | 0.63 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1293 | | | | | | 3790 | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.16 | | | | | | | | | | |
| v/c Ratio | | 0.62 | | | | | | 0.12 | | | | |
| Uniform Delay, d1 | | 19.8 | | | | | | 4.5 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.7 | | | | | | 0.1 | | | | |
| Delay (s) | | 20.5 | | | | | | 4.6 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 20.5 | | | 0.0 | | | 4.6 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 14.5 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.27 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | | 7.0 | |
| Intersection Capacity Utilization | | | 40.9% | | | ICU Level of Service | | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |













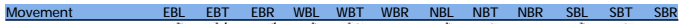
HCM Signalized Intersection Capacity Analysis 5: 27th Street & Telegraph Avenue

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|----------------------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 394 | 406 | 153 | 50 | 280 | 122 | 94 | 415 | 26 | 53 | 377 | 154 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1546 | 1764 | 1863 | 1519 | 1764 | 1842 | | 1766 | 1771 | |
| Flt Permitted | 0.36 | 1.00 | 1.00 | 0.45 | 1.00 | 1.00 | 0.14 | 1.00 | | 0.25 | 1.00 | |
| Satd. Flow (perm) | 677 | 1863 | 1546 | 840 | 1863 | 1519 | 258 | 1842 | | 467 | 1771 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 428 | 441 | 166 | 54 | 304 | 133 | 98 | 451 | 28 | 58 | 410 | 167 |
| RTOR Reduction (vph) | 0 | 0 | 92 | 0 | 0 | 87 | 0 | 3 | 0 | 0 | 18 | 0 |
| Lane Group Flow (vph) | 428 | 441 | 74 | 54 | 304 | 46 | 98 | 476 | 0 | 58 | 559 | 0 |
| Confl. Peds. (#/hr) | 1 | | | 1 | 8 | | 8 | 12 | | 12 | 6 | 6 |
| Confl. Bikes (#/hr) | | | | 2 | | | 5 | | | 27 | | 6 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | 2 | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 46.2 | 37.8 | 37.8 | 33.0 | 29.1 | 29.1 | 29.8 | 29.8 | | 29.8 | 29.8 | |
| Effective Green, g (s) | 46.2 | 37.8 | 37.8 | 33.0 | 29.1 | 29.1 | 29.8 | 29.8 | | 29.8 | 29.8 | |
| Actuated g/C Ratio | 0.54 | 0.44 | 0.44 | 0.39 | 0.34 | 0.34 | 0.35 | 0.35 | | 0.35 | 0.35 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 530 | 828 | 688 | 369 | 638 | 520 | 90 | 646 | | 164 | 621 | |
| v/s Ratio Prot | c0.12 | 0.24 | | 0.01 | 0.16 | | | 0.26 | | | 0.32 | |
| v/s Ratio Perm | c0.32 | | 0.05 | 0.05 | | 0.03 | c0.38 | | | 0.12 | | |
| v/c Ratio | 0.81 | 0.53 | 0.11 | 0.15 | 0.48 | 0.09 | 1.09 | 0.74 | | 0.35 | 0.90 | |
| Uniform Delay, d1 | 13.2 | 17.2 | 13.8 | 16.5 | 22.0 | 18.9 | 27.6 | 24.2 | | 20.5 | 26.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.71 | 0.64 | 0.26 | 1.02 | 1.01 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 8.3 | 2.4 | 0.3 | 0.1 | 2.5 | 0.3 | 115.7 | 3.4 | | 0.5 | 15.5 | |
| Delay (s) | 21.5 | 19.6 | 14.1 | 11.7 | 16.5 | 5.3 | 143.8 | 27.9 | | 20.9 | 41.7 | |
| Level of Service | C | B | B | B | B | A | F | C | | C | D | |
| Approach Delay (s) | 19.5 | | | | 13.0 | | | 47.6 | | | 39.8 | |
| Approach LOS | B | | | | B | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 29.0 | | | HCM Level of Service | | | | | C | | | |
| HCM Volume to Capacity ratio | 0.91 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 10.0 | | | |
| Intersection Capacity Utilization | 90.6% | | | ICU Level of Service | | | | | E | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |













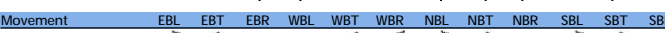
HCM Signalized Intersection Capacity Analysis 9: West Grand Avenue & Telegraph Avenue

Cumulative AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 125 | 892 | 410 | 79 | 482 | 74 | 232 | 296 | 35 | 99 | 409 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1765 | 3427 | 1553 | 1768 | 3343 | | 1770 | 1828 | | 1757 | 1805 | |
| Flt Permitted | 0.27 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.95 | 1.00 | | 0.55 | 1.00 | |
| Satd. Flow (perm) | 499 | 3427 | 1553 | 297 | 3343 | | 1770 | 1828 | | 1020 | 1805 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 136 | 929 | 446 | 86 | 524 | 80 | 252 | 312 | 38 | 108 | 445 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 314 | 0 | 13 | 0 | 0 | 5 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 136 | 929 | 132 | 86 | 591 | 0 | 252 | 345 | 0 | 108 | 533 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | 4 | | 4 | 4 | | 4 | 11 | 11 |
| Confl. Bikes (#/hr) | | | | 3 | | | 7 | | | 21 | | 1 |
| Turn Type | Perm | | Perm | Perm | | | Prot | 5 | 2 | Perm | | 6 |
| Protected Phases | | 4 | | | 4 | | | | | | 6 | |
| Permitted Phases | 4 | | 4 | | 4 | | | | | | | 6 |
| Actuated Green, G (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 12.9 | 49.4 | | 32.0 | 32.0 | |
| Effective Green, g (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 12.9 | 49.4 | | 32.0 | 32.0 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | | 0.15 | 0.58 | | 0.38 | 0.38 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 147 | 1012 | 459 | 88 | 987 | | 269 | 1062 | | 384 | 680 | |
| v/s Ratio Prot | | 0.27 | | | 0.18 | | c0.14 | 0.19 | | | c0.30 | |
| v/s Ratio Perm | 0.27 | | 0.08 | c0.29 | | | | | | 0.11 | | |
| v/c Ratio | 0.93 | 0.92 | 0.92 | 0.98 | 0.60 | | 0.94 | 0.32 | | 0.28 | 0.78 | |
| Uniform Delay, d1 | 29.0 | 29.0 | 23.1 | 29.7 | 25.6 | | 35.6 | 9.2 | | 18.5 | 23.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.91 | 1.01 | |
| Incremental Delay, d2 | 56.5 | 14.3 | 1.6 | 89.9 | 2.7 | | 37.4 | 0.8 | | 1.5 | 7.3 | |
| Delay (s) | 85.6 | 43.3 | 24.6 | 119.5 | 28.3 | | 73.1 | 10.0 | | 18.3 | 30.9 | |
| Level of Service | F | D | C | F | C | | E | B | | B | C | |
| Approach Delay (s) | 41.6 | | 39.7 | | 36.4 | | | 28.8 | | | | |
| Approach LOS | D | | D | | D | | | C | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 37.9 | | | HCM Level of Service | | | | | D | | | |
| HCM Volume to Capacity ratio | 0.88 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 15.0 | | | |
| Intersection Capacity Utilization | 85.3% | | | ICU Level of Service | | | | | E | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 20: 20th Street & Telegraph Avenue

Cumulative AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 22 | 92 | 24 | 15 | 234 | 119 | 40 | 547 | 28 | 188 | 194 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1760 | 1790 | | | 1855 | 1538 | 1759 | 1846 | | 1770 | 1773 | |
| Flt Permitted | 0.45 | 1.00 | | | 0.98 | 1.00 | 0.58 | 1.00 | | 0.18 | 1.00 | |
| Satd. Flow (perm) | 842 | 1790 | | | 1821 | 1538 | 1081 | 1846 | | 329 | 1773 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 24 | 100 | 26 | 16 | 249 | 129 | 43 | 558 | 30 | 204 | 211 | 76 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 0 | 98 | 0 | 3 | 0 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 24 | 108 | 0 | 0 | 265 | 31 | 43 | 585 | 0 | 204 | 270 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 1 | 6 |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 14.3 | 14.3 | | | 14.3 | 14.3 | 24.3 | 24.3 | | 36.7 | 36.7 | |
| Effective Green, g (s) | 14.3 | 14.3 | | | 14.3 | 14.3 | 24.3 | 24.3 | | 36.7 | 36.7 | |
| Actuated g/C Ratio | 0.24 | 0.24 | | | 0.24 | 0.24 | 0.40 | 0.40 | | 0.61 | 0.61 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 201 | 427 | | | 434 | 367 | 438 | 748 | | 391 | 1084 | |
| v/s Ratio Prot | | 0.06 | | | | | | 0.32 | | c0.07 | 0.15 | |
| v/s Ratio Perm | 0.03 | | | | c0.15 | 0.02 | 0.04 | | | 0.25 | | |
| v/c Ratio | 0.12 | 0.25 | | | 0.61 | 0.08 | 0.10 | 0.78 | | 0.52 | 0.25 | |
| Uniform Delay, d1 | 17.9 | 18.5 | | | 20.4 | 17.8 | 11.1 | 15.5 | | 8.4 | 5.3 | |
| Progression Factor | 1.00 | 1.00 | | | 1.03 | 1.53 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.3 | 0.3 | | | 2.3 | 0.1 | 0.4 | 8.0 | | 1.3 | 0.6 | |
| Delay (s) | 18.2 | 18.8 | | | 23.3 | 27.2 | 11.5 | 23.5 | | 9.7 | 5.9 | |
| Level of Service | B | B | | | C | C | B | C | | A | A | |
| Approach Delay (s) | | 18.7 | | | 24.6 | | | 22.7 | | | 7.5 | |
| Approach LOS | | B | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 18.3 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.69 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 13.5 | | |
| Intersection Capacity Utilization | 72.0% | | | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 478 | 1728 | 0 | 0 | 0 | 0 | 0 | 591 | 104 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.5 | | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.91 | | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | 1.00 | | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | 0.99 | | | | | | | 1.00 | |
| Frt | | | | 1.00 | | | | | | | 0.98 | |
| Flt Protected | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 4992 | | | | | | | 4933 | |
| Flt Permitted | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 4992 | | | | | | | 4933 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 520 | 1781 | 0 | 0 | 0 | 0 | 0 | 603 | 113 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 87 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2214 | 0 | 0 | 0 | 0 | 0 | 714 | 0 |
| Confl. Peds. (#/hr) | 48 | | | 48 | 30 | | 30 | 54 | | 54 | 27 | 27 |
| Confl. Bikes (#/hr) | | | | 9 | | | 5 | | | 4 | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2163 | | | | | | 2179 | |
| v/s Ratio Prot | | | | | | | | | | | c0.14 | |
| v/s Ratio Perm | | | | | 0.44 | | | | | | | |
| v/c Ratio | | | | | 1.02 | | | | | | 0.33 | |
| Uniform Delay, d1 | | | | | 17.0 | | | | | | 10.9 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 21.6 | | | | | | 0.4 | |
| Delay (s) | | | | | 29.7 | | | | | | 11.3 | |
| Level of Service | | | | | C | | | | | | B | |
| Approach Delay (s) | 0.0 | | | | 29.7 | | | 0.0 | | | 11.3 | |
| Approach LOS | A | | | | C | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 25.3 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.67 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | | 66.0% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 36: 12th St. & Oak St.

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1936 | 89 | 372 | 904 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.93 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1467 | | 6163 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1467 | | 6163 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1996 | 97 | 400 | 983 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1996 | 91 | 0 | 1382 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | 102 | 84 | | 84 | 84 | | 168 | | 168 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | 1 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 731 | | 2116 | | | | |
| v/s Ratio Prot | | | | | c0.39 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.06 | | 0.22 | | | | |
| v/c Ratio | | | | | 0.79 | 0.13 | | 0.65 | | | | |
| Uniform Delay, d1 | | | | | 12.4 | 8.1 | | 16.7 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 2.6 | 0.4 | | 1.6 | | | | |
| Delay (s) | | | | | 15.0 | 8.4 | | 18.3 | | | | |
| Level of Service | | | | | B | A | | B | | | | |
| Approach Delay (s) | 0.0 | | | | 14.7 | | | 18.3 | | | 0.0 | |
| Approach LOS | A | | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 16.1 | | | | | | | |
| HCM Volume to Capacity ratio | | | | | 0.73 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 60.0 | | | | | | 9.5 | |
| Intersection Capacity Utilization | | | | | 72.6% | | | | | | | |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 457 | 174 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 949 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.95 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1503 | | | | | | | | 5063 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1503 | | | | | | | | 5063 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 497 | 189 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 999 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 497 | 162 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1056 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 21 | | 21 | 23 | | 23 | 17 | 17 |
| Confl. Bikes (#/hr) | | | | 10 | | | 10 | | | 2 | | 3 |
| Turn Type | | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 576 | | | | | | | | 2194 | |
| v/s Ratio Prot | | 0.10 | | | | | | | | | 0.21 | |
| v/s Ratio Perm | | | c0.11 | | | | | | | | | |
| v/c Ratio | | 0.26 | 0.28 | | | | | | | | 0.48 | |
| Uniform Delay, d1 | | 12.6 | 12.8 | | | | | | | | 12.2 | |
| Progression Factor | | 0.73 | 0.66 | | | | | | | | 0.91 | |
| Incremental Delay, d2 | | 0.3 | 1.2 | | | | | | | | 0.6 | |
| Delay (s) | | 9.5 | 9.6 | | | | | | | | 11.6 | |
| Level of Service | | A | A | | | | | | | | B | |
| Approach Delay (s) | 9.6 | | | | | | 0.0 | | | 0.0 | 11.6 | |
| Approach LOS | A | | | | | | A | | | A | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 10.8 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.39 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 11.0 | |
| Intersection Capacity Utilization | | | | 43.0% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | | |
|-----------------------------------|--|------|------|----------------------|------|------|------|-------|------|------|------|------|-----|--|
| Lane Configurations | <div> <div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div> <div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div> </div> | | | | | | | | | | | | | |
| Volume (vph) | 99 | 463 | 0 | 0 | 0 | 0 | 0 | 377 | 68 | 0 | 0 | 0 | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | | |
| Total Lost time (s) | 3.5 | | | | | | | | | | | | | |
| Lane Util. Factor | 0.91 | | | | | | | 0.86 | | | | | | |
| Frpb, ped/bikes | 1.00 | | | | | | | 1.00 | | | | | | |
| Flpb, ped/bikes | 0.99 | | | | | | | 1.00 | | | | | | |
| Frt | 1.00 | | | | | | | 0.98 | | | | | | |
| Flt Protected | 0.99 | | | | | | | 1.00 | | | | | | |
| Satd. Flow (prot) | 5003 | | | | | | | 6231 | | | | | | |
| Flt Permitted | 0.99 | | | | | | | 1.00 | | | | | | |
| Satd. Flow (perm) | 5003 | | | | | | | 6231 | | | | | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | |
| Adj. Flow (vph) | 108 | 498 | 0 | 0 | 0 | 0 | 0 | 410 | 74 | 0 | 0 | 0 | | |
| RTOR Reduction (vph) | 0 | 77 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | | |
| Lane Group Flow (vph) | 0 | 529 | 0 | 0 | 0 | 0 | 0 | 461 | 0 | 0 | 0 | 0 | | |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | | 56 | 21 | | 21 | 52 | 52 | | |
| Confl. Bikes (#/hr) | | | 2 | | | | 2 | | | 5 | | | | |
| Turn Type | Perm | | | | | | | | | | | | | |
| Protected Phases | 2 | | | | | | | | | | | | | |
| Permitted Phases | 2 | | | | | | | | | | | | | |
| Actuated Green, G (s) | 11.4 | | | | | | | 41.6 | | | | | | |
| Effective Green, g (s) | 11.4 | | | | | | | 41.6 | | | | | | |
| Actuated g/C Ratio | 0.19 | | | | | | | 0.69 | | | | | | |
| Clearance Time (s) | 3.5 | | | | | | | 3.5 | | | | | | |
| Vehicle Extension (s) | 2.0 | | | | | | | 2.0 | | | | | | |
| Lane Grp Cap (vph) | 951 | | | | | | | 4320 | | | | | | |
| v/s Ratio Prot | | | | | | | | c0.07 | | | | | | |
| v/s Ratio Perm | 0.11 | | | | | | | | | | | | | |
| v/c Ratio | 0.56 | | | | | | | 0.11 | | | | | | |
| Uniform Delay, d1 | 22.0 | | | | | | | 3.0 | | | | | | |
| Progression Factor | 1.06 | | | | | | | 1.00 | | | | | | |
| Incremental Delay, d2 | 0.2 | | | | | | | 0.0 | | | | | | |
| Delay (s) | 23.6 | | | | | | | 3.1 | | | | | | |
| Level of Service | C | | | | | | | A | | | | | | |
| Approach Delay (s) | 23.6 | | | | | | | 0.0 | | 3.1 | | | 0.0 | |
| Approach LOS | C | | | | | | | A | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | | | |
| HCM Average Control Delay | 14.5 | | | HCM Level of Service | | | | | | B | | | | |
| HCM Volume to Capacity ratio | 0.20 | | | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 7.0 | | | | |
| Intersection Capacity Utilization | 40.1% | | | ICU Level of Service | | | | | | A | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | | | |
| c. Critical Lane Group | | | | | | | | | | | | | | |

















HCM Signalized Intersection Capacity Analysis 5: 27th Street & Telegraph Avenue

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|---|--|--|---|--|--|--|--|---|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | | | |  | | |
| Volume (vph) | 239 | 459 | 155 | 73 | 604 | 130 | 203 | 555 | 54 | 154 | 532 | 405 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1534 | 1769 | 1863 | 1531 | 1770 | 1832 | | 1766 | 1714 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.28 | 1.00 | 1.00 | 0.12 | 1.00 | | 0.12 | 1.00 | |
| Satd. Flow (perm) | 230 | 1863 | 1534 | 527 | 1863 | 1531 | 226 | 1832 | | 225 | 1714 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 260 | 499 | 168 | 79 | 657 | 141 | 221 | 603 | 59 | 167 | 578 | 440 |
| RTOR Reduction (vph) | 0 | 0 | 103 | 0 | 0 | 87 | 0 | 4 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 260 | 499 | 65 | 79 | 657 | 54 | 221 | 658 | 0 | 167 | 986 | 0 |
| Confl. Peds. (#/hr) | 4 | | | 4 | 1 | | 1 | 17 | | 17 | 10 | |
| Confl. Bikes (#/hr) | | | | | | | 10 | | | 17 | | 28 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | 2 | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.39 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 308 | 721 | 594 | 290 | 612 | 503 | 88 | 711 | | 87 | 665 | |
| v/s Ratio Prot | c0.11 | 0.27 | | 0.02 | c0.35 | | | 0.36 | | | 0.57 | |
| v/s Ratio Perm | 0.32 | | 0.04 | 0.09 | | 0.04 | c0.98 | | | 0.74 | | |
| v/c Ratio | 0.84 | 0.69 | 0.11 | 0.27 | 1.07 | 0.11 | 2.51 | 0.93 | | 1.92 | 1.48 | |
| Uniform Delay, d1 | 19.8 | 21.8 | 16.7 | 17.2 | 28.6 | 19.9 | 26.0 | 24.8 | | 26.0 | 26.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.49 | 1.35 | 2.32 | 0.72 | 0.70 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 17.9 | 5.4 | 0.4 | 0.2 | 56.2 | 0.4 | 703.0 | 13.4 | | 453.2 | 225.0 | |
| Delay (s) | 37.8 | 27.2 | 17.0 | 25.7 | 94.8 | 46.5 | 721.7 | 30.6 | | 479.2 | 251.0 | |
| Level of Service | D | C | B | C | F | D | F | C | | F | C | |
| Approach Delay (s) | | 28.3 | | | 80.9 | | | 203.6 | | | 283.1 | |
| Approach LOS | | C | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 158.2 | | | HCM Level of Service | | | | | F | | | |
| HCM Volume to Capacity ratio | 1.71 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 13.5 | | | |
| Intersection Capacity Utilization | 125.7% | | | ICU Level of Service | | | | | H | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |























HCM Signalized Intersection Capacity Analysis 9: West Grand Avenue & Telegraph Avenue

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|---|--|--|---|--|--|---|--|--|---|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Volume (vph) | 31 | 775 | 36 | 21 | 927 | 132 | 110 | 616 | 39 | 158 | 497 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | *0.92 | 1.00 | 1.00 | *0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1762 | 3337 | | 1770 | 1844 | | 1762 | 1792 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.95 | 1.00 | | 0.36 | 1.00 | |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 307 | 3337 | | 1770 | 1844 | | 661 | 1792 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 34 | 842 | 39 | 23 | 1008 | 143 | 120 | 670 | 42 | 172 | 523 | 134 |
| RTOR Reduction (vph) | 0 | 0 | 28 | 0 | 13 | 0 | 0 | 2 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 34 | 842 | 11 | 23 | 1138 | 0 | 120 | 710 | 0 | 172 | 647 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | 6 | | | 10 | | | | 28 |
| Turn Type | Perm | | Perm | Perm | | | Prot | | | Perm | | |
| Protected Phases | | 4 | | 4 | | 4 | 5 | 2 | | | 6 | |
| Permitted Phases | 4 | 4 | | 4 | | 4 | | | | 6 | | 6 |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.6 | 50.3 | | 37.2 | 37.2 | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.6 | 50.3 | | 37.2 | 37.2 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | | 0.10 | 0.59 | | 0.44 | 0.44 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 87 | 950 | | 179 | 1091 | | 289 | 784 | |
| v/s Ratio Prot | | 0.25 | | | c0.34 | | 0.07 | c0.38 | | | c0.36 | |
| v/s Ratio Perm | 0.11 | | 0.01 | 0.08 | | | | | | 0.26 | | |
| v/c Ratio | 0.39 | 0.86 | 0.03 | 0.26 | 1.20 | | 0.67 | 0.65 | | 0.60 | 0.83 | |
| Uniform Delay, d1 | 24.4 | 28.8 | 21.9 | 23.5 | 30.4 | | 36.8 | 11.5 | | 18.2 | 21.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.19 | 1.21 | |
| Incremental Delay, d2 | 12.3 | 10.0 | 0.1 | 7.3 | 99.4 | | 7.5 | 3.0 | | 0.8 | 1.0 | |
| Delay (s) | 36.8 | 38.8 | 22.0 | 30.8 | 129.8 | | 44.3 | 14.5 | | 22.5 | 26.5 | |
| Level of Service | D | D | C | C | | | D | B | | C | C | |
| Approach Delay (s) | 38.0 | | | 127.8 | | | 18.8 | | | 25.7 | | |
| Approach LOS | D | | | F | | | B | | | C | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 59.2 | | | HCM Level of Service | | | | | E | | | |
| HCM Volume to Capacity ratio | 0.97 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 16.5 | | | |
| Intersection Capacity Utilization | 87.4% | | | ICU Level of Service | | | | | E | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 20: 20th Street & Telegraph Avenue

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | |  |  | |  |  |  |  |  |  |  |  | |
| Volume (vph) | 35 | 202 | | 37 | 14 | 240 | 237 | 32 | 807 | 33 | 49 | 221 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.98 | 1.00 | | | | 1.00 | 1.00 | 0.98 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1739 | 1799 | | | | 1855 | 1527 | 1738 | 1847 | | 1770 | 1764 | |
| Flt Permitted | 0.45 | 1.00 | | | | 0.97 | 1.00 | 0.56 | 1.00 | | 0.12 | 1.00 | |
| Satd. Flow (perm) | 820 | 1799 | | | | 1814 | 1527 | 1032 | 1847 | | 231 | 1764 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 38 | 220 | 40 | 15 | 261 | 258 | 35 | 877 | 36 | 51 | 240 | 85 | 33 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 181 | 0 | 2 | 0 | 0 | 17 | 0 | 0 |
| Lane Group Flow (vph) | 38 | 247 | 0 | 0 | 276 | 77 | 35 | 911 | 0 | 51 | 308 | 0 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 | 3 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | | 25 | | | 19 | 33 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | | | 3 |
| Protected Phases | | 4 | | | 8 | | 2 | 2 | | 1 | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | | | | 6 | | | |
| Actuated Green, G (s) | 15.1 | 15.1 | | | 15.1 | 15.1 | 27.8 | 27.8 | | 35.9 | 35.9 | | |
| Effective Green, g (s) | 15.1 | 15.1 | | | 15.1 | 15.1 | 27.8 | 27.8 | | 35.9 | 35.9 | | |
| Actuated g/C Ratio | 0.25 | 0.25 | | | 0.25 | 0.25 | 0.46 | 0.46 | | 0.60 | 0.60 | | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 206 | 453 | | | 457 | 384 | 478 | 856 | | 231 | 1055 | | |
| v/s Ratio Prot | | 0.14 | | | | | | c0.49 | | 0.01 | c0.17 | | |
| v/s Ratio Perm | 0.05 | | | | c0.15 | 0.05 | 0.03 | | | 0.12 | | | |
| v/c Ratio | 0.18 | 0.55 | | | 0.60 | 0.20 | 0.07 | 1.06 | | 0.22 | 0.29 | | |
| Uniform Delay, d1 | 17.6 | 19.5 | | | 19.8 | 17.7 | 8.9 | 16.1 | | 11.8 | 5.9 | | |
| Progression Factor | 1.00 | 1.00 | | | 1.05 | 1.52 | 1.00 | 1.00 | | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 0.4 | 1.3 | | | 1.4 | 0.2 | 0.3 | 49.3 | | 0.5 | 0.7 | | |
| Delay (s) | 18.1 | 20.8 | | | 22.1 | 27.0 | 9.2 | 65.4 | | 12.3 | 6.6 | | |
| Level of Service | B | C | | | C | C | A | E | | B | A | | |
| Approach Delay (s) | | 20.5 | | | 24.5 | | | 63.3 | | | 7.3 | | |
| Approach LOS | | C | | | C | | | E | | | A | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | 38.0 | | | HCM Level of Service | | | | | | D | | | |
| HCM Volume to Capacity ratio | 0.87 | | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 13.5 | | | |
| Intersection Capacity Utilization | 89.1% | | | ICU Level of Service | | | | | | E | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 290 | 1096 | 0 | 0 | 0 | 0 | 0 | 812 | 57 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.5 | | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.91 | | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | 1.00 | | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 0.99 | | | | | | | 1.00 | |
| Frt | | | | 1.00 | | | | | | | 0.99 | |
| Flt Protected | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 4976 | | | | | | | 5021 | |
| Flt Permitted | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 4976 | | | | | | | 5021 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 315 | 1130 | 0 | 0 | 0 | 0 | 0 | 883 | 62 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1409 | 0 | 0 | 0 | 0 | 0 | 932 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 47 | | 47 | 36 | | 36 | 29 | 29 |
| Confl. Bikes (#/hr) | | | | 3 | | | 13 | | | 9 | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2156 | | | | | | 2218 | |
| v/s Ratio Prot | | | | | | | | | | | c0.19 | |
| v/s Ratio Perm | | | | | 0.28 | | | | | | | |
| v/c Ratio | | | | | 0.65 | | | | | | 0.42 | |
| Uniform Delay, d1 | | | | | 13.4 | | | | | | 11.5 | |
| Progression Factor | | | | | 0.66 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 1.3 | | | | | | 0.6 | |
| Delay (s) | | | | | 10.1 | | | | | | 12.1 | |
| Level of Service | | | | | B | | | | | | B | |
| Approach Delay (s) | 0.0 | | | | 10.1 | | | 0.0 | | | 12.1 | |
| Approach LOS | A | | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 10.9 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.54 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | | 53.0% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 36: 12th Street & Oak St.

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1183 | 70 | 436 | 1147 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.94 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.97 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1484 | | 6106 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1484 | | 6106 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1245 | 76 | 474 | 1195 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 16 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1245 | 74 | 0 | 1653 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | 121 | | 69 | 118 | | 118 | 84 | | 84 |
| Confl. Bikes (#/hr) | | | | | 3 | | | | | | | 15 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 740 | | 2096 | | | | |
| v/s Ratio Prot | | | | | c0.24 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.05 | | 0.27 | | | | |
| v/c Ratio | | | | | 0.49 | 0.10 | | 0.79 | | | | |
| Uniform Delay, d1 | | | | | 10.0 | 7.9 | | 17.7 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.7 | 0.3 | | 3.1 | | | | |
| Delay (s) | | | | | 10.7 | 8.2 | | 20.8 | | | | |
| Level of Service | | | | | B | A | | C | | | | |
| Approach Delay (s) | 0.0 | | | | 10.5 | | | 20.8 | | | 0.0 | |
| Approach LOS | A | | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 16.3 | | | | | | | |
| HCM Volume to Capacity ratio | | | | | 0.61 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 60.0 | | | | | | 9.5 | |
| Intersection Capacity Utilization | | | | | 61.6% | | | | | | | |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 1295 | 226 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1017 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.96 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1527 | | | | | | | | 5066 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1527 | | | | | | | | 5066 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 1349 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 1094 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 1349 | 226 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1155 | 0 |
| Confl. Peds. (#/hr) | 20 | | | 20 | 30 | | 30 | 12 | | 12 | 17 | 17 |
| Confl. Bikes (#/hr) | | | | 5 | | | 7 | | | 3 | | |
| Turn Type | | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 585 | | | | | | | | 2195 | |
| v/s Ratio Prot | | c0.27 | | | | | | | | | 0.23 | |
| v/s Ratio Perm | | | 0.15 | | | | | | | | | |
| v/c Ratio | | 0.69 | 0.39 | | | | | | | | 0.53 | |
| Uniform Delay, d1 | | 15.5 | 13.4 | | | | | | | | 12.5 | |
| Progression Factor | | 0.79 | 0.66 | | | | | | | | 0.56 | |
| Incremental Delay, d2 | | 2.0 | 1.9 | | | | | | | | 0.8 | |
| Delay (s) | | 14.3 | 10.8 | | | | | | | | 7.7 | |
| Level of Service | | B | B | | | | | | | | A | |
| Approach Delay (s) | 13.8 | | | | | 0.0 | | 0.0 | | | 7.7 | |
| Approach LOS | B | | | | | A | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 11.2 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.60 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 11.0 | |
| Intersection Capacity Utilization | | | | 55.1% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |













HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|-------|------|------|------|------|
| Lane Configurations | | ↑↑↑ | | | | | | ↓↓↓ | | | | |
| Volume (vph) | 28 | 844 | 0 | 0 | 0 | 0 | 0 | 371 | 156 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.91 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 5071 | | | | | | 6031 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 5071 | | | | | | 6031 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 30 | 917 | 0 | 0 | 0 | 0 | 0 | 403 | 161 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 941 | 0 | 0 | 0 | 0 | 0 | 549 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | | 17 | 53 | | 53 | 68 | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | | 1 | | | 6 | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 17.6 | | | | | | 35.4 | | | | |
| Effective Green, g (s) | | 17.6 | | | | | | 35.4 | | | | |
| Actuated g/C Ratio | | 0.29 | | | | | | 0.59 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1487 | | | | | | 3558 | | | | |
| v/s Ratio Prot | | | | | | | | c0.09 | | | | |
| v/s Ratio Perm | | 0.19 | | | | | | | | | | |
| v/c Ratio | | 0.63 | | | | | | 0.15 | | | | |
| Uniform Delay, d1 | | 18.4 | | | | | | 5.5 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.7 | | | | | | 0.1 | | | | |
| Delay (s) | | 19.0 | | | | | | 5.6 | | | | |
| Level of Service | | B | | | | | | A | | | | |
| Approach Delay (s) | | 19.0 | | | 0.0 | | | 5.6 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.0 | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | | 0.31 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | Sum of lost time (s) | | | | 7.0 | | | |
| Intersection Capacity Utilization | | 43.3% | | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis
5: 27th Street & Telegraph Avenue

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 343 | 365 | 134 | 43 | 253 | 107 | 83 | 362 | 22 | 46 | 341 | 133 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1546 | 1762 | 1863 | 1520 | 1763 | 1842 | | 1765 | 1773 | |
| Flt Permitted | 0.42 | 1.00 | 1.00 | 0.51 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | 780 | 1863 | 1546 | 948 | 1863 | 1520 | 319 | 1842 | | 551 | 1773 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 373 | 397 | 146 | 47 | 275 | 116 | 86 | 393 | 24 | 50 | 371 | 145 |
| RTOR Reduction (vph) | 0 | 0 | 77 | 0 | 72 | 0 | 3 | 0 | 0 | 18 | 0 | 0 |
| Lane Group Flow (vph) | 373 | 397 | 69 | 47 | 275 | 44 | 86 | 414 | 0 | 50 | 498 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | Permpm+pt | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 7 | | 4 | | 3 | | 8 | | 2 | | 6 | |
| Permitted Phases | 4 | | 4 | | 8 | | 8 | | 2 | | 6 | |
| Actuated Green, G (s) | 48.4 | 40.1 | 40.1 | 35.7 | 31.9 | 31.9 | 27.6 | 27.6 | | 27.6 | 27.6 | |
| Effective Green, g (s) | 48.4 | 40.1 | 40.1 | 35.7 | 31.9 | 31.9 | 27.6 | 27.6 | | 27.6 | 27.6 | |
| Actuated g/C Ratio | 0.57 | 0.47 | 0.47 | 0.42 | 0.38 | 0.38 | 0.32 | 0.32 | | 0.32 | 0.32 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 584 | 879 | 729 | 435 | 699 | 570 | 104 | 598 | | 179 | 576 | |
| v/s Ratio Prot | c0.09 | 0.21 | | 0.00 | 0.15 | | | 0.22 | | c0.28 | | |
| v/s Ratio Perm | c0.27 | | 0.04 | 0.04 | | 0.03 | 0.27 | | 0.09 | | | |
| v/c Ratio | 0.64 | 0.45 | 0.09 | 0.11 | 0.39 | 0.08 | 0.83 | 0.69 | | 0.28 | 0.86 | |
| Uniform Delay, d1 | 11.0 | 15.1 | 12.4 | 14.7 | 19.5 | 17.1 | 26.5 | 25.0 | | 21.3 | 26.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.72 | 0.65 | 0.30 | 1.02 | 1.01 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.7 | 1.7 | 0.3 | 0.0 | 1.6 | 0.3 | 35.9 | 2.6 | | 0.3 | 12.4 | |
| Delay (s) | 12.7 | 16.7 | 12.7 | 10.6 | 14.3 | 5.3 | 63.0 | 28.0 | | 21.6 | 39.3 | |
| Level of Service | B | B | B | B | B | A | E | C | | C | D | |
| Approach Delay (s) | 14.4 | | | | 11.5 | | 34.0 | | | | 37.7 | |
| Approach LOS | B | | | | B | | C | | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 23.4 | | | HCM Level of Service | | | | | C | | | |
| HCM Volume to Capacity ratio | 0.72 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 10.0 | | | |
| Intersection Capacity Utilization | 84.2% | | | ICU Level of Service | | | | | E | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |























HCM Signalized Intersection Capacity Analysis
9: West Grand Avenue & Telegraph Avenue

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | | | | |  | |
| Volume (vph) | 108 | 835 | 357 | 68 | 424 | 67 | 201 | 258 | 31 | 100 | 354 | 77 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.92 | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3427 | 1553 | 1768 | 3340 | | 1770 | 1827 | | 1757 | 1805 | |
| Flt Permitted | 0.32 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.95 | 1.00 | | 0.57 | 1.00 | |
| Satd. Flow (perm) | 592 | 3427 | 1553 | 300 | 3340 | | 1770 | 1827 | | 1061 | 1805 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 117 | 870 | 388 | 74 | 461 | 73 | 218 | 272 | 34 | 109 | 385 | 84 |
| RTOR Reduction (vph) | 0 | 0 | 275 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 117 | 870 | 113 | 74 | 520 | 0 | 218 | 301 | 0 | 109 | 460 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | | Prot | | | Perm | | |
| Protected Phases | | 4 | | | 4 | | 5 | | 2 | | 6 | |
| Permitted Phases | 4 | | | 4 | | 4 | | | | 6 | | |
| Actuated Green, G (s) | 24.8 | 24.8 | 24.8 | 24.8 | 24.8 | | 12.3 | 49.7 | | 32.9 | 32.9 | |
| Effective Green, g (s) | 24.8 | 24.8 | 24.8 | 24.8 | 24.8 | | 12.3 | 49.7 | | 32.9 | 32.9 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | | 0.14 | 0.58 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 173 | 1000 | 453 | 88 | 974 | | 256 | 1068 | | 411 | 699 | |
| v/s Ratio Prot | | c0.25 | | | 0.16 | | c0.12 | 0.16 | | | c0.25 | |
| v/s Ratio Perm | 0.20 | | 0.07 | 0.25 | | | | | | 0.10 | | |
| v/c Ratio | 0.68 | 0.87 | 0.25 | 0.84 | 0.53 | | 0.85 | 0.28 | | 0.27 | 0.66 | |
| Uniform Delay, d1 | 26.6 | 28.6 | 23.0 | 28.2 | 25.2 | | 35.5 | 8.8 | | 17.8 | 21.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.94 | 1.02 | |
| Incremental Delay, d2 | 19.2 | 10.3 | 1.3 | 59.2 | 2.1 | | 22.1 | 0.7 | | 1.4 | 4.2 | |
| Delay (s) | 45.8 | 38.8 | 24.3 | 87.4 | 27.3 | | 57.6 | 9.4 | | 18.0 | 26.0 | |
| Level of Service | D | D | C | F | C | | E | A | | B | C | |
| Approach Delay (s) | 35.3 | | 34.7 | | 29.5 | | C | | C | | C | |
| Approach LOS | D | | C | | C | | C | | C | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 32.2 | | | HCM Level of Service | | | C | | | | | |
| HCM Volume to Capacity ratio | 0.77 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | 15.0 | | | | | |
| Intersection Capacity Utilization | 78.1% | | | ICU Level of Service | | | D | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis
20: 20th Street & Telegraph Avenue

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  |  |  |  |  |  |  |  |
| Volume (vph) | 19 | 90 | 20 | 12 | 198 | 101 | 34 | 458 | 37 | 158 | 163 | 58 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1759 | 1798 | | | 1855 | 1537 | 1758 | 1836 | | 1769 | 1774 | |
| Flt Permitted | 0.51 | 1.00 | | | 0.98 | 1.00 | 0.61 | 1.00 | | 0.27 | 1.00 | |
| Satd. Flow (perm) | 945 | 1798 | | | 1823 | 1537 | 1128 | 1836 | | 505 | 1774 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 21 | 98 | 22 | 13 | 211 | 110 | 37 | 467 | 40 | 172 | 177 | 63 |
| RTOR Reduction (vph) | 0 | 17 | 0 | 0 | 0 | 87 | 0 | 5 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 21 | 103 | 0 | 0 | 224 | 23 | 37 | 502 | 0 | 172 | 224 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | | 6 |
| Permitted Phases | 4 | | | 8 | | 8 | | | | 6 | | |
| Actuated Green, G (s) | 12.7 | 12.7 | | | 12.7 | 12.7 | 26.2 | 26.2 | | 38.3 | 38.3 | |
| Effective Green, g (s) | 12.7 | 12.7 | | | 12.7 | 12.7 | 26.2 | 26.2 | | 38.3 | 38.3 | |
| Actuated g/C Ratio | 0.21 | 0.21 | | | 0.21 | 0.21 | 0.44 | 0.44 | | 0.64 | 0.64 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 200 | 381 | | | 386 | 325 | 493 | 802 | | 482 | 1132 | |
| v/s Ratio Prot | | 0.06 | | | | | | 0.27 | | c0.05 | 0.13 | |
| v/s Ratio Perm | 0.02 | | | | c0.12 | 0.02 | 0.03 | | | 0.18 | | |
| v/c Ratio | 0.10 | 0.27 | | | 0.58 | 0.07 | 0.08 | 0.63 | | 0.36 | 0.20 | |
| Uniform Delay, d1 | 19.1 | 19.8 | | | 21.3 | 18.9 | 9.8 | 13.1 | | 6.2 | 4.5 | |
| Progression Factor | 1.00 | 1.00 | | | 1.02 | 1.40 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.4 | | | 2.1 | 0.1 | 0.3 | 3.7 | | 0.5 | 0.4 | |
| Delay (s) | 19.3 | 20.2 | | | 23.7 | 26.6 | 10.1 | 16.8 | | 6.6 | 4.9 | |
| Level of Service | B | C | | | C | C | B | B | | A | A | |
| Approach Delay (s) | | 20.0 | | | 24.6 | | | 16.3 | | | 5.6 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 15.5 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.57 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 13.5 | | |
| Intersection Capacity Utilization | 64.1% | | | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|--|--|--|---|--|--|---|--|--|---|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | | | |  | | |  | | |  | | | |
| Volume (vph) | 0 | 0 | 0 | 415 | 1502 | 0 | 0 | 0 | 0 | 0 | 378 | 76 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | | | | | 3.5 | | | | | 4.0 | | | |
| Lane Util. Factor | | | | | 0.91 | | | | | 0.91 | | | |
| Frpb, ped/bikes | | | | | 1.00 | | | | | 0.99 | | | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | 1.00 | | | |
| Frt | | | | | 1.00 | | | | | 0.97 | | | |
| Flt Protected | | | | | 0.99 | | | | | 1.00 | | | |
| Satd. Flow (prot) | | | | | 4993 | | | | | 4914 | | | |
| Flt Permitted | | | | | 0.99 | | | | | 1.00 | | | |
| Satd. Flow (perm) | | | | | 4993 | | | | | 4914 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 | |
| Adj. Flow (vph) | 0 | 0 | 0 | 451 | 1548 | 0 | 0 | 0 | 0 | 0 | 386 | 83 | |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1911 | 0 | 0 | 0 | 0 | 0 | 466 | 0 | |
| Confl. Peds. (#/hr) | 48 | | | 48 | 30 | 30 | 54 | | 54 | 27 | 27 | 1 | |
| Confl. Bikes (#/hr) | | | | 9 | | 5 | | | 4 | | | | |
| Turn Type | Perm | | | | | | | | | | | | |
| Protected Phases | 6 | | | | | | | | | | | | |
| Permitted Phases | 4 | | | | | | | | | | | | |
| Actuated Green, G (s) | 6 | | | | | | | | | | | | |
| Effective Green, g (s) | 26.0 | | | | | | | | | | | | |
| Actuated g/C Ratio | 0.43 | | | | | | | | | | | | |
| Clearance Time (s) | 3.5 | | | | | | | | | | | | |
| Lane Grp Cap (vph) | 2164 | | | | | | | | | | | | |
| v/s Ratio Prot | c0.09 | | | | | | | | | | | | |
| v/s Ratio Perm | 0.38 | | | | | | | | | | | | |
| v/c Ratio | 0.88 | | | | | | | | | | | | |
| Uniform Delay, d1 | 15.6 | | | | | | | | | | | | |
| Progression Factor | 0.48 | | | | | | | | | | | | |
| Incremental Delay, d2 | 4.3 | | | | | | | | | | | | |
| Delay (s) | 11.8 | | | | | | | | | | | | |
| Level of Service | B | | | | | | | | | | | | |
| Approach Delay (s) | 0.0 | | | 11.8 | | | 0.0 | | | 10.6 | | | |
| Approach LOS | A | | | B | | | A | | | B | | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | 11.5 | | | HCM Level of Service | | | | | | B | | | |
| HCM Volume to Capacity ratio | 0.55 | | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 7.5 | | | |
| Intersection Capacity Utilization | 60.0% | | | ICU Level of Service | | | | | | B | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 36: 12th St. & Oak St.

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------------------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1684 | 78 | 324 | 797 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.93 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1467 | | 6165 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1467 | | 6165 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 85 | 348 | 866 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 76 | 0 | 1211 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | 102 | 84 | | 84 | 84 | | 84 | 168 | | 168 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | 1 |
| Turn Type | Perm Perm | | | | | | | | | | | |
| Protected Phases | 6 4 | | | | | | | | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | 29.9 29.9 20.6 | | | | | | | | | | | |
| Effective Green, g (s) | 29.9 29.9 20.6 | | | | | | | | | | | |
| Actuated g/C Ratio | 0.50 0.50 0.34 | | | | | | | | | | | |
| Clearance Time (s) | 5.5 5.5 4.0 | | | | | | | | | | | |
| Lane Grp Cap (vph) | 2534 731 2117 | | | | | | | | | | | |
| v/s Ratio Prot | c0.34 | | | | | | | | | | | |
| v/s Ratio Perm | 0.05 0.20 | | | | | | | | | | | |
| v/c Ratio | 0.69 0.10 0.57 | | | | | | | | | | | |
| Uniform Delay, d1 | 11.5 8.0 16.1 | | | | | | | | | | | |
| Progression Factor | 1.00 1.00 1.00 | | | | | | | | | | | |
| Incremental Delay, d2 | 1.5 0.3 1.1 | | | | | | | | | | | |
| Delay (s) | 13.0 8.2 17.2 | | | | | | | | | | | |
| Level of Service | B A B | | | | | | | | | | | |
| Approach Delay (s) | 0.0 12.8 17.2 0.0 | | | | | | | | | | | |
| Approach LOS | A B B A | | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 14.6 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.64 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | | Sum of lost time (s) | | | | 9.5 | | | |
| Intersection Capacity Utilization | 65.1% | | | | ICU Level of Service | | | | C | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

















HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↑↑↑ | | | ↑↑↑ | | | ↑↑↑ | | | ↑↑↑ | | |
| Volume (vph) | 0 | 398 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 778 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.95 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1503 | | | | | | | | 5074 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1503 | | | | | | | | 5074 | |
















HCM Signalized Intersection Capacity Analysis
5: 27th Street & Telegraph Avenue

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|---|--|--|---|--|--|---|--|---|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | |  | | |
| Volume (vph) | 210 | 405 | 136 | 64 | 588 | 114 | 186 | 491 | 46 | 133 | 461 | 350 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1534 | 1769 | 1863 | 1531 | 1770 | 1833 | | 1765 | 1714 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.35 | 1.00 | 1.00 | 0.12 | 1.00 | | 0.18 | 1.00 | |
| Satd. Flow (perm) | 226 | 1863 | 1534 | 659 | 1863 | 1531 | 226 | 1833 | | 338 | 1714 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 228 | 440 | 148 | 70 | 639 | 124 | 202 | 534 | 50 | 145 | 501 | 380 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 83 | 0 | 4 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 228 | 440 | 58 | 70 | 639 | 41 | 202 | 580 | 0 | 145 | 849 | 0 |
| Confl. Peds. (#/hr) | 4 | | | 4 | 1 | | 1 | 17 | | 17 | 10 | |
| Confl. Bikes (#/hr) | | | | 4 | | | 10 | | | 17 | | 28 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | 2 | | 6 | |
| Permitted Phases | 4 | 4 | | 8 | | 8 | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.40 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 298 | 725 | 597 | 333 | 622 | 512 | 88 | 712 | | 131 | 665 | |
| v/s Ratio Prot | c0.09 | 0.24 | | 0.01 | c0.34 | | | 0.32 | | | 0.49 | |
| v/s Ratio Perm | 0.30 | | 0.04 | 0.07 | | 0.03 | c0.89 | | | 0.43 | | |
| v/c Ratio | 0.77 | 0.61 | 0.10 | 0.21 | 1.03 | 0.08 | 2.30 | 0.82 | | 1.11 | 1.28 | |
| Uniform Delay, d1 | 17.6 | 20.7 | 16.5 | 16.5 | 28.3 | 19.4 | 26.0 | 23.3 | | 26.0 | 26.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.57 | 1.42 | 2.79 | 0.71 | 0.67 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.1 | 3.8 | 0.3 | 0.1 | 42.2 | 0.3 | 609.6 | 5.3 | | 110.2 | 135.7 | |
| Delay (s) | 27.7 | 24.5 | 16.8 | 26.0 | 82.3 | 54.2 | 628.1 | 20.9 | | 136.2 | 161.7 | |
| Level of Service | C | C | B | C | F | D | F | C | | F | C | |
| Approach Delay (s) | 24.0 | | | | 73.4 | | | 177.0 | | | 158.1 | |
| Approach LOS | C | | | | E | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 110.4 | | | HCM Level of Service | | | | | F | | | |
| HCM Volume to Capacity ratio | 1.58 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 13.5 | | | |
| Intersection Capacity Utilization | 115.2% | | | ICU Level of Service | | | | | H | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
9: West Grand Avenue & Telegraph Avenue

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|---|--|--|---|--|--|--|--|--|---|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | | | | |  | |
| Volume (vph) | 27 | 688 | 32 | 19 | 845 | 128 | 95 | 542 | 33 | 139 | 429 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.92 | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1760 | 3332 | | 1770 | 1845 | | 1761 | 1792 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.95 | 1.00 | | 0.43 | 1.00 | |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 306 | 3332 | | 1770 | 1845 | | 793 | 1792 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 29 | 748 | 35 | 21 | 918 | 139 | 103 | 589 | 36 | 151 | 452 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 14 | 0 | 0 | 2 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 29 | 748 | 10 | 21 | 1043 | 0 | 103 | 623 | 0 | 151 | 558 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | Perm | | | Prot | 5 | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | | 2 | | | 6 |
| Permitted Phases | 4 | | 4 | | 4 | | | | | 6 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.2 | 50.3 | | 37.6 | 37.6 | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.2 | 50.3 | | 37.6 | 37.6 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | | 0.10 | 0.59 | | 0.44 | 0.44 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 87 | 949 | | 171 | 1092 | | 351 | 793 | |
| v/s Ratio Prot | | 0.22 | | | c0.31 | | 0.06 | c0.34 | | | c0.31 | |
| v/s Ratio Perm | 0.09 | | 0.01 | 0.07 | | | 0.60 | 0.57 | | 0.19 | | |
| v/c Ratio | 0.33 | 0.77 | 0.02 | 0.24 | 1.10 | | 0.60 | 0.57 | | 0.43 | 0.70 | |
| Uniform Delay, d1 | 24.0 | 27.8 | 21.9 | 30.3 | 30.4 | | 36.8 | 10.7 | | 16.3 | 19.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.18 | 1.22 | |
| Incremental Delay, d2 | 9.7 | 5.7 | 0.1 | 6.5 | 60.3 | | 4.1 | 2.2 | | 1.3 | 1.8 | |
| Delay (s) | 33.7 | 33.6 | 22.0 | 29.8 | 90.7 | | 40.9 | 12.9 | | 20.7 | 25.3 | |
| Level of Service | C | C | C | C | F | | D | B | | C | C | |
| Approach Delay (s) | 33.1 | | | 89.5 | | | 16.8 | | | 24.3 | | |
| Approach LOS | C | | | F | | | B | | | C | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 45.9 | | | HCM Level of Service | | | | | D | | | |
| HCM Volume to Capacity ratio | 0.86 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 16.5 | | | |
| Intersection Capacity Utilization | 79.7% | | | ICU Level of Service | | | | | D | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
20: 20th Street & Telegraph Avenue

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|----------------------|-------|------|------|-------|------|-------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 29 | 167 | 30 | 12 | 207 | 204 | 26 | 657 | 29 | 40 | 180 | 64 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.98 | 1.00 | | | 1.00 | 1.00 | 0.98 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1737 | 1799 | | | 1855 | 1526 | 1735 | 1846 | | 1770 | 1764 | |
| Flt Permitted | 0.49 | 1.00 | | | 0.98 | 1.00 | 0.60 | 1.00 | | 0.15 | 1.00 | |
| Satd. Flow (perm) | 903 | 1799 | | | 1817 | 1526 | 1087 | 1846 | | 285 | 1764 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 32 | 182 | 33 | 13 | 225 | 222 | 28 | 714 | 32 | 41 | 196 | 70 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 172 | 0 | 2 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 32 | 202 | 0 | 0 | 238 | 50 | 28 | 744 | 0 | 41 | 250 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | 25 | | | 3 | |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | 1 | 6 |
| Protected Phases | | 4 | | | 8 | | 8 | 2 | 2 | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | | | | 6 | | |
| Actuated Green, G (s) | 13.5 | 13.5 | | | 13.5 | 13.5 | 30.4 | 30.4 | | 37.5 | 37.5 | |
| Effective Green, g (s) | 13.5 | 13.5 | | | 13.5 | 13.5 | 30.4 | 30.4 | | 37.5 | 37.5 | |
| Actuated g/C Ratio | 0.22 | 0.22 | | | 0.22 | 0.22 | 0.51 | 0.51 | | 0.62 | 0.62 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 203 | 405 | | | 409 | 343 | 551 | 935 | | 242 | 1103 | |
| v/s Ratio Prot | | 0.11 | | | | | | c0.40 | | 0.01 | c0.14 | |
| v/s Ratio Perm | 0.04 | | | | c0.13 | 0.03 | 0.03 | | | 0.10 | | |
| v/c Ratio | 0.16 | 0.50 | | | 0.58 | 0.15 | 0.05 | 0.80 | | 0.17 | 0.23 | |
| Uniform Delay, d1 | 18.7 | 20.3 | | | 20.7 | 18.6 | 7.5 | 12.2 | | 8.2 | 4.9 | |
| Progression Factor | 1.00 | 1.00 | | | 1.03 | 1.71 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.4 | | | 1.4 | 0.1 | 0.2 | 7.0 | | 0.3 | 0.5 | |
| Delay (s) | 19.0 | 21.3 | | | 22.9 | 32.0 | 7.7 | 19.2 | | 8.5 | 5.4 | |
| Level of Service | B | C | | | C | C | A | B | | A | A | |
| Approach Delay (s) | | 21.0 | | | 27.3 | | | 18.8 | | | 5.8 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 19.0 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.71 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 13.5 | | |
| Intersection Capacity Utilization | 79.3% | | | ICU Level of Service | | | | | | D | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|------|----------------------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 249 | 941 | 0 | 0 | 0 | 0 | 0 | 735 | 46 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.91 | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 0.99 | 1.00 | | | | | | 1.00 | |
| Frt | | | | 1.00 | 0.99 | | | | | | 1.00 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 4976 | | | | | | 5027 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 4976 | | | | | | 5027 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 271 | 970 | 0 | 0 | 0 | 0 | 0 | 799 | 50 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1194 | 0 | 0 | 0 | 0 | 0 | 837 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 47 | | 47 | 36 | | 36 | 29 | 29 |
| Confl. Bikes (#/hr) | | | | 3 | | | 13 | | | 9 | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2156 | | | | | | 2220 | |
| v/s Ratio Prot | | | | | | | | | | | c0.17 | |
| v/s Ratio Perm | | | | | 0.24 | | | | | | | |
| v/c Ratio | | | | | 0.55 | | | | | | 0.38 | |
| Uniform Delay, d1 | | | | | 12.7 | | | | | | 11.2 | |
| Progression Factor | | | | | 0.46 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 0.9 | | | | | | 0.5 | |
| Delay (s) | | | | | 6.8 | | | | | | 11.7 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | 0.0 | | | | 6.8 | | 0.0 | | | | 11.7 | |
| Approach LOS | A | | | | A | | A | | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 8.8 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.46 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | | 47.5% | | | | | | | ICU Level of Service | A |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 36: 12th Street & Oak St.

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|-------|------|------|------|------|------|----------------------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1015 | 60 | 178 | 986 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.94 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1484 | | 6239 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1484 | | 6239 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 65 | 193 | 1027 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 28 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 61 | 0 | 1192 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | | 121 | 69 | | 69 | 118 | | 118 | 84 | 84 |
| Confl. Bikes (#/hr) | | | | | 3 | | | | | | | 15 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 740 | | 2142 | | | | |
| v/s Ratio Prot | | | | | c0.21 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.04 | | 0.19 | | | | |
| v/c Ratio | | | | | 0.42 | 0.08 | | 0.56 | | | | |
| Uniform Delay, d1 | | | | | 9.6 | 7.9 | | 16.0 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.5 | 0.2 | | 1.0 | | | | |
| Delay (s) | | | | | 10.1 | 8.1 | | 17.0 | | | | |
| Level of Service | | | | | B | A | | B | | | | |
| Approach Delay (s) | 0.0 | | | | 10.0 | | | 17.0 | | | 0.0 | |
| Approach LOS | A | | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 13.6 | | | | | | B | |
| HCM Volume to Capacity ratio | | | | | 0.48 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 60.0 | | | | | | 9.5 | |
| Intersection Capacity Utilization | | | | | 46.5% | | | | | | ICU Level of Service | A |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |













HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 910 | 194 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 911 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.96 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1527 | | | | | | | | 5067 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1527 | | | | | | | | 5067 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 948 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 980 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 948 | 182 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1025 | 0 |
| Confl. Peds. (#/hr) | 20 | | | 20 | 30 | | 30 | 12 | | 12 | 17 | 17 |
| Confl. Bikes (#/hr) | | | | 5 | | | 7 | | | 3 | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 585 | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.19 | | | | | | | | | 0.20 | |
| v/s Ratio Perm | | | 0.12 | | | | | | | | | |
| v/c Ratio | | 0.49 | 0.31 | | | | | | | | 0.47 | |
| Uniform Delay, d1 | | 14.0 | 13.0 | | | | | | | | 12.1 | |
| Progression Factor | | 0.78 | 0.65 | | | | | | | | 0.56 | |
| Incremental Delay, d2 | | 0.8 | 1.3 | | | | | | | | 0.7 | |
| Delay (s) | | 11.7 | 9.8 | | | | | | | | 7.5 | |
| Level of Service | | B | A | | | | | | | | A | |
| Approach Delay (s) | 11.4 | | | | | 0.0 | | 0.0 | | | 7.5 | |
| Approach LOS | B | | | | | A | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | | | | | | | 9.5 | |
| HCM Volume to Capacity ratio | | | | | | | | | | | 0.48 | |
| Actuated Cycle Length (s) | | | | | | | | | | | 60.0 | |
| Intersection Capacity Utilization | | | | | | | | | | | 45.4% | |
| Analysis Period (min) | | | | | | | | | | | 15 | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | 4TT | | | | | | TTT | | | | |
| Volume (vph) | 27 | 724 | 0 | 0 | 0 | 0 | 0 | 326 | 134 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.91 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 5069 | | | | | | 6038 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 5069 | | | | | | 6038 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 29 | 787 | 0 | 0 | 0 | 0 | 0 | 354 | 138 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 808 | 0 | 0 | 0 | 0 | 0 | 470 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | | 17 | 53 | | 53 | 68 | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | | 1 | | | 6 | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 15.3 | | | | | | 37.7 | | | | |
| Effective Green, g (s) | | 15.3 | | | | | | 37.7 | | | | |
| Actuated g/C Ratio | | 0.26 | | | | | | 0.63 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1293 | | | | | | 3794 | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | |
| v/s Ratio Perm | | 0.16 | | | | | | | | | | |
| v/c Ratio | | 0.62 | | | | | | 0.12 | | | | |
| Uniform Delay, d1 | | 19.8 | | | | | | 4.5 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.7 | | | | | | 0.1 | | | | |
| Delay (s) | | 20.5 | | | | | | 4.6 | | | | |
| Level of Service | | C | | | | | | A | | | | |
| Approach Delay (s) | | 20.5 | | | 0.0 | | | 4.6 | | | 0.0 | |
| Approach LOS | | C | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.5 | | | | HCM Level of Service | | | B | | | |
| HCM Volume to Capacity ratio | | 0.27 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | Sum of lost time (s) | | | 7.0 | | | |
| Intersection Capacity Utilization | | 40.9% | | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
5: 27th Street & Telegraph Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Volume (vph) | 343 | 392 | 145 | 43 | 263 | 107 | 87 | 364 | 22 | 48 | 356 | 133 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1546 | 1763 | 1863 | 1520 | 1763 | 1842 | | 1765 | 1776 | |
| Flt Permitted | 0.40 | 1.00 | 1.00 | 0.47 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | 753 | 1863 | 1546 | 867 | 1863 | 1520 | 309 | 1842 | | 564 | 1776 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 373 | 426 | 158 | 47 | 286 | 116 | 91 | 396 | 24 | 52 | 387 | 145 |
| RTOR Reduction (vph) | 0 | 0 | 85 | 0 | 0 | 73 | 0 | 3 | 0 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 373 | 426 | 73 | 47 | 286 | 43 | 91 | 417 | 0 | 52 | 515 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | | 6 | | 6 |
| Permitted Phases | 4 | 4 | | 8 | | 8 | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 47.6 | 39.3 | 39.3 | 35.3 | 31.5 | 31.5 | 28.4 | 28.4 | | 28.4 | 28.4 | |
| Effective Green, g (s) | 47.6 | 39.3 | 39.3 | 35.3 | 31.5 | 31.5 | 28.4 | 28.4 | | 28.4 | 28.4 | |
| Actuated g/C Ratio | 0.56 | 0.46 | 0.46 | 0.42 | 0.37 | 0.37 | 0.33 | 0.33 | | 0.33 | 0.33 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 560 | 861 | 715 | 400 | 690 | 563 | 103 | 615 | | 188 | 593 | |
| v/s Ratio Prot | c0.09 | 0.23 | | 0.01 | 0.15 | | | 0.23 | | | 0.29 | |
| v/s Ratio Perm | c0.28 | | 0.05 | 0.04 | | 0.03 | c0.29 | | | 0.09 | | |
| v/c Ratio | 0.67 | 0.49 | 0.10 | 0.12 | 0.41 | 0.08 | 0.88 | 0.68 | | 0.28 | 0.87 | |
| Uniform Delay, d1 | 11.5 | 15.9 | 12.9 | 15.0 | 19.9 | 17.3 | 26.7 | 24.4 | | 20.8 | 26.5 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.72 | 0.65 | 0.30 | 1.03 | 1.02 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.3 | 2.0 | 0.3 | 0.0 | 1.8 | 0.3 | 49.9 | 2.2 | | 0.3 | 12.4 | |
| Delay (s) | 13.9 | 18.0 | 13.2 | 10.8 | 14.7 | 5.5 | 77.4 | 27.0 | | 21.1 | 38.9 | |
| Level of Service | B | B | B | B | B | A | E | C | | C | D | |
| Approach Delay (s) | | 15.6 | | | 11.9 | | | 36.0 | | | 37.3 | |
| Approach LOS | | B | | | B | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 24.2 | | | | | | | C | | | |
| HCM Volume to Capacity ratio | | 0.75 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 85.0 | | | | | | 10.0 | | | | |
| Intersection Capacity Utilization | | 85.4% | | | | | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |


HCM Signalized Intersection Capacity Analysis
9: West Grand Avenue & Telegraph Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|------|------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Volume (vph) | 108 | 903 | 357 | 68 | 431 | 69 | 201 | 262 | 31 | 119 | 368 | 77 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.92 | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1764 | 3427 | 1553 | 1768 | 3339 | | 1770 | 1827 | | 1757 | 1807 | |
| Flt Permitted | 0.31 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.95 | 1.00 | | 0.57 | 1.00 | |
| Satd. Flow (perm) | 583 | 3427 | 1553 | 297 | 3339 | | 1770 | 1827 | | 1057 | 1807 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 117 | 941 | 388 | 74 | 468 | 75 | 218 | 276 | 34 | 129 | 400 | 84 |
| RTOR Reduction (vph) | 0 | 0 | 273 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 117 | 941 | 115 | 74 | 529 | 0 | 218 | 305 | 0 | 129 | 475 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | | 4 | | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | 7 | | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | | Prot | 5 | 2 | Perm | | 6 |
| Protected Phases | | 4 | | 4 | | 4 | | 5 | | | 6 | |
| Permitted Phases | 4 | | 4 | | 4 | | | | | 6 | | |
| Actuated Green, G (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 12.3 | 49.4 | | 32.6 | 32.6 | |
| Effective Green, g (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 12.3 | 49.4 | | 32.6 | 32.6 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | | 0.14 | 0.58 | | 0.38 | 0.38 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 172 | 1012 | 459 | 88 | 986 | | 256 | 1062 | | 405 | 693 | |
| v/s Ratio Prot | c0.27 | | | | 0.16 | | c0.12 | 0.17 | | | c0.26 | |
| v/s Ratio Perm | 0.20 | | 0.07 | 0.25 | | | | | | 0.12 | | |
| v/c Ratio | 0.68 | 0.93 | 0.25 | 0.84 | 0.54 | | 0.85 | 0.29 | | 0.32 | 0.69 | |
| Uniform Delay, d1 | 26.4 | 29.1 | 22.8 | 28.1 | 25.1 | | 35.5 | 8.9 | | 18.4 | 21.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.94 | 1.01 | |
| Incremental Delay, d2 | 19.6 | 15.7 | 1.3 | 59.2 | 2.1 | | 22.1 | 0.7 | | 1.8 | 4.7 | |
| Delay (s) | 46.0 | 44.8 | 24.1 | 87.3 | 27.2 | | 57.6 | 9.6 | | 19.1 | 26.9 | |
| Level of Service | D | D | C | F | C | | E | A | | B | C | |
| Approach Delay (s) | | 39.4 | | 34.4 | | | | 29.4 | | | 25.2 | |
| Approach LOS | | D | | C | | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 34.1 | | | | | | | C | | | |
| HCM Volume to Capacity ratio | | 0.80 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 85.0 | | | | | | 15.0 | | | | |
| Intersection Capacity Utilization | | 80.8% | | | | | | D | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |



















HCM Signalized Intersection Capacity Analysis
20: 20th Street & Telegraph Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|---|------|------|----------------------|-------|------|------|-------|------|-------|------|------|
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 19 | 101 | 20 | 12 | 199 | 105 | 34 | 458 | 47 | 163 | 163 | 58 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1759 | 1804 | | | 1855 | 1537 | 1758 | 1830 | | 1769 | 1774 | |
| Flt Permitted | 0.51 | 1.00 | | | 0.98 | 1.00 | 0.61 | 1.00 | | 0.26 | 1.00 | |
| Satd. Flow (perm) | 944 | 1804 | | | 1822 | 1537 | 1128 | 1830 | | 481 | 1774 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 21 | 110 | 22 | 13 | 212 | 114 | 37 | 467 | 51 | 177 | 177 | 63 |
| RTOR Reduction (vph) | 0 | 15 | 0 | 0 | 0 | 90 | 0 | 6 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 21 | 117 | 0 | 0 | 225 | 24 | 37 | 512 | 0 | 177 | 224 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 19 | | 19 | 5 | | 5 | 4 | | 4 |
| Confl. Bikes (#/hr) | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | | |
| Protected Phases | | 4 | | | 8 | | 2 | | 2 | | 1 | 6 |
| Permitted Phases | 4 | | | 8 | | 8 | | 2 | | 6 | | |
| Actuated Green, G (s) | 12.8 | 12.8 | | | 12.8 | 12.8 | 25.9 | 25.9 | | 38.2 | 38.2 | |
| Effective Green, g (s) | 12.8 | 12.8 | | | 12.8 | 12.8 | 25.9 | 25.9 | | 38.2 | 38.2 | |
| Actuated g/C Ratio | 0.21 | 0.21 | | | 0.21 | 0.21 | 0.43 | 0.43 | | 0.64 | 0.64 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 201 | 385 | | | 389 | 328 | 487 | 790 | | 474 | 1129 | |
| v/s Ratio Prot | | 0.06 | | | | 0.02 | 0.03 | c0.28 | | c0.05 | 0.13 | |
| v/s Ratio Perm | 0.02 | | | | c0.12 | 0.02 | 0.03 | | | 0.19 | | |
| v/c Ratio | 0.10 | 0.30 | | | 0.58 | 0.07 | 0.08 | 0.65 | | 0.37 | 0.20 | |
| Uniform Delay, d1 | 19.0 | 19.9 | | | 21.2 | 18.9 | 10.0 | 13.5 | | 6.4 | 4.5 | |
| Progression Factor | 1.00 | 1.00 | | | 1.02 | 1.45 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.4 | | | 1.9 | 0.1 | 0.3 | 4.1 | | 0.5 | 0.4 | |
| Delay (s) | 19.2 | 20.3 | | | 23.6 | 27.4 | 10.3 | 17.6 | | 6.9 | 4.9 | |
| Level of Service | B | C | | | C | C | B | B | | A | A | |
| Approach Delay (s) | | 20.2 | | | 24.9 | | | 17.1 | | | 5.8 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 16.0 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.59 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 13.5 | | |
| Intersection Capacity Utilization | 67.6% | | | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|---|--|--|--|--|--|---|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | |    | | | | | |    | | |
| Volume (vph) | 0 | 0 | 0 | 415 | 1502 | 0 | 0 | 0 | 0 | 0 | 384 | 76 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.5 | | | | | | 4.0 | | |
| Lane Util. Factor | | | | 0.91 | | | | | | 0.91 | | |
| Frpb, ped/bikes | | | | 1.00 | | | | | | 0.99 | | |
| Flpb, ped/bikes | | | | 0.99 | | | | | | 1.00 | | |
| Frt | | | | 1.00 | | | | | | 0.97 | | |
| Flt Protected | | | | 0.99 | | | | | | 1.00 | | |
| Satd. Flow (prot) | | | | 4993 | | | | | | 4916 | | |
| Flt Permitted | | | | 0.99 | | | | | | 1.00 | | |
| Satd. Flow (perm) | | | | 4993 | | | | | | 4916 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 451 | 1548 | 0 | 0 | 0 | 0 | 0 | 392 | 83 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1911 | 0 | 0 | 0 | 0 | 0 | 472 | 0 |
| Confl. Peds. (#/hr) | 48 | | | 48 | 30 | 30 | 54 | | 54 | 27 | | 27 |
| Confl. Bikes (#/hr) | | | | 9 | | 5 | | | 4 | | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | 6 | | | | | | 4 | | |
| Permitted Phases | | | | 6 | | | | | | 4 | | |
| Actuated Green, G (s) | | | | 26.0 | | | | | | 26.5 | | |
| Effective Green, g (s) | | | | 26.0 | | | | | | 26.5 | | |
| Actuated g/C Ratio | | | | 0.43 | | | | | | 0.44 | | |
| Clearance Time (s) | | | | 3.5 | | | | | | 4.0 | | |
| Lane Grp Cap (vph) | | | | 2164 | | | | | | 2171 | | |
| v/s Ratio Prot | | | | | | | | | | c0.10 | | |
| v/s Ratio Perm | | | | 0.38 | | | | | | | | |
| v/c Ratio | | | | 0.88 | | | | | | 0.22 | | |
| Uniform Delay, d1 | | | | 15.6 | | | | | | 10.3 | | |
| Progression Factor | | | | 0.48 | | | | | | 1.00 | | |
| Incremental Delay, d2 | | | | 4.3 | | | | | | 0.2 | | |
| Delay (s) | | | | 11.8 | | | | | | 10.6 | | |
| Level of Service | | | | B | | | | | | B | | |
| Approach Delay (s) | 0.0 | | | 11.8 | | | 0.0 | | | 10.6 | | |
| Approach LOS | A | | | B | | | A | | | B | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 11.5 | | | HCM Level of Service | | | B | | | | | |
| HCM Volume to Capacity ratio | 0.55 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | 7.5 | | | | | |
| Intersection Capacity Utilization | 60.0% | | | ICU Level of Service | | | B | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

















HCM Signalized Intersection Capacity Analysis 36: 12th St. & Oak St.

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1684 | 78 | 326 | 814 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.93 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1467 | | 6167 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1467 | | 6167 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 85 | 351 | 885 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1736 | 76 | 0 | 1233 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 102 | | | 102 | 84 | | 84 | 84 | | 84 | 168 | 168 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | 1 |
| Turn Type | | | | | Perm | | Perm | | | | | |
| Protected Phases | | | | | 6 | | | | 4 | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | | 29.9 | | 20.6 | | | |
| Effective Green, g (s) | | | | | 29.9 | | 29.9 | | 20.6 | | | |
| Actuated g/C Ratio | | | | | 0.50 | | 0.50 | | 0.34 | | | |
| Clearance Time (s) | | | | | 5.5 | | 5.5 | | 4.0 | | | |
| Lane Grp Cap (vph) | | | | | 2534 | | 731 | | 2117 | | | |
| v/s Ratio Prot | | | | | c0.34 | | | | | | | |
| v/s Ratio Perm | | | | | | | 0.05 | | 0.20 | | | |
| v/c Ratio | | | | | 0.69 | | 0.10 | | 0.58 | | | |
| Uniform Delay, d1 | | | | | 11.5 | | 8.0 | | 16.2 | | | |
| Progression Factor | | | | | 1.00 | | 1.00 | | 1.00 | | | |
| Incremental Delay, d2 | | | | | 1.5 | | 0.3 | | 1.2 | | | |
| Delay (s) | | | | | 13.0 | | 8.3 | | 17.3 | | | |
| Level of Service | | | | | B | | A | | B | | | |
| Approach Delay (s) | 0.0 | | | | 12.8 | | | | 17.3 | | 0.0 | |
| Approach LOS | A | | | | B | | | | B | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 14.6 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.64 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | | Sum of lost time (s) | | | | 9.5 | | | |
| Intersection Capacity Utilization | 65.2% | | | | ICU Level of Service | | | | C | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | |  |  | | | | | | | |  |  | |
| Volume (vph) | 0 | 398 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 784 | 0 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | | |
| Frpb, ped/bikes | | 1.00 | 0.95 | | | | | | | | 1.00 | | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | | |
| Satd. Flow (prot) | | 5085 | 1503 | | | | | | | | 5074 | | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | | |
| Satd. Flow (perm) | | 5085 | 1503 | | | | | | | | 5074 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | |
| Adj. Flow (vph) | 0 | 433 | 154 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 825 | 0 | |
| RTOR Reduction (vph) | 0 | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | |
| Lane Group Flow (vph) | 0 | 433 | 106 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 847 | 0 | |
| Confl. Peds. (#/hr) | 32 | | 32 | 21 | | 21 | 23 | | 23 | 17 | | 17 | |
| Confl. Bikes (#/hr) | | | 10 | | | 10 | | | 2 | | | 3 | |
| Turn Type | | Perm | | | | | | Perm | | | | | |
| Protected Phases | | 2 | | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | 4 | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | | |
| Lane Grp Cap (vph) | | 1949 | 576 | | | | | | | | 2199 | | |
| v/s Ratio Prot | | c0.09 | | | | | | | | | | | |
| v/s Ratio Perm | | | 0.07 | | | | | | | | 0.17 | | |
| v/c Ratio | | 0.22 | 0.18 | | | | | | | | 0.39 | | |
| Uniform Delay, d1 | | 12.5 | 12.3 | | | | | | | | 11.6 | | |
| Progression Factor | | 0.75 | 0.63 | | | | | | | | 1.07 | | |
| Incremental Delay, d2 | | 0.3 | 0.7 | | | | | | | | 0.4 | | |
| Delay (s) | | 9.7 | 8.4 | | | | | | | | 12.8 | | |
| Level of Service | | A | A | | | | | | | | B | | |
| Approach Delay (s) | | 9.3 | | | 0.0 | | | 0.0 | | | 12.8 | | |
| Approach LOS | | A | | | A | | | A | | | B | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | | | 11.4 | | HCM Level of Service | | | | | B | | | |
| HCM Volume to Capacity ratio | | | 0.31 | | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | Sum of lost time (s) | | | | | 11.0 | | | |
| Intersection Capacity Utilization | | | 39.0% | | ICU Level of Service | | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | | |














HCM Signalized Intersection Capacity Analysis
5: 27th Street & Telegraph Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--------|------|------|----------------------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 210 | 409 | 137 | 64 | 660 | 115 | 210 | 506 | 46 | 133 | 464 | 350 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1534 | 1769 | 1863 | 1531 | 1770 | 1834 | | 1765 | 1715 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.35 | 1.00 | 1.00 | 0.12 | 1.00 | | 0.17 | 1.00 | |
| Satd. Flow (perm) | 226 | 1863 | 1534 | 648 | 1863 | 1531 | 226 | 1834 | | 308 | 1715 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 228 | 445 | 149 | 70 | 717 | 125 | 228 | 550 | 50 | 145 | 504 | 380 |
| RTOR Reduction (vph) | 0 | 0 | 91 | 0 | 0 | 80 | 0 | 4 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 228 | 445 | 58 | 70 | 717 | 45 | 228 | 596 | 0 | 145 | 852 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 1 | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | | 4 | | | 10 | | 17 | | | 28 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | 2 | | 6 | |
| Permitted Phases | 4 | 4 | | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 33.1 | 33.1 | 33.8 | 28.4 | 28.4 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.40 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 298 | 725 | 597 | 329 | 622 | 512 | 88 | 712 | | 120 | 666 | |
| v/s Ratio Prot | c0.09 | 0.24 | | 0.01 | c0.38 | | | 0.33 | | | 0.50 | |
| v/s Ratio Perm | 0.30 | | 0.04 | 0.07 | | 0.03 | c1.01 | | | 0.47 | | |
| v/c Ratio | 0.77 | 0.61 | 0.10 | 0.21 | 1.15 | 0.09 | 2.59 | 0.84 | | 1.21 | 1.28 | |
| Uniform Delay, d1 | 17.6 | 20.8 | 16.5 | 16.6 | 28.3 | 19.4 | 26.0 | 23.6 | | 26.0 | 26.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.56 | 1.41 | 2.63 | 0.72 | 0.68 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.1 | 3.9 | 0.3 | 0.1 | 85.0 | 0.3 | 739.6 | 6.1 | | 148.6 | 137.1 | |
| Delay (s) | 27.7 | 24.7 | 16.8 | 26.0 | 125.0 | 51.3 | 758.4 | 22.3 | | 174.6 | 163.1 | |
| Level of Service | C | C | B | C | F | D | F | C | | F | C | |
| Approach Delay (s) | | 24.1 | | | 107.3 | | | 225.0 | | | 164.8 | |
| Approach LOS | | C | | | F | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 131.8 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.77 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | 13.5 | | | | | |
| Intersection Capacity Utilization | 120.5% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |























HCM Signalized Intersection Capacity Analysis
9: West Grand Avenue & Telegraph Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 27 | 702 | 32 | 19 | 893 | 141 | 95 | 566 | 33 | 143 | 431 | 106 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.92 | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1761 | 3329 | | 1770 | 1845 | | 1761 | 1792 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | | 0.95 | 1.00 | | 0.41 | 1.00 | |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 306 | 3329 | | 1770 | 1845 | | 754 | 1792 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 29 | 763 | 35 | 21 | 971 | 153 | 103 | 615 | 36 | 155 | 454 | 115 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 14 | 0 | 0 | 2 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 29 | 763 | 10 | 21 | 1110 | 0 | 103 | 649 | 0 | 155 | 560 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | 10 | | | | 28 |
| Turn Type | Perm | | Perm | Perm | | | Prot | 5 | 2 | Perm | | 6 |
| Protected Phases | 4 | 4 | | 4 | 4 | | | | | 6 | | |
| Permitted Phases | 4 | 4 | | 4 | | 4 | | | | 6 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.2 | 50.3 | | 37.6 | 37.6 | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.2 | 50.3 | | 37.6 | 37.6 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | | 0.10 | 0.59 | | 0.44 | 0.44 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 87 | 948 | | 171 | 1092 | | 334 | 793 | |
| v/s Ratio Prot | | 0.22 | | | c0.33 | | 0.06 | c0.35 | | | c0.31 | |
| v/s Ratio Perm | 0.09 | | 0.01 | 0.07 | | | | | | 0.21 | | |
| v/c Ratio | 0.33 | 0.78 | 0.02 | 0.24 | 1.17 | | 0.60 | 0.59 | | 0.46 | 0.71 | |
| Uniform Delay, d1 | 24.0 | 28.0 | 21.9 | 23.3 | 30.4 | | 36.8 | 10.9 | | 16.6 | 19.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.19 | 1.23 | |
| Incremental Delay, d2 | 9.7 | 6.2 | 0.1 | 6.5 | 88.1 | | 4.1 | 2.4 | | 1.6 | 1.8 | |
| Delay (s) | 33.7 | 34.2 | 22.0 | 29.8 | 118.5 | | 40.9 | 13.3 | | 21.4 | 25.4 | |
| Level of Service | C | C | C | C | F | | D | B | | C | C | |
| Approach Delay (s) | | 33.7 | | | 116.9 | | | 17.1 | | | 24.5 | |
| Approach LOS | | C | | | F | | | B | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 55.7 | | | HCM Level of Service | | | E | | | | | |
| HCM Volume to Capacity ratio | 0.89 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | 16.5 | | | | | |
| Intersection Capacity Utilization | 82.9% | | | ICU Level of Service | | | E | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
20: 20th Street & Telegraph Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  |  |  |  |  |  |  |  |
| Volume (vph) | 29 | 169 | 30 | 12 | 218 | 227 | 26 | 657 | 31 | 41 | 180 | 64 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.98 | 1.00 | | | 1.00 | 1.00 | 0.98 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1738 | 1800 | | | 1856 | 1527 | 1735 | 1845 | | 1770 | 1764 | |
| Flt Permitted | 0.48 | 1.00 | | | 0.98 | 1.00 | 0.60 | 1.00 | | 0.14 | 1.00 | |
| Satd. Flow (perm) | 880 | 1800 | | | 1820 | 1527 | 1087 | 1845 | | 268 | 1764 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 |
| Adj. Flow (vph) | 32 | 184 | 33 | 13 | 237 | 247 | 28 | 714 | 34 | 42 | 196 | 70 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 189 | 0 | 2 | 0 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 32 | 204 | 0 | 0 | 250 | 58 | 28 | 746 | 0 | 42 | 249 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | 25 | | | | 3 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | pm+pt | | 1 | 6 |
| Protected Phases | | 4 | | | 8 | | 8 | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | | 2 | | | | |
| Actuated Green, G (s) | 14.2 | 14.2 | | | 14.2 | 14.2 | 29.9 | 29.9 | | 36.8 | 36.8 | |
| Effective Green, g (s) | 14.2 | 14.2 | | | 14.2 | 14.2 | 29.9 | 29.9 | | 36.8 | 36.8 | |
| Actuated g/C Ratio | 0.24 | 0.24 | | | 0.24 | 0.24 | 0.50 | 0.50 | | 0.61 | 0.61 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 208 | 426 | | | 431 | 361 | 542 | 919 | | 224 | 1082 | |
| v/s Ratio Prot | | 0.11 | | | | | | c0.40 | | 0.01 | c0.14 | |
| v/s Ratio Perm | 0.04 | | | | c0.14 | 0.04 | 0.03 | | | 0.11 | | |
| v/c Ratio | 0.15 | 0.48 | | | 0.58 | 0.16 | 0.05 | 0.81 | | 0.19 | 0.23 | |
| Uniform Delay, d1 | 18.1 | 19.7 | | | 20.3 | 18.2 | 7.7 | 12.7 | | 8.7 | 5.2 | |
| Progression Factor | 1.00 | 1.00 | | | 1.02 | 1.88 | 1.00 | 0.70 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.3 | 0.9 | | | 1.2 | 0.1 | 0.2 | 7.7 | | 0.4 | 0.5 | |
| Delay (s) | 18.5 | 20.6 | | | 21.9 | 34.3 | 7.9 | 20.4 | | 9.1 | 5.7 | |
| Level of Service | B | C | | | C | C | A | C | | A | A | |
| Approach Delay (s) | | 20.3 | | | 28.1 | | | 20.0 | | | 6.2 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 19.9 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.72 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | | Sum of lost time (s) | | | | 13.5 | | | |
| Intersection Capacity Utilization | 80.1% | | | | ICU Level of Service | | | | D | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 249 | 941 | 0 | 0 | 0 | 0 | 0 | 780 | 46 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Util. Factor | | | | | 0.91 | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | | 1.00 | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | | 0.99 | | | | | | 1.00 | |
| Frt | | | | | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | | 4976 | | | | | | 5030 | |
| Flt Permitted | | | | | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | | 4976 | | | | | | 5030 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 271 | 970 | 0 | 0 | 0 | 0 | 0 | 848 | 50 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1201 | 0 | 0 | 0 | 0 | 0 | 887 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 47 | | 47 | 36 | | 36 | 29 | 29 |
| Confl. Bikes (#/hr) | | | | 3 | | | 13 | | | 9 | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2156 | | | | | | 2222 | |
| v/s Ratio Prot | | | | | | | | | | | c0.18 | |
| v/s Ratio Perm | | | | | 0.24 | | | | | | | |
| v/c Ratio | | | | | 0.56 | | | | | | 0.40 | |
| Uniform Delay, d1 | | | | | 12.7 | | | | | | 11.4 | |
| Progression Factor | | | | | 0.47 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 1.0 | | | | | | 0.5 | |
| Delay (s) | | | | | 6.9 | | | | | | 11.9 | |
| Level of Service | | | | | A | | | | | | B | |
| Approach Delay (s) | 0.0 | | | | 6.9 | | 0.0 | | | | 11.9 | |
| Approach LOS | A | | | | A | | A | | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 9.0 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.48 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | | 48.3% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |

c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 36: 12th Street & Oak St.

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1015 | 60 | 178 | 989 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.94 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1484 | | 6239 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1484 | | 6239 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 65 | 193 | 1030 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 28 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1068 | 61 | 0 | 1195 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | 121 | | 69 | | 118 | | 84 | | 84 |
| Confl. Bikes (#/hr) | | | | 3 | | | | | | | | 15 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 740 | | 2142 | | | | |
| v/s Ratio Prot | | | | | c0.21 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.04 | | 0.19 | | | | |
| v/c Ratio | | | | | 0.42 | 0.08 | | 0.56 | | | | |
| Uniform Delay, d1 | | | | | 9.6 | 7.9 | | 16.0 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.5 | 0.2 | | 1.1 | | | | |
| Delay (s) | | | | | 10.1 | 8.1 | | 17.1 | | | | |
| Level of Service | | | | | B | A | | B | | | | |
| Approach Delay (s) | 0.0 | | | | 10.0 | | | 17.1 | | | 0.0 | |
| Approach LOS | A | | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 13.6 | | | | | | | |
| HCM Volume to Capacity ratio | | | | | 0.48 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 60.0 | | | | | | 9.5 | |
| Intersection Capacity Utilization | | | | | 46.6% | | | | | | | |
| Analysis Period (min) | | | | | 15 | | | | | | | |

c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 910 | 194 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 956 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.96 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1527 | | | | | | | | 5068 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1527 | | | | | | | | 5068 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 948 | 211 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 1028 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 0 | 948 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1073 | 0 |
| Confl. Peds. (#/hr) | 20 | | | 20 | 30 | | 30 | 12 | | 12 | 17 | 17 |
| Confl. Bikes (#/hr) | | | | 5 | | | 7 | | | 3 | | |
| Turn Type | | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 585 | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.19 | | | | | | | | | 0.21 | |
| v/s Ratio Perm | | | 0.12 | | | | | | | | | |
| v/c Ratio | | 0.49 | 0.32 | | | | | | | | 0.49 | |
| Uniform Delay, d1 | | 14.0 | 13.0 | | | | | | | | 12.2 | |
| Progression Factor | | 0.77 | 0.66 | | | | | | | | 0.55 | |
| Incremental Delay, d2 | | 0.8 | 1.4 | | | | | | | | 0.7 | |
| Delay (s) | | 11.7 | 9.9 | | | | | | | | 7.4 | |
| Level of Service | | B | A | | | | | | | | A | |
| Approach Delay (s) | 11.4 | | | | | 0.0 | | 0.0 | | | 7.4 | |
| Approach LOS | B | | | | | A | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 9.4 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.49 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 11.0 | |
| Intersection Capacity Utilization | | | | 46.3% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |















c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | |  | | | | | |  | | | | | |
| Volume (vph) | 31 | 724 | 0 | 0 | 0 | 0 | 0 | 335 | 134 | 0 | 0 | 0 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | | |
| Lane Util. Factor | | 0.91 | | | | | | 0.86 | | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | | |
| Satd. Flow (prot) | | 5066 | | | | | | 6045 | | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | | |
| Satd. Flow (perm) | | 5066 | | | | | | 6045 | | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | |
| Adj. Flow (vph) | 34 | 787 | 0 | 0 | 0 | 0 | 0 | 364 | 138 | 0 | 0 | 0 | |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | |
| Lane Group Flow (vph) | 0 | 811 | 0 | 0 | 0 | 0 | 0 | 480 | 0 | 0 | 0 | 0 | |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | | 17 | 53 | | 53 | 68 | 68 | |
| Confl. Bikes (#/hr) | | | 1 | | | | 1 | | | 6 | | 2 | |
| Turn Type | Perm | | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | | |
| Permitted Phases | 2 | | | | | | | | | | | | |
| Actuated Green, G (s) | | 15.3 | | | | | | 37.7 | | | | | |
| Effective Green, g (s) | | 15.3 | | | | | | 37.7 | | | | | |
| Actuated g/C Ratio | | 0.26 | | | | | | 0.63 | | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | | |
| Lane Grp Cap (vph) | 1292 | | | | | | | 3798 | | | | | |
| v/s Ratio Prot | | | | | | | | c0.08 | | | | | |
| v/s Ratio Perm | 0.16 | | | | | | | | | | | | |
| v/c Ratio | 0.63 | | | | | | | 0.13 | | | | | |
| Uniform Delay, d1 | 19.8 | | | | | | | 4.5 | | | | | |
| Progression Factor | 1.00 | | | | | | | 1.00 | | | | | |
| Incremental Delay, d2 | 0.7 | | | | | | | 0.1 | | | | | |
| Delay (s) | 20.5 | | | | | | | 4.6 | | | | | |
| Level of Service | C | | | | | | | A | | | | | |
| Approach Delay (s) | 20.5 | | | | 0.0 | | | 4.6 | | | 0.0 | | |
| Approach LOS | C | | | | A | | | A | | | A | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | 14.5 | | HCM Level of Service | | | | | | B | | | | |
| HCM Volume to Capacity ratio | 0.27 | | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | Sum of lost time (s) | | | | | | 7.0 | | | | |
| Intersection Capacity Utilization | 41.0% | | ICU Level of Service | | | | | | A | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | | |
| c. Critical Lane Group | | | | | | | | | | | | | |














HCM Signalized Intersection Capacity Analysis 5: 27th Street & Telegraph Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|----------------------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 394 | 444 | 164 | 50 | 299 | 122 | 100 | 419 | 26 | 55 | 406 | 154 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1769 | 1863 | 1546 | 1765 | 1863 | 1519 | 1764 | 1842 | | 1766 | 1776 | |
| Flt Permitted | 0.33 | 1.00 | 1.00 | 0.38 | 1.00 | 1.00 | 0.13 | 1.00 | | 0.27 | 1.00 | |
| Satd. Flow (perm) | 618 | 1863 | 1546 | 703 | 1863 | 1519 | 243 | 1842 | | 495 | 1776 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 428 | 483 | 178 | 54 | 325 | 133 | 104 | 455 | 28 | 60 | 441 | 167 |
| RTOR Reduction (vph) | 0 | 0 | 102 | 0 | 0 | 89 | 0 | 3 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 428 | 483 | 76 | 54 | 325 | 44 | 104 | 480 | 0 | 60 | 592 | 0 |
| Confl. Peds. (#/hr) | 1 | | 1 | 8 | | 8 | 12 | | 12 | 6 | | 6 |
| Confl. Bikes (#/hr) | | | 2 | | | 5 | | | 27 | | | 6 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | 2 | | 6 | |
| Permitted Phases | 4 | 4 | | 8 | | 8 | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 44.7 | 36.3 | 36.3 | 32.2 | 28.3 | 28.3 | 31.3 | 31.3 | | 31.3 | 31.3 | |
| Effective Green, g (s) | 44.7 | 36.3 | 36.3 | 32.2 | 28.3 | 28.3 | 31.3 | 31.3 | | 31.3 | 31.3 | |
| Actuated g/C Ratio | 0.53 | 0.43 | 0.43 | 0.38 | 0.33 | 0.33 | 0.37 | 0.37 | | 0.37 | 0.37 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 486 | 796 | 660 | 315 | 620 | 506 | 89 | 678 | | 182 | 654 | |
| v/s Ratio Prot | c0.12 | 0.26 | | 0.01 | 0.17 | | | 0.26 | | | 0.33 | |
| v/s Ratio Perm | c0.34 | | 0.05 | 0.06 | | 0.03 | c0.43 | | | 0.12 | | |
| v/c Ratio | 0.88 | 0.61 | 0.12 | 0.17 | 0.52 | 0.09 | 1.17 | 0.71 | | 0.33 | 0.90 | |
| Uniform Delay, d1 | 15.2 | 18.8 | 14.7 | 17.2 | 22.9 | 19.5 | 26.8 | 23.0 | | 19.3 | 25.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.70 | 0.63 | 0.24 | 1.03 | 1.02 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 16.4 | 3.4 | 0.4 | 0.1 | 3.1 | 0.3 | 141.9 | 2.5 | | 0.4 | 15.7 | |
| Delay (s) | 31.6 | 22.3 | 15.0 | 12.2 | 17.5 | 5.0 | 169.6 | 25.9 | | 19.7 | 41.1 | |
| Level of Service | C | C | B | B | B | A | F | C | | B | D | |
| Approach Delay (s) | | 24.8 | | | 13.7 | | | 51.4 | | | 39.2 | |
| Approach LOS | | C | | | B | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 31.6 | | | HCM Level of Service | | | | | C | | | |
| HCM Volume to Capacity ratio | 0.99 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 10.0 | | | |
| Intersection Capacity Utilization | 92.9% | | | ICU Level of Service | | | | | F | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |














HCM Signalized Intersection Capacity Analysis 9: West Grand Avenue & Telegraph Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  | | | | | | | | | | | |
| Volume (vph) | 125 | 1019 | 410 | 79 | 494 | 78 | 232 | 302 | 35 | 132 | 423 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.92 | 1.00 | 1.00 | 0.92 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1765 | 3427 | 1553 | 1770 | 3340 | | 1770 | 1828 | | 1757 | 1807 | |
| Flt Permitted | 0.26 | 1.00 | 1.00 | 0.16 | 1.00 | | 0.95 | 1.00 | | 0.55 | 1.00 | |
| Satd. Flow (perm) | 475 | 3427 | 1553 | 297 | 3340 | | 1770 | 1828 | | 1014 | 1807 | |
| Peak-hour factor, PHF | 0.92 | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 136 | 1061 | 446 | 86 | 537 | 85 | 252 | 318 | 38 | 143 | 460 | 97 |
| RTOR Reduction (vph) | 0 | 0 | 314 | 0 | 14 | 0 | 0 | 3 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 136 | 1061 | 132 | 86 | 608 | 0 | 252 | 353 | 0 | 143 | 548 | 0 |
| Confl. Peds. (#/hr) | 4 | | 4 | 4 | | 4 | 4 | | 4 | 11 | | 11 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | Perm | | | Prot | 5 | | Perm | | |
| Protected Phases | | 4 | | | 4 | | | 5 | 2 | | 6 | |
| Permitted Phases | 4 | 4 | | 4 | | | | 5 | | 6 | | |
| Actuated Green, G (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 12.9 | 49.4 | | 32.0 | 32.0 | |
| Effective Green, g (s) | 25.1 | 25.1 | 25.1 | 25.1 | 25.1 | | 12.9 | 49.4 | | 32.0 | 32.0 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | | 0.15 | 0.58 | | 0.38 | 0.38 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 140 | 1012 | 459 | 88 | 986 | | 269 | 1062 | | 382 | 680 | |
| v/s Ratio Prot | | c0.31 | | | 0.18 | | c0.14 | 0.19 | | | c0.30 | |
| v/s Ratio Perm | 0.29 | | 0.08 | 0.29 | | | | | | 0.14 | | |
| v/c Ratio | 0.97 | 1.05 | 0.29 | 0.98 | 0.62 | | 0.94 | 0.33 | | 0.37 | 0.81 | |
| Uniform Delay, d1 | 29.6 | 30.0 | 23.1 | 29.7 | 25.8 | | 35.6 | 9.2 | | 19.2 | 23.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.92 | 0.99 | |
| Incremental Delay, d2 | 68.8 | 41.8 | 1.6 | 89.9 | 2.9 | | 37.4 | 0.8 | | 2.2 | 8.0 | |
| Delay (s) | 98.4 | 71.8 | 24.6 | 119.5 | 28.7 | | 73.1 | 10.1 | | 19.9 | 31.5 | |
| Level of Service | F | E | C | F | C | | E | B | | B | C | |
| Approach Delay (s) | 61.2 | | | 39.7 | | | 36.2 | | | 29.1 | | |
| Approach LOS | E | | | D | | | D | | | C | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 46.8 | | | HCM Level of Service | | | | | D | | | |
| HCM Volume to Capacity ratio | 0.92 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 85.0 | | | Sum of lost time (s) | | | | | 15.0 | | | |
| Intersection Capacity Utilization | 89.5% | | | ICU Level of Service | | | | | E | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 20: 20th Street & Telegraph Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations |  | | | | | | | | | | | | |
| Volume (vph) | 22 | 116 | | 24 | 15 | 237 | 125 | 40 | 547 | 51 | 193 | 194 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1760 | 1803 | | | | 1855 | 1538 | 1759 | 1833 | | 1770 | 1773 | |
| Flt Permitted | 0.45 | 1.00 | | | | 0.98 | 1.00 | 0.58 | 1.00 | | 0.15 | 1.00 | |
| Satd. Flow (perm) | 835 | 1803 | | | | 1819 | 1538 | 1081 | 1833 | | 283 | 1773 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 24 | 126 | | 26 | 16 | 252 | 136 | 43 | 558 | 55 | 210 | 211 | 76 |
| RTOR Reduction (vph) | 0 | 14 | | 0 | 0 | 0 | 103 | 0 | 5 | 0 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 24 | 138 | | 0 | 0 | 268 | 33 | 43 | 608 | 0 | 210 | 270 | 0 |
| Confl. Peds. (#/hr) | 10 | | | 10 | 19 | | 19 | 5 | | 5 | 4 | 4 | |
| Confl. Bikes (#/hr) | | | | 4 | | | 1 | | | 3 | | | 9 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | | | |
| Protected Phases | | 4 | | | 8 | | 2 | | 2 | | 1 | | 6 |
| Permitted Phases | 4 | | | | 8 | | 2 | | | 6 | | | 6 |
| Actuated Green, G (s) | 14.4 | 14.4 | | | 14.4 | 14.4 | 24.1 | 24.1 | 24.1 | 36.6 | 36.6 | | |
| Effective Green, g (s) | 14.4 | 14.4 | | | 14.4 | 14.4 | 24.1 | 24.1 | 24.1 | 36.6 | 36.6 | | |
| Actuated g/C Ratio | 0.24 | 0.24 | | | 0.24 | 0.24 | 0.40 | 0.40 | 0.40 | 0.61 | 0.61 | | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | 200 | 433 | | | 437 | 369 | 434 | 736 | 361 | 371 | 1082 | | |
| v/s Ratio Prot | | 0.08 | | | | | | c0.33 | | c0.08 | 0.15 | | |
| v/s Ratio Perm | 0.03 | | | | c0.15 | 0.02 | 0.04 | | | 0.27 | | | |
| v/c Ratio | 0.12 | 0.32 | | | 0.61 | 0.09 | 0.10 | 0.83 | | 0.57 | 0.25 | | |
| Uniform Delay, d1 | 17.8 | 18.8 | | | 20.3 | 17.7 | 11.2 | 16.1 | | 9.1 | 5.4 | | |
| Progression Factor | 1.00 | 1.00 | | | 1.04 | 1.60 | 1.00 | 1.00 | | 1.00 | 1.00 | | |
| Incremental Delay, d2 | 0.3 | 0.4 | | | 2.3 | 0.1 | 0.5 | 10.2 | | 2.0 | 0.6 | | |
| Delay (s) | 18.1 | 19.2 | | | 23.4 | 28.5 | 11.6 | 26.3 | | 11.0 | 5.9 | | |
| Level of Service | B | B | | | C | C | B | C | | B | A | | |
| Approach Delay (s) | | 19.0 | | | 25.1 | | | 25.3 | | | 8.1 | | |
| Approach LOS | | B | | | C | | | C | | | A | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | 19.7 | | | | HCM Level of Service | | | | B | | | | |
| HCM Volume to Capacity ratio | 0.72 | | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | | Sum of lost time (s) | | | | 13.5 | | | | |
| Intersection Capacity Utilization | 78.6% | | | | ICU Level of Service | | | | D | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th St. & Madison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 478 | 1728 | 0 | 0 | 0 | 0 | 0 | 603 | 104 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.5 | | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.91 | | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | 1.00 | | | | | | | 0.99 | |
| Flpb, ped/bikes | | | | 0.99 | | | | | | | 1.00 | |
| Frt | | | | 1.00 | | | | | | | 0.98 | |
| Flt Protected | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 4992 | | | | | | | 4935 | |
| Flt Permitted | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 4992 | | | | | | | 4935 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 520 | 1781 | 0 | 0 | 0 | 0 | 0 | 615 | 113 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 84 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 2217 | 0 | 0 | 0 | 0 | 0 | 0 | 726 | 0 |
| Confl. Peds. (#/hr) | 48 | | | 48 | 30 | | 30 | 54 | | 54 | 27 | 27 |
| Confl. Bikes (#/hr) | | | | 9 | | | 5 | | | 4 | | 1 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2163 | | | | | | 2180 | |
| v/s Ratio Prot | | | | | | | | | | | c0.15 | |
| v/s Ratio Perm | | | | | 0.44 | | | | | | | |
| v/c Ratio | | | | | 1.02 | | | | | | 0.33 | |
| Uniform Delay, d1 | | | | | 17.0 | | | | | | 11.0 | |
| Progression Factor | | | | | 0.48 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 21.9 | | | | | | 0.4 | |
| Delay (s) | | | | | 30.1 | | | | | | 11.4 | |
| Level of Service | | | | | C | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 30.1 | | | 0.0 | | | 11.4 | |
| Approach LOS | | A | | | C | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 25.6 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.68 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | | | | 66.3% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 36: 12th St. & Oak St.

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1936 | 89 | 374 | 932 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.91 | 1.00 | | 0.86 | | | | |
| Frpb, ped/bikes | | | | | 1.00 | 0.93 | | 1.00 | | | | |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | | 0.98 | | | | |
| Frt | | | | | 1.00 | 0.85 | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 5085 | 1467 | | 6167 | | | | |
| Flt Permitted | | | | | 1.00 | 1.00 | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 5085 | 1467 | | 6167 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1996 | 97 | 402 | 1013 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1996 | 92 | 0 | 1414 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | | | | 102 | | 84 | | 84 | | 168 | | 168 |
| Confl. Bikes (#/hr) | | | | 1 | | | | | | | | 1 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 731 | | 2117 | | | | |
| v/s Ratio Prot | | | | | c0.39 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.06 | | 0.23 | | | | |
| v/c Ratio | | | | | 0.79 | 0.13 | | 0.67 | | | | |
| Uniform Delay, d1 | | | | | 12.4 | 8.1 | | 16.8 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 2.6 | 0.4 | | 1.7 | | | | |
| Delay (s) | | | | | 15.0 | 8.4 | | 18.5 | | | | |
| Level of Service | | | | | B | A | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 14.7 | | | 18.5 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 16.2 | | | | | | | |
| HCM Volume to Capacity ratio | | | | | 0.74 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 60.0 | | | | | | 9.5 | |
| Intersection Capacity Utilization | | | | | 72.7% | | | | | | | |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 457 | 174 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 961 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.95 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1503 | | | | | | | | 5063 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1503 | | | | | | | | 5063 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 497 | 189 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 1012 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 497 | 163 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1069 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 21 | | 21 | 23 | | 23 | 17 | 17 |
| Confl. Bikes (#/hr) | | | | 10 | | | 10 | | | 2 | | 3 |
| Turn Type | | | | Perm | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 576 | | | | | | | | 2194 | |
| v/s Ratio Prot | | 0.10 | | | | | | | | | 0.21 | |
| v/s Ratio Perm | | | c0.11 | | | | | | | | | |
| v/c Ratio | | 0.26 | 0.28 | | | | | | | | 0.49 | |
| Uniform Delay, d1 | | 12.6 | 12.8 | | | | | | | | 12.2 | |
| Progression Factor | | 0.72 | 0.64 | | | | | | | | 0.90 | |
| Incremental Delay, d2 | | 0.3 | 1.2 | | | | | | | | 0.6 | |
| Delay (s) | | 9.4 | 9.5 | | | | | | | | 11.6 | |
| Level of Service | | A | A | | | | | | | | B | |
| Approach Delay (s) | | 9.4 | | | | 0.0 | | 0.0 | | | 11.6 | |
| Approach LOS | | A | | | | A | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 10.8 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.39 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 11.0 | |
| Intersection Capacity Utilization | | | | 43.2% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|----------------------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | 411 | | | | | | 111 | | | | |
| Volume (vph) | 133 | 463 | 0 | 0 | 0 | 0 | 0 | 460 | 68 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.91 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Flpb, ped/bikes | | 0.99 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.98 | | | | |
| Flt Protected | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 4982 | | | | | | 6259 | | | | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 4982 | | | | | | 6259 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 145 | 498 | 0 | 0 | 0 | 0 | 0 | 500 | 74 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 118 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 525 | 0 | 0 | 0 | 0 | 0 | 551 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 56 | | | 56 | 21 | | 21 | 52 | 52 |
| Confl. Bikes (#/hr) | | | 2 | | | | 2 | | | 5 | | |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | 4 | | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 11.3 | | | | | | 41.7 | | | | |
| Effective Green, g (s) | | 11.3 | | | | | | 41.7 | | | | |
| Actuated g/C Ratio | | 0.19 | | | | | | 0.70 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | 938 | | | | | | | 4350 | | | | |
| v/s Ratio Prot | | | | | | | | 0.09 | | | | |
| v/s Ratio Perm | 0.11 | | | | | | | | | | | |
| v/c Ratio | 0.56 | | | | | | | 0.13 | | | | |
| Uniform Delay, d1 | 22.1 | | | | | | | 3.1 | | | | |
| Progression Factor | 1.08 | | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | 0.3 | | | | | | | 0.1 | | | | |
| Delay (s) | 24.1 | | | | | | | 3.1 | | | | |
| Level of Service | C | | | | | | | A | | | | |
| Approach Delay (s) | 24.1 | | | | 0.0 | | | 3.1 | | | 0.0 | |
| Approach LOS | C | | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 14.2 | | HCM Level of Service | | | | | | B | | | |
| HCM Volume to Capacity ratio | 0.22 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | Sum of lost time (s) | | | | | | 7.0 | | | |
| Intersection Capacity Utilization | 40.3% | | ICU Level of Service | | | | | | A | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 5: 27th Street & Telegraph Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|--------|------|-------|-------|------|-------|------|------|-------|-------|------|
| Lane Configurations | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Volume (vph) | 239 | 465 | 156 | 73 | 734 | 131 | 238 | 582 | 54 | 154 | 537 | 405 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.98 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1534 | 1769 | 1863 | 1531 | 1770 | 1833 | | 1766 | 1715 | |
| Flt Permitted | 0.12 | 1.00 | 1.00 | 0.28 | 1.00 | 1.00 | 0.12 | 1.00 | | 0.12 | 1.00 | |
| Satd. Flow (perm) | 230 | 1863 | 1534 | 513 | 1863 | 1531 | 226 | 1833 | | 225 | 1715 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 260 | 505 | 170 | 79 | 798 | 142 | 259 | 633 | 59 | 167 | 584 | 440 |
| RTOR Reduction (vph) | 0 | 0 | 104 | 0 | 0 | 81 | 0 | 4 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 260 | 505 | 66 | 79 | 798 | 61 | 259 | 688 | 0 | 167 | 992 | 0 |
| Confl. Peds. (#/hr) | 4 | 4 | 1 | | | 1 | 17 | | 17 | 10 | | 10 |
| Confl. Bikes (#/hr) | | | | 4 | | | 10 | | | | | 28 |
| Turn Type | pm+pt | | | Perm | pm+pt | | Perm | Perm | | Perm | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | | | 6 | 6 | |
| Permitted Phases | 4 | 4 | | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Effective Green, g (s) | 43.0 | 32.9 | 32.9 | 33.5 | 27.9 | 27.9 | 33.0 | 33.0 | | 33.0 | 33.0 | |
| Actuated g/C Ratio | 0.51 | 0.39 | 0.39 | 0.39 | 0.33 | 0.33 | 0.39 | 0.39 | | 0.39 | 0.39 | |
| Clearance Time (s) | 4.5 | 3.5 | 3.5 | 4.5 | 3.5 | 3.5 | 5.5 | 5.5 | | 5.5 | 5.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 308 | 721 | 594 | 285 | 612 | 503 | 88 | 712 | | 87 | 666 | |
| v/s Ratio Prot | c0.11 | 0.27 | | 0.02 | c0.43 | | | 0.38 | | | 0.58 | |
| v/s Ratio Perm | 0.32 | | 0.04 | 0.09 | | 0.04 | c1.15 | | | 0.74 | | |
| v/c Ratio | 0.84 | 0.70 | 0.11 | 0.28 | 1.30 | 0.12 | 2.94 | 0.97 | | 1.92 | 1.49 | |
| Uniform Delay, d1 | 19.8 | 21.9 | 16.7 | 17.2 | 28.6 | 20.0 | 26.0 | 25.5 | | 26.0 | 26.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.53 | 1.38 | 2.24 | 0.74 | 0.73 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 17.9 | 5.6 | 0.4 | 0.2 | 146.8 | 0.4 | 893.4 | 18.9 | | 453.2 | 228.3 | |
| Delay (s) | 37.8 | 27.5 | 17.1 | 26.5 | 186.1 | 45.2 | 912.7 | 37.4 | | 479.2 | 254.3 | |
| Level of Service | D | C | B | C | F | D | F | D | | F | F | |
| Approach Delay (s) | 28.5 | | | 154.1 | | | 275.8 | | | 285.9 | | |
| Approach LOS | C | | | F | | | F | | | F | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 192.0 | | | | | | | F | | | |
| HCM Volume to Capacity ratio | | 2.00 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 85.0 | | | | | | 13.5 | | | | |
| Intersection Capacity Utilization | | 134.7% | | | | | | H | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |





















HCM Signalized Intersection Capacity Analysis 9: West Grand Avenue & Telegraph Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|-------|------|------|-------|------|------|-------|------|
| Lane Configurations | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Volume (vph) | 31 | 800 | 36 | 21 | 1010 | 157 | 110 | 651 | 39 | 164 | 499 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.92 | 1.00 | 1.00 | 0.92 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | 1.00 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | 1.00 | 0.99 | 1.00 | | 0.99 | 1.00 | 0.97 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3427 | 1532 | 1763 | 3330 | 1770 | 1845 | 1763 | | 1763 | 1792 | |
| Flt Permitted | 0.17 | 1.00 | 1.00 | 0.17 | 1.00 | 0.95 | 1.00 | 0.32 | | 0.32 | 1.00 | |
| Satd. Flow (perm) | 308 | 3427 | 1532 | 307 | 3330 | 1770 | 1845 | 599 | | 1792 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.92 |
| Adj. Flow (vph) | 34 | 870 | 39 | 23 | 1098 | 171 | 120 | 708 | 42 | 178 | 525 | 134 |
| RTOR Reduction (vph) | 0 | 0 | 28 | 0 | 14 | 0 | 0 | 2 | 0 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 34 | 870 | 11 | 23 | 1255 | 0 | 120 | 748 | 0 | 178 | 649 | 0 |
| Confl. Peds. (#/hr) | 12 | | 12 | 18 | | 18 | 3 | | 3 | 12 | | 12 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | 10 | | | | 28 |
| Turn Type | Perm | | Perm | Perm | | Prot | | Perm | | | | |
| Protected Phases | | 4 | | 4 | | 5 | | 2 | | 6 | 6 | |
| Permitted Phases | 4 | 4 | | 4 | | 4 | | 6 | | 6 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.6 | 50.3 | | 37.2 | 37.2 | |
| Effective Green, g (s) | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | | 8.6 | 50.3 | | 37.2 | 37.2 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | | 0.10 | 0.59 | | 0.44 | 0.44 | |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lane Grp Cap (vph) | 88 | 976 | 436 | 87 | 948 | | 179 | 1092 | | 262 | 784 | |
| v/s Ratio Prot | | 0.25 | | | c0.38 | | 0.07 | c0.41 | | | c0.36 | |
| v/s Ratio Perm | 0.11 | | 0.01 | 0.07 | | | | 0.30 | | | | |
| v/c Ratio | 0.39 | 0.89 | 0.03 | 0.26 | 1.32 | | 0.67 | 0.68 | | 0.68 | 0.83 | |
| Uniform Delay, d1 | 24.4 | 29.1 | 21.9 | 23.5 | 30.4 | | 36.8 | 11.9 | | 19.1 | 21.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.20 | 1.22 | |
| Incremental Delay, d2 | 12.3 | 12.1 | 0.1 | 7.3 | 153.0 | | 7.5 | 3.5 | | 1.3 | 1.0 | |
| Delay (s) | 36.8 | 41.3 | 22.0 | 30.8 | 183.4 | | 44.3 | 15.4 | | 24.3 | 26.7 | |
| Level of Service | D | D | C | C | F | | D | B | | C | C | |
| Approach Delay (s) | 40.3 | | | 180.7 | | | 19.4 | | | 26.1 | | |
| Approach LOS | D | | | F | | | B | | | C | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 78.7 | | | | | | | E | | | |
| HCM Volume to Capacity ratio | | 1.02 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 85.0 | | | | | | 16.5 | | | | |
| Intersection Capacity Utilization | | 92.6% | | | | | | F | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 20: 20th Street & Telegraph Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  |  |  | |  |  |  | |
| Volume (vph) | 35 | 206 | | 37 | 14 | 262 | 271 | 32 | 807 | 37 | 50 | 221 |
| Ideal Flow (vphpl) | 1900 | 1900 | | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 |
| Lane Util. Factor | 1.00 | 1.00 | | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 0.99 | | | | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 |
| Flpb, ped/bikes | 0.98 | 1.00 | | | | 1.00 | 1.00 | 0.98 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 0.98 | | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.96 |
| Flt Protected | 0.95 | 1.00 | | | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1741 | 1800 | | | | 1856 | 1527 | 1738 | 1845 | | 1770 | 1764 |
| Flt Permitted | 0.42 | 1.00 | | | | 0.98 | 1.00 | 0.56 | 1.00 | | 0.13 | 1.00 |
| Satd. Flow (perm) | 761 | 1800 | | | | 1818 | 1527 | 1032 | 1845 | | 234 | 1764 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 38 | 224 | 40 | 15 | 285 | 295 | 35 | 877 | 40 | 52 | 240 | 85 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 179 | 0 | 2 | 0 | 0 | 17 | 0 |
| Lane Group Flow (vph) | 38 | 251 | 0 | 0 | 300 | 116 | 35 | 915 | 0 | 52 | 308 | 0 |
| Confl. Peds. (#/hr) | 32 | | 32 | 24 | | 24 | 16 | | 16 | 19 | | 19 |
| Confl. Bikes (#/hr) | | | 6 | | | 4 | | 25 | | | | 3 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | pm+pt | | |
| Protected Phases | | 4 | | | 8 | | 8 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | | 8 | | 8 | 2 | | 6 | | |
| Actuated Green, G (s) | 15.6 | 15.6 | | | 15.6 | 15.6 | 27.3 | 27.3 | | 35.4 | 35.4 | |
| Effective Green, g (s) | 15.6 | 15.6 | | | 15.6 | 15.6 | 27.3 | 27.3 | | 35.4 | 35.4 | |
| Actuated g/C Ratio | 0.26 | 0.26 | | | 0.26 | 0.26 | 0.46 | 0.46 | | 0.59 | 0.59 | |
| Clearance Time (s) | 4.5 | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 198 | 468 | | | 473 | 397 | 470 | 839 | | 230 | 1041 | |
| v/s Ratio Prot | | 0.14 | | | | | | c0.50 | | 0.01 | c0.17 | |
| v/s Ratio Perm | 0.05 | | | | c0.17 | 0.08 | 0.03 | | | 0.12 | | |
| v/c Ratio | 0.19 | 0.54 | | | 0.63 | 0.29 | 0.07 | 1.09 | | 0.23 | 0.30 | |
| Uniform Delay, d1 | 17.3 | 19.1 | | | 19.7 | 17.8 | 9.2 | 16.3 | | 11.8 | 6.1 | |
| Progression Factor | 1.00 | 1.00 | | | 1.02 | 1.37 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.5 | 1.2 | | | 1.4 | 0.5 | 0.3 | 58.6 | | 0.5 | 0.7 | |
| Delay (s) | 17.8 | 20.3 | | | 21.6 | 24.2 | 9.5 | 75.0 | | 12.3 | 6.8 | |
| Level of Service | B | C | | | C | C | A | E | | B | A | |
| Approach Delay (s) | | 20.0 | | | 23.0 | | | 72.6 | | | 7.6 | |
| Approach LOS | | B | | | C | | | E | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 41.2 | | | | HCM Level of Service | | | | D | | | |
| HCM Volume to Capacity ratio | 0.89 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | | Sum of lost time (s) | | | | 13.5 | | | |
| Intersection Capacity Utilization | 91.2% | | | | ICU Level of Service | | | | F | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 35: 12th Street & Madison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 290 | 1096 | 0 | 0 | 0 | 0 | 0 | 895 | 57 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 3.5 | | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.91 | | | | | | | 0.91 | |
| Frpb, ped/bikes | | | | 1.00 | | | | | | | 1.00 | |
| Flpb, ped/bikes | | | | 0.99 | | | | | | | 1.00 | |
| Frt | | | | 1.00 | | | | | | | 0.99 | |
| Flt Protected | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 4976 | | | | | | | 5026 | |
| Flt Permitted | | | | 0.99 | | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 4976 | | | | | | | 5026 | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 315 | 1130 | 0 | 0 | 0 | 0 | 0 | 973 | 62 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1418 | 0 | 0 | 0 | 0 | 0 | 1023 | 0 |
| Confl. Peds. (#/hr) | 32 | | | 32 | 47 | | 47 | 36 | | 36 | 29 | 29 |
| Confl. Bikes (#/hr) | | | | 3 | | | 13 | | | 9 | | 2 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 6 | | | | | | 4 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 6 | 26.0 | | | | | | 26.5 | |
| Effective Green, g (s) | | | | | 26.0 | | | | | | 26.5 | |
| Actuated g/C Ratio | | | | | 0.43 | | | | | | 0.44 | |
| Clearance Time (s) | | | | | 3.5 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | | 2156 | | | | | | 2220 | |
| v/s Ratio Prot | | | | | | | | | | | c0.20 | |
| v/s Ratio Perm | | | | | 0.29 | | | | | | | |
| v/c Ratio | | | | | 0.66 | | | | | | 0.46 | |
| Uniform Delay, d1 | | | | | 13.5 | | | | | | 11.7 | |
| Progression Factor | | | | | 0.66 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | | 1.3 | | | | | | 0.7 | |
| Delay (s) | | | | | 10.2 | | | | | | 12.4 | |
| Level of Service | | | | | B | | | | | | B | |
| Approach Delay (s) | 0.0 | | | | 10.2 | | | 0.0 | | | 12.4 | |
| Approach LOS | A | | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 11.2 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.56 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 7.5 | |
| Intersection Capacity Utilization | 54.6% | | | | ICU Level of Service | | | | | | A | |
| Analysis Period (min) | | | | 15 | | | | | | | | |

c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 36: 12th Street & Oak St.

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1183 | 70 | 436 | 1152 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.5 | 5.5 | | | 4.0 | | | | |
| Lane Util. Factor | | | | 0.91 | 1.00 | | | 0.86 | | | | |
| Frpb, ped/bikes | | | | 1.00 | 0.94 | | | 1.00 | | | | |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | | 0.97 | | | | |
| Frt | | | | 1.00 | 0.85 | | | 1.00 | | | | |
| Flt Protected | | | | 1.00 | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | 5085 | 1484 | | | 6107 | | | | |
| Flt Permitted | | | | 1.00 | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | 5085 | 1484 | | | 6107 | | | | |
| Peak-hour factor, PHF | 0.25 | 0.25 | 0.25 | 0.25 | 0.95 | 0.92 | 0.92 | 0.96 | 0.25 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1245 | 76 | 474 | 1200 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 16 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1245 | 74 | 0 | 1658 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 121 | | | 121 | 69 | | 69 | 118 | | 118 | 84 | 84 |
| Confl. Bikes (#/hr) | | | | 3 | | | | | | | | 15 |
| Turn Type | | | | | Perm | Perm | | | | | | |
| Protected Phases | | | | | 6 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Effective Green, g (s) | | | | | 29.9 | 29.9 | | 20.6 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | 0.50 | | 0.34 | | | | |
| Clearance Time (s) | | | | | 5.5 | 5.5 | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 2534 | 740 | | 2097 | | | | |
| v/s Ratio Prot | | | | | c0.24 | | | | | | | |
| v/s Ratio Perm | | | | | | 0.05 | | 0.27 | | | | |
| v/c Ratio | | | | | 0.49 | 0.10 | | 0.79 | | | | |
| Uniform Delay, d1 | | | | | 10.0 | 7.9 | | 17.8 | | | | |
| Progression Factor | | | | | 1.00 | 1.00 | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.7 | 0.3 | | 3.1 | | | | |
| Delay (s) | | | | | 10.7 | 8.2 | | 20.9 | | | | |
| Level of Service | | | | | B | A | | C | | | | |
| Approach Delay (s) | 0.0 | | | | 10.5 | | | 20.9 | | | 0.0 | |
| Approach LOS | A | | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 16.3 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.61 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 9.5 | |
| Intersection Capacity Utilization | 61.6% | | | | ICU Level of Service | | | | | | B | |
| Analysis Period (min) | | | | 15 | | | | | | | | |

c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 38: 11th Street & Madison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 1295 | 226 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1100 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Util. Factor | | 0.91 | 1.00 | | | | | | | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 0.96 | | | | | | | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Frt | | 1.00 | 0.85 | | | | | | | | 1.00 | |
| Flt Protected | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (prot) | | 5085 | 1527 | | | | | | | | 5068 | |
| Flt Permitted | | 1.00 | 1.00 | | | | | | | | 1.00 | |
| Satd. Flow (perm) | | 5085 | 1527 | | | | | | | | 5068 | |
| Peak-hour factor, PHF | 0.25 | 0.96 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.93 | 0.25 |
| Adj. Flow (vph) | 0 | 1349 | 246 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 1183 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 1349 | 231 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1244 | 0 |
| Confl. Peds. (#/hr) | 20 | | | 20 | 30 | | 30 | 12 | | 12 | 17 | 17 |
| Confl. Bikes (#/hr) | | 5 | | | | | 7 | | | 3 | | |
| Turn Type | | Perm | | | | | | | | Perm | | |
| Protected Phases | | 2 | | | | | | | | | 4 | |
| Permitted Phases | | | 2 | | | | | | | | | |
| Actuated Green, G (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Effective Green, g (s) | | 23.0 | 23.0 | | | | | | | | 26.0 | |
| Actuated g/C Ratio | | 0.38 | 0.38 | | | | | | | | 0.43 | |
| Clearance Time (s) | | 5.5 | 5.5 | | | | | | | | 5.5 | |
| Lane Grp Cap (vph) | | 1949 | 585 | | | | | | | | 2196 | |
| v/s Ratio Prot | | c0.27 | | | | | | | | | 0.25 | |
| v/s Ratio Perm | | | 0.15 | | | | | | | | | |
| v/c Ratio | | 0.69 | 0.40 | | | | | | | | 0.57 | |
| Uniform Delay, d1 | | 15.5 | 13.4 | | | | | | | | 12.8 | |
| Progression Factor | | 0.79 | 0.68 | | | | | | | | 0.52 | |
| Incremental Delay, d2 | | 2.0 | 1.9 | | | | | | | | 0.9 | |
| Delay (s) | | 14.3 | 11.1 | | | | | | | | 7.6 | |
| Level of Service | | B | B | | | | | | | | A | |
| Approach Delay (s) | 13.8 | | | | | 0.0 | | 0.0 | | | 7.6 | |
| Approach LOS | B | | | | | A | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.1 | | | | | | | | | | |
| HCM Volume to Capacity ratio | | 0.63 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | | | | | | 11.0 | |
| Intersection Capacity Utilization | 56.7% | | | | | | | | | | B | |
| Analysis Period (min) | | 15 | | | | | | | | | | |













c Critical Lane Group

AECOM
AC Transit Bus Rapid Transit (BRT) Supplementary Analysis

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 39: 11th Street & Franklin Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | 4TT | | | | | | TTT | | | | |
| Volume (vph) | 35 | 844 | 0 | 0 | 0 | 0 | 0 | 387 | 156 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Lane Util. Factor | | 0.91 | | | | | | 0.86 | | | | |
| Frpb, ped/bikes | | 1.00 | | | | | | 0.98 | | | | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | | | | |
| Frt | | 1.00 | | | | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (prot) | | 5067 | | | | | | 6042 | | | | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | | | | |
| Satd. Flow (perm) | | 5067 | | | | | | 6042 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 38 | 917 | 0 | 0 | 0 | 0 | 0 | 421 | 161 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 947 | 0 | 0 | 0 | 0 | 0 | 567 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 46 | | 46 | 17 | | | 17 | 53 | | 53 | 68 | 68 |
| Confl. Bikes (#/hr) | | | 1 | | | | 1 | | | 6 | | 2 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | 2 | | | | | | | 4 | | | |
| Permitted Phases | 2 | | | | | | | | | | | |
| Actuated Green, G (s) | | 17.6 | | | | | | 35.4 | | | | |
| Effective Green, g (s) | | 17.6 | | | | | | 35.4 | | | | |
| Actuated g/C Ratio | | 0.29 | | | | | | 0.59 | | | | |
| Clearance Time (s) | | 3.5 | | | | | | 3.5 | | | | |
| Vehicle Extension (s) | | 2.0 | | | | | | 2.0 | | | | |
| Lane Grp Cap (vph) | | 1486 | | | | | | 3565 | | | | |
| v/s Ratio Prot | | | | | | | | c0.09 | | | | |
| v/s Ratio Perm | | 0.19 | | | | | | | | | | |
| v/c Ratio | | 0.64 | | | | | | 0.16 | | | | |
| Uniform Delay, d1 | | 18.4 | | | | | | 5.6 | | | | |
| Progression Factor | | 1.00 | | | | | | 1.00 | | | | |
| Incremental Delay, d2 | | 0.7 | | | | | | 0.1 | | | | |
| Delay (s) | | 19.1 | | | | | | 5.7 | | | | |
| Level of Service | | B | | | | | | A | | | | |
| Approach Delay (s) | | 19.1 | | | 0.0 | | | 5.7 | | | 0.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.0 | | | | | HCM Level of Service | | | B | | |
| HCM Volume to Capacity ratio | | 0.32 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 60.0 | | | | Sum of lost time (s) | | | 7.0 | | | |
| Intersection Capacity Utilization | | 43.4% | | | | ICU Level of Service | | | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2015 | | | | | |
|--------------|---|-----------|---------------------|-------|-------------------|--------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| Other
MTS | Telegraph between 20th St. and 27th St. | NB | 900 | 1 | 900 | C | 576 | 0.64 | E | 879 | 0.98 |
| | | SB | 900 | 1 | 900 | E | 779 | 0.87 | D | 672 | 0.75 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2030 | | | | | |
|--------------|---|-----------|---------------------|-------|-------------------|--------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| Other
MTS | Telegraph between 20th St. and 27th St. | NB | 900 | 1 | 900 | D | 688 | 0.76 | F | 1,080 | 1.20 |
| | | SB | 900 | 1 | 900 | E | 897 | 1.00 | E | 779 | 0.87 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2015 + Phase 1 | | | | | |
|--------------------|---|-----------|---------------------|-------|-------------------|----------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| Other
or
MTS | Telegraph between 20th St. and 27th St. | NB | 900 | 1 | 900 | C | 578 | 0.64 | E | 890 | 0.99 |
| | | SB | 900 | 1 | 900 | E | 779 | 0.87 | D | 674 | 0.75 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2015 + Project | | | | | |
|--------------------|---|-----------|---------------------|-------|-------------------|----------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| Other
or
MTS | Telegraph between 20th St. and 27th St. | NB | 900 | 1 | 900 | C | 582 | 0.65 | F | 913 | 1.01 |
| | | SB | 900 | 1 | 900 | E | 793 | 0.88 | D | 680 | 0.76 |

| Type | Segment | Direction | Capacity
(vphpl) | Lanes | Capacity
(vph) | 2030 + Project | | | | | |
|--------------------|---|-----------|---------------------|-------|-------------------|----------------|--------|------|--------------|--------|------|
| | | | | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | | LOS | Volume | v/c | LOS | Volume | v/c |
| Other
or
MTS | Telegraph between 20th St. and 27th St. | NB | 900 | 1 | 900 | D | 694 | 0.77 | F | 1,114 | 1.24 |
| | | SB | 900 | 1 | 900 | F | 911 | 1.01 | E | 787 | 0.87 |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | | | ↑ | | | | | | ↑↓ | |
| Volume (vph) | 0 | 190 | 56 | 50 | 51 | 0 | 0 | 0 | 0 | 154 | 400 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | | |
| Frpb, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.94 | | | | | 0.97 | | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | 0.99 | | |
| Satd. Flow (prot) | | 1863 | 1341 | | 1712 | | | | | 3337 | | |
| Flt Permitted | | 1.00 | 1.00 | | 0.63 | | | | | 0.99 | | |
| Satd. Flow (perm) | | 1863 | 1341 | | 1100 | | | | | 3337 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 207 | 61 | 54 | 55 | 0 | 0 | 0 | 0 | 167 | 435 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 207 | 11 | 0 | 109 | 0 | 0 | 0 | 0 | 0 | 633 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Permitted Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Actuated Green, G (s) | 14.8 | | 14.8 | | 14.8 | | 57.2 | | 57.2 | | 57.2 | |
| Effective Green, g (s) | 14.8 | | 14.8 | | 14.8 | | 0.72 | | 0.72 | | 0.72 | |
| Actuated g/C Ratio | 0.18 | | 0.18 | | 0.18 | | 4.0 | | 4.0 | | 4.0 | |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | | 3.0 | | 3.0 | | 3.0 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | | | | | | | |
| Lane Grp Cap (vph) | 345 | | 248 | | 204 | | 2386 | | | | | |
| v/s Ratio Prot | c0.11 | | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.10 | | 0.19 | | | | | |
| v/c Ratio | 0.60 | | 0.05 | | 0.53 | | 0.27 | | | | | |
| Uniform Delay, d1 | 29.9 | | 26.8 | | 29.5 | | 4.0 | | | | | |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | | 0.71 | | | | | |
| Incremental Delay, d2 | 2.9 | | 0.1 | | 2.7 | | 0.3 | | | | | |
| Delay (s) | 32.8 | | 26.9 | | 32.2 | | 3.1 | | | | | |
| Level of Service | C | | C | | C | | A | | | | | |
| Approach Delay (s) | 31.5 | | | | 32.2 | | 0.0 | | 3.1 | | | |
| Approach LOS | C | | | | C | | A | | A | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 13.7 | | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | 0.33 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | 59.7% | | | | ICU Level of Service | | B | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰ | | | | |
| Volume (vph) | 7 | 172 | 4 | 0 | 39 | 34 | 10 | 202 | 81 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 0.96 | | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | | |
| Frt | | 1.00 | | | 0.94 | | | 0.96 | | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (prot) | | 1847 | | | 1643 | | | 3254 | | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (perm) | | 1839 | | | 1643 | | | 3254 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 8 | 187 | 4 | 0 | 42 | 37 | 11 | 220 | 88 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 13 | 0 | 0 | 73 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 198 | 0 | 0 | 66 | 0 | 0 | 246 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | | 5 | | | 5 | | | 2 |
| Turn Type | Perm | | | | | Perm | | | | | | |
| Protected Phases | 2 | | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | | | 1 | | | | |
| Actuated Green, G (s) | 29.3 | | | | 29.3 | | | 7.7 | | | | |
| Effective Green, g (s) | 29.3 | | | | 29.3 | | | 7.7 | | | | |
| Actuated g/C Ratio | 0.65 | | | | 0.65 | | | 0.17 | | | | |
| Clearance Time (s) | 4.0 | | | | 4.0 | | | 4.0 | | | | |
| Vehicle Extension (s) | 2.0 | | | | 2.0 | | | 2.0 | | | | |
| Lane Grp Cap (vph) | 1197 | | | | 1070 | | | 557 | | | | |
| v/s Ratio Prot | c0.11 | | | | 0.04 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.08 | | | | |
| v/c Ratio | 0.17 | | | | 0.06 | | | 0.44 | | | | |
| Uniform Delay, d1 | 3.1 | | | | 2.9 | | | 16.7 | | | | |
| Progression Factor | 0.82 | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | 0.3 | | | | 0.1 | | | 0.2 | | | | |
| Delay (s) | 2.8 | | | | 3.0 | | | 16.9 | | | | |
| Level of Service | A | | | | A | | | B | | | | |
| Approach Delay (s) | 2.8 | | | | 3.0 | | | 16.9 | | | 0.0 | |
| Approach LOS | A | | | | A | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 10.4 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.22 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | | Sum of lost time (s) | | | | 8.0 | | | |
| Intersection Capacity Utilization | 35.1% | | | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Near-Term AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | | | |
| Volume (vph) | 29 | 277 | 0 | 0 | 252 | 86 | 32 | 190 | 94 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frft | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3512 | | | 3366 | 1337 | | 3486 | 1459 | | | |
| Flt Permitted | | 0.91 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3225 | | | 3366 | 1337 | | 3486 | 1459 | | | |
| Peak-hour factor, PHF | 0.96 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 30 | 301 | 0 | 0 | 274 | 93 | 35 | 207 | 102 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 19 | 0 | 0 | 88 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 331 | 0 | 0 | 282 | 65 | 0 | 242 | 14 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | | Perm | | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 62.0 | | | 62.0 | 62.0 | | 11.0 | 11.0 | | | |
| Effective Green, g (s) | | 62.0 | | | 62.0 | 62.0 | | 11.0 | 11.0 | | | |
| Actuated g/C Ratio | | 0.78 | | | 0.78 | 0.78 | | 0.14 | 0.14 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | 2499 | | | | 2609 | 1036 | | 479 | 201 | | | |
| v/s Ratio Prot | | | | | 0.08 | | | | | | | |
| v/s Ratio Perm | c0.10 | | | | | 0.05 | | 0.07 | 0.07 | | | |
| v/c Ratio | 0.13 | | | | 0.11 | 0.06 | | 0.51 | 0.01 | | | |
| Uniform Delay, d1 | 2.3 | | | | 2.2 | 2.1 | | 32.0 | 30.0 | | | |
| Progression Factor | 1.00 | | | | 0.49 | 0.09 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | 0.1 | | | | 0.1 | 0.1 | | 0.8 | 0.1 | | | |
| Delay (s) | 2.4 | | | | 1.2 | 0.3 | | 32.8 | 30.2 | | | |
| Level of Service | A | | | | A | A | | C | C | | | |
| Approach Delay (s) | 2.4 | | | | 1.0 | | | 32.0 | | | 0.0 | |
| Approach LOS | A | | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 11.7 | | | HCM Level of Service | | | | | B | | |
| HCM Volume to Capacity ratio | | 0.19 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | | | 7.0 | | |
| Intersection Capacity Utilization | | 56.1% | | | ICU Level of Service | | | | | B | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 203 | 102 | 75 | 170 | 0 | 0 | 0 | 0 | 51 | 521 | 29 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 0.91 | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 1.00 | 0.99 | 1.00 | 0.99 | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 0.97 | 1.00 | 0.97 | 1.00 | 0.97 | 1.00 | 0.97 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 1.00 | 0.99 | 1.00 | 0.99 | 1.00 |
| Flt Protected | 1.00 | 1.00 | 0.98 | 1.00 | 0.98 | 1.00 | 0.98 | 1.00 | 0.98 | 1.00 | 0.98 | 1.00 |
| Satd. Flow (prot) | 1863 | 1435 | 1786 | 1863 | 1435 | 1786 | 1863 | 1435 | 1786 | 1863 | 1435 | 1786 |
| Flt Permitted | 1.00 | 1.00 | 0.74 | 1.00 | 0.74 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1863 | 1435 | 1339 | 1863 | 1435 | 1339 | 1863 | 1435 | 1339 | 1863 | 1435 | 1339 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 221 | 111 | 82 | 185 | 0 | 0 | 0 | 0 | 55 | 537 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 221 | 90 | 0 | 267 | 0 | 0 | 0 | 0 | 0 | 621 | 0 |
| Confl. Peds. (#/hr) | 58 | 58 | 100 | 100 | 50 | 50 | 50 | 104 | 104 | 58 | 58 | 100 |
| Confl. Bikes (#/hr) | 8 | 8 | 6 | 6 | 10 | 10 | 10 | 28 | 28 | 8 | 8 | 10 |
| Turn Type | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm |
| Protected Phases | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Permitted Phases | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Actuated Green, G (s) | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 |
| Effective Green, g (s) | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 482 | 371 | 346 | 482 | 371 | 346 | 482 | 371 | 346 | 482 | 371 | 346 |
| v/s Ratio Prot | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| v/s Ratio Perm | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| v/c Ratio | 0.46 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Uniform Delay, d1 | 24.9 | 23.5 | 27.5 | 24.9 | 23.5 | 27.5 | 24.9 | 23.5 | 27.5 | 24.9 | 23.5 | 27.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.7 | 0.3 | 10.2 | 0.7 | 0.3 | 10.2 | 0.7 | 0.3 | 10.2 | 0.7 | 0.3 | 10.2 |
| Delay (s) | 25.6 | 23.8 | 37.7 | 25.6 | 23.8 | 37.7 | 25.6 | 23.8 | 37.7 | 25.6 | 23.8 | 37.7 |
| Level of Service | C | C | D | C | C | D | C | C | D | C | C | D |
| Approach Delay (s) | 25.0 | 25.0 | 37.7 | 25.0 | 25.0 | 37.7 | 25.0 | 25.0 | 37.7 | 25.0 | 25.0 | 37.7 |
| Approach LOS | C | C | D | C | C | D | C | C | D | C | C | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 |
| HCM Volume to Capacity ratio | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 |
| Actuated Cycle Length (s) | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 |
| Intersection Capacity Utilization | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% | 59.7% |
| Analysis Period (min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 13 | 106 | 1 | 0 | 102 | 72 | 21 | 342 | 181 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 |
| Frt | 1.00 | 0.94 | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.94 | 1.00 | 1.00 | 0.94 | 1.00 |
| Flt Protected | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 |
| Satd. Flow (prot) | 1841 | 1706 | 3134 | 1841 | 1706 | 3134 | 1841 | 1706 | 3134 | 1841 | 1706 | 3134 |
| Flt Permitted | 0.97 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1800 | 1706 | 3134 | 1800 | 1706 | 3134 | 1800 | 1706 | 3134 | 1800 | 1706 | 3134 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 14 | 115 | 1 | 0 | 111 | 78 | 23 | 368 | 197 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 151 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 130 | 0 | 0 | 157 | 0 | 0 | 437 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | 71 | 82 | 82 | 88 | 88 | 88 | 88 | 75 | 75 | 82 | 82 |
| Confl. Bikes (#/hr) | 8 | 8 | 2 | 2 | 40 | 40 | 40 | 40 | 75 | 75 | 8 | 8 |
| Turn Type | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm |
| Protected Phases | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Permitted Phases | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Actuated Green, G (s) | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 |
| Effective Green, g (s) | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 | 26.5 |
| Actuated g/C Ratio | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 | 0.59 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 1060 | 1005 | 731 | 1060 | 1005 | 731 | 1060 | 1005 | 731 | 1060 | 1005 | 731 |
| v/s Ratio Prot | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 |
| v/s Ratio Perm | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| v/c Ratio | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 |
| Uniform Delay, d1 | 24.9 | 23.5 | 27.5 | 24.9 | 23.5 | 27.5 | 24.9 | 23.5 | 27.5 | 24.9 | 23.5 | 27.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.2 | 0.3 | 10.2 | 0.2 | 0.3 | 10.2 | 0.2 | 0.3 | 10.2 | 0.2 | 0.3 | 10.2 |
| Delay (s) | 2.0 | 4.5 | 16.2 | 2.0 | 4.5 | 16.2 | 2.0 | 4.5 | 16.2 | 2.0 | 4.5 | 16.2 |
| Level of Service | A | A | B | A | A | B | A | A | B | A | A | B |
| Approach Delay (s) | 2.0 | 4.5 | 16.2 | 2.0 | 4.5 | 16.2 | 2.0 | 4.5 | 16.2 | 2.0 | 4.5 | 16.2 |
| Approach LOS | A | A | B | A | A | B | A | A | B | A | A | B |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 |
| HCM Volume to Capacity ratio | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 |
| Actuated Cycle Length (s) | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 |
| Intersection Capacity Utilization | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% | 44.3% |
| Analysis Period (min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Near-Term PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | | | |
| Volume (vph) | 38 | 331 | 0 | 0 | 389 | 97 | 65 | 391 | 257 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3510 | | | 3372 | 1319 | | 3482 | 1459 | | | |
| Flt Permitted | | 0.88 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3118 | | | 3372 | 1319 | | 3482 | 1459 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 41 | 360 | 0 | 0 | 423 | 103 | 71 | 425 | 276 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 29 | 0 | 0 | 213 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 401 | 0 | 0 | 432 | 64 | 0 | 496 | 63 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | | Perm | Perm | | Perm | | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | | | | |
| Actuated Green, G (s) | | 54.8 | | | 54.8 | 54.8 | | 18.2 | 18.2 | | | |
| Effective Green, g (s) | | 54.8 | | | 54.8 | 54.8 | | 18.2 | 18.2 | | | |
| Actuated g/C Ratio | | 0.68 | | | 0.68 | 0.68 | | 0.23 | 0.23 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | 2136 | | | | 2310 | 904 | | 792 | 332 | | | |
| v/s Ratio Prot | | | | | 0.13 | | | | | | | |
| v/s Ratio Perm | c0.13 | | | | | 0.05 | | 0.14 | 0.04 | | | |
| v/c Ratio | 0.19 | | | | 0.19 | 0.07 | | 0.63 | 0.19 | | | |
| Uniform Delay, d1 | 4.6 | | | | 4.6 | 4.2 | | 27.8 | 24.9 | | | |
| Progression Factor | 1.00 | | | | 0.86 | 0.63 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | 0.2 | | | | 0.2 | 0.1 | | 1.6 | 0.3 | | | |
| Delay (s) | 4.7 | | | | 4.1 | 2.8 | | 29.4 | 25.2 | | | |
| Level of Service | A | | | | A | A | | C | C | | | |
| Approach Delay (s) | 4.7 | | | | 3.8 | | | 27.9 | | | 0.0 | |
| Approach LOS | A | | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 15.0 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.30 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | Sum of lost time (s) | | | | | | 7.0 | | |
| Intersection Capacity Utilization | 58.0% | | | ICU Level of Service | | | | | | B | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
17: 21st Street & Webster Street

AECOM
Franklin - Webster Bikeway Supplementary Analysis

HCM Signalized Intersection Capacity Analysis Cumulative AM
 18: 21st Street & Franklin Street Kaiser Center Transportation Study

AECOM
Franklin - Webster Bikeway Supplementary Analysis

HCM Signalized Intersection Capacity Analysis
22: 20th Street & Franklin Street

AECOM
Franklin - Webster Bikeway Supplementary Analysis

HCM Signalized Intersection Capacity Analysis Cumulative AM
 23: 20th Street & Webster Street Kaiser Center Transportation Study

AECOM
Franklin - Webster Bikeway Supplementary Analysis

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | | | ↑ | | | | | | ↑↓ | |
| Volume (vph) | 0 | 250 | 126 | 92 | 209 | 0 | 0 | 0 | 0 | 62 | 640 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | | |
| Frpb, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | 0.99 | | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.98 | | | | | 0.98 | | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | 1.00 | | |
| Satd. Flow (prot) | | 1863 | 1437 | | 1792 | | | | | 3382 | | |
| Flt Permitted | | 1.00 | 1.00 | | 0.70 | | | | | 1.00 | | |
| Satd. Flow (perm) | | 1863 | 1437 | | 1270 | | | | | 3382 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 272 | 137 | 100 | 227 | 0 | 0 | 0 | 0 | 67 | 660 | 38 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 272 | 127 | 0 | 327 | 0 | 0 | 0 | 0 | 0 | 763 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Permitted Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Actuated Green, G (s) | 25.2 | 25.2 | | 25.2 | | | | | | | 46.8 | |
| Effective Green, g (s) | 25.2 | 25.2 | | 25.2 | | | | | | | 46.8 | |
| Actuated g/C Ratio | 0.32 | 0.32 | | 0.32 | | | | | | | 0.58 | |
| Clearance Time (s) | 4.0 | 4.0 | | 4.0 | | | | | | | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | | | | | | | 3.0 | |
| Lane Grp Cap (vph) | 587 | 453 | | 400 | | | | | | | 1978 | |
| v/s Ratio Prot | 0.15 | | | | | | | | | | | |
| v/s Ratio Perm | | 0.09 | | 0.26 | | | | | | | 0.23 | |
| v/c Ratio | 0.46 | 0.28 | | 0.82 | | | | | | | 0.39 | |
| Uniform Delay, d1 | 22.0 | 20.6 | | 25.3 | | | | | | | 8.9 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | | | | | | | 1.21 | |
| Incremental Delay, d2 | 0.6 | 0.3 | | 12.2 | | | | | | | 0.5 | |
| Delay (s) | 22.6 | 20.9 | | 37.5 | | | | | | | 11.2 | |
| Level of Service | C | C | | D | | | | | | | B | |
| Approach Delay (s) | 22.0 | | | 37.5 | | | 0.0 | | | | 11.2 | |
| Approach LOS | C | | | D | | | A | | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 19.9 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.54 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | | Sum of lost time (s) | | | | 8.0 | | | |
| Intersection Capacity Utilization | 65.0% | | | | ICU Level of Service | | | | C | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↰ | | | ↱ | | | ↰↱ | | | | |
| Volume (vph) | 15 | 122 | 1 | 0 | 116 | 83 | 25 | 420 | 223 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 0.94 | | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | | |
| Frt | | 1.00 | | | 0.94 | | | 0.95 | | | | |
| Flt Protected | | 0.99 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (prot) | | 1842 | | | 1705 | | | 3142 | | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (perm) | | 1795 | | | 1705 | | | 3142 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 16 | 133 | 1 | 0 | 126 | 90 | 27 | 452 | 242 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 177 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 150 | 0 | 0 | 176 | 0 | 0 | 544 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | 40 | | | | 1 |
| Turn Type | Perm | | | | Perm | | | | | | | |
| Protected Phases | 2 | | | | 2 | | | | 1 | | | |
| Permitted Phases | 2 | | | | 2 | | | | 1 | | | |
| Actuated Green, G (s) | 25.0 | | | | 25.0 | | | | 12.0 | | | |
| Effective Green, g (s) | 25.0 | | | | 25.0 | | | | 12.0 | | | |
| Actuated g/C Ratio | 0.56 | | | | 0.56 | | | | 0.27 | | | |
| Clearance Time (s) | 4.0 | | | | 4.0 | | | | 4.0 | | | |
| Vehicle Extension (s) | 2.0 | | | | 2.0 | | | | 2.0 | | | |
| Lane Grp Cap (vph) | 997 | | | | 947 | | | | 838 | | | |
| v/s Ratio Prot | | | | | c0.10 | | | | | | | |
| v/s Ratio Perm | 0.08 | | | | | | | | 0.17 | | | |
| v/c Ratio | 0.15 | | | | 0.19 | | | | 0.65 | | | |
| Uniform Delay, d1 | 4.8 | | | | 5.0 | | | | 14.6 | | | |
| Progression Factor | 0.46 | | | | 1.00 | | | | 1.00 | | | |
| Incremental Delay, d2 | 0.3 | | | | 0.4 | | | | 1.3 | | | |
| Delay (s) | 2.5 | | | | 5.4 | | | | 15.9 | | | |
| Level of Service | A | | | | A | | | | B | | | |
| Approach Delay (s) | 2.5 | | | | 5.4 | | | | 15.9 | | 0.0 | |
| Approach LOS | A | | | | A | | | | B | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 12.0 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.34 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | | Sum of lost time (s) | | | | 8.0 | | | |
| Intersection Capacity Utilization | 50.4% | | | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Cumulative PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | | | |
| Volume (vph) | 46 | 406 | 0 | 0 | 478 | 119 | 80 | 481 | 315 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frft | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 0.99 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3512 | | | 3371 | 1319 | | 3482 | 1460 | | | |
| Flt Permitted | | 0.86 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3046 | | | 3371 | 1319 | | 3482 | 1460 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 50 | 441 | 0 | 0 | 520 | 127 | 87 | 523 | 339 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 41 | 0 | 0 | 159 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 491 | 0 | 0 | 532 | 73 | 0 | 610 | 180 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | | | Perm | Perm | | Perm | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | | | | |
| Actuated Green, G (s) | | 51.5 | | | 51.5 | 51.5 | | 21.5 | 21.5 | | | |
| Effective Green, g (s) | | 51.5 | | | 51.5 | 51.5 | | 21.5 | 21.5 | | | |
| Actuated g/C Ratio | | 0.64 | | | 0.64 | 0.64 | | 0.27 | 0.27 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | 1961 | | | | 2170 | 849 | | 936 | 392 | | | |
| v/s Ratio Prot | | | | | 0.16 | | | | | | | |
| v/s Ratio Perm | c0.16 | | | | | 0.06 | | 0.18 | 0.12 | | | |
| v/c Ratio | 0.25 | | | | 0.24 | 0.09 | | 0.65 | 0.46 | | | |
| Uniform Delay, d1 | 6.1 | | | | 6.0 | 5.4 | | 25.9 | 24.4 | | | |
| Progression Factor | 1.00 | | | | 0.73 | 0.25 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | 0.3 | | | | 0.2 | 0.2 | | 1.6 | 0.9 | | | |
| Delay (s) | 6.4 | | | | 4.6 | 1.5 | | 27.6 | 25.3 | | | |
| Level of Service | A | | | | A | A | | C | C | | | |
| Approach Delay (s) | 6.4 | | | | 4.1 | | | 26.7 | | | 0.0 | |
| Approach LOS | A | | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 14.9 | | | | HCM Level of Service | | | | | B | | |
| HCM Volume to Capacity ratio | 0.37 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | | Sum of lost time (s) | | | | | 7.0 | | |
| Intersection Capacity Utilization | 58.9% | | | | ICU Level of Service | | | | | B | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |





HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑ | | | ↑ | | | | | | ↑↓ | |
| Volume (vph) | 0 | 283 | 56 | 50 | 56 | 0 | 0 | 0 | 0 | 228 | 400 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | | |
| Frpb, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.96 | | | | | 0.96 | | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | 0.98 | | |
| Satd. Flow (prot) | | 1863 | 1342 | | 1744 | | | | | 3296 | | |
| Flt Permitted | | 1.00 | 1.00 | | 0.58 | | | | | 0.98 | | |
| Satd. Flow (perm) | | 1863 | 1342 | | 1041 | | | | | 3296 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 308 | 61 | 54 | 61 | 0 | 0 | 0 | 0 | 248 | 435 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 308 | 15 | 0 | 115 | 0 | 0 | 0 | 0 | 0 | 714 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Permitted Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Actuated Green, G (s) | 19.8 | | 19.8 | | 19.8 | | 52.2 | | 52.2 | | 52.2 | |
| Effective Green, g (s) | 19.8 | | 19.8 | | 19.8 | | 0.65 | | 0.65 | | 0.65 | |
| Actuated g/C Ratio | 0.25 | | 0.25 | | 0.25 | | 4.0 | | 4.0 | | 4.0 | |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | | 3.0 | | 3.0 | | 3.0 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | | | | | | | |
| Lane Grp Cap (vph) | 461 | | 332 | | 258 | | 2151 | | | | | |
| v/s Ratio Prot | c0.17 | | | | | | | | | | | |
| v/s Ratio Perm | | | 0.01 | | 0.11 | | 0.22 | | | | | |
| v/c Ratio | 0.67 | | 0.05 | | 0.45 | | 0.33 | | | | | |
| Uniform Delay, d1 | 27.1 | | 22.9 | | 25.5 | | 6.2 | | | | | |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | | 0.72 | | | | | |
| Incremental Delay, d2 | 3.7 | | 0.1 | | 1.2 | | 0.4 | | | | | |
| Delay (s) | 30.8 | | 23.0 | | 26.7 | | 4.8 | | | | | |
| Level of Service | C | | C | | C | | A | | | | | |
| Approach Delay (s) | 29.5 | | | | 26.7 | | 0.0 | | 4.8 | | | |
| Approach LOS | C | | | | C | | A | | A | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 14.5 | | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | 0.42 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | 62.0% | | | | ICU Level of Service | | B | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
|-----------------------------------|-------|---|------|------|---|----------------------|------|---|---|------|------|------|--|
| Lane Configurations | |  | | |  | | |  |  | | | | |
| Volume (vph) | 7 | 213 | 4 | 0 | 40 | 38 | 10 | 204 | 133 | 0 | 0 | 0 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | | | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | | | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 0.95 | | | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | | | |
| Frt | | 1.00 | | | 0.93 | | | 0.94 | | | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | | | | | |
| Satd. Flow (prot) | | 1850 | | | 1635 | | | 3155 | | | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | | | | | |
| Satd. Flow (perm) | | 1843 | | | 1635 | | | 3155 | | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Adj. Flow (vph) | 8 | 232 | 4 | 0 | 43 | 41 | 11 | 222 | 145 | 0 | 0 | 0 | |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 15 | 0 | 0 | 119 | 0 | 0 | 0 | 0 | |
| Lane Group Flow (vph) | 0 | 243 | 0 | 0 | 69 | 0 | 0 | 259 | 0 | 0 | 0 | 0 | |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 | |
| Confl. Bikes (#/hr) | | | | | 5 | | | 5 | | | | 2 | |
| Turn Type | Perm | | | | | Perm | | | | | | | |
| Protected Phases | 2 | | | | | 2 | | 1 | | | | | |
| Permitted Phases | 2 | | | | | 2 | | 1 | | | | | |
| Actuated Green, G (s) | 29.0 | | | | | 29.0 | | 8.0 | | | | | |
| Effective Green, g (s) | 29.0 | | | | | 29.0 | | 8.0 | | | | | |
| Actuated g/C Ratio | 0.64 | | | | | 0.64 | | 0.18 | | | | | |
| Clearance Time (s) | 4.0 | | | | | 4.0 | | 4.0 | | | | | |
| Vehicle Extension (s) | 2.0 | | | | | 2.0 | | 2.0 | | | | | |
| Lane Grp Cap (vph) | 1188 | | | | | 1054 | | 561 | | | | | |
| v/s Ratio Prot | c0.13 | | | | | | | 0.08 | | | | | |
| v/s Ratio Perm | 0.20 | | | | | 0.07 | | 0.46 | | | | | |
| v/c Ratio | 3.3 | | | | | 3.0 | | 16.6 | | | | | |
| Uniform Delay, d1 | 0.52 | | | | | 1.00 | | 1.00 | | | | | |
| Progression Factor | 0.4 | | | | | 0.1 | | 0.2 | | | | | |
| Incremental Delay, d2 | 2.1 | | | | | 3.1 | | 16.8 | | | | | |
| Delay (s) | A | | | | | A | | B | | | | | |
| Level of Service | A | | | | | A | | B | | | | | |
| Approach Delay (s) | 2.1 | | | | | 3.1 | | 16.8 | | | | | |
| Approach LOS | A | | | | | A | | B | | | | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | 10.1 | | | | | HCM Level of Service | | | | | B | | |
| HCM Volume to Capacity ratio | 0.26 | | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | | | Sum of lost time (s) | | | | | 8.0 | | |
| Intersection Capacity Utilization | 39.3% | | | | | ICU Level of Service | | | | | A | | |
| Analysis Period (min) | 15 | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 22: 20th Street & Franklin Street

Near-Term plus Project (I) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | | | |
| Volume (vph) | 29 | 313 | 0 | 0 | 257 | 88 | 32 | 242 | 96 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.93 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Fit | | 1.00 | | | 0.99 | 0.85 | | 1.00 | 0.85 | | | |
| Fit Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3515 | | | 3364 | 1337 | | 3496 | 1462 | | | |
| Fit Permitted | | 0.92 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3237 | | | 3364 | 1337 | | 3496 | 1462 | | | |
| Peak-hour factor, PHF | 0.96 | 0.92 | 0 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 30 | 340 | 0 | 0 | 279 | 96 | 35 | 263 | 104 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 21 | 0 | 0 | 88 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 370 | 0 | 0 | 288 | 65 | 0 | 298 | 16 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 40 | | 40 | 45 | | 45 | 51 | | 51 | 207 | | 207 |
| Confl. Bikes (#/hr) | | | 5 | | | 6 | | | 8 | | | 12 |
| Turn Type | Perm | | | | Perm | Perm | | Perm | | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 60.6 | | | 60.6 | 60.6 | | 12.4 | 12.4 | | | |
| Effective Green, g (s) | | 60.6 | | | 60.6 | 60.6 | | 12.4 | 12.4 | | | |
| Actuated g/C Ratio | | 0.76 | | | 0.76 | 0.76 | | 0.16 | 0.16 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | 2452 | | | | 2548 | 1013 | | 542 | 227 | | | |
| v/s Ratio Prot | | | | | 0.09 | | | | | | | |
| v/s Ratio Perm | c0.11 | | | | | 0.05 | | 0.09 | 0.01 | | | |
| v/c Ratio | 0.15 | | | | 0.11 | 0.06 | | 0.55 | 0.07 | | | |
| Uniform Delay, d1 | 2.7 | | | | 2.6 | 2.5 | | 3.12 | 28.9 | | | |
| Progression Factor | 1.00 | | | | 2.00 | 4.21 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | 0.1 | | | | 0.1 | 0.1 | | 1.1 | 0.1 | | | |
| Delay (s) | 2.8 | | | | 5.2 | 10.5 | | 32.4 | 29.0 | | | |
| Level of Service | A | | | | A | B | | C | C | | | |
| Approach Delay (s) | 2.8 | | | | 6.5 | | | 31.5 | | | 0.0 | |
| Approach LOS | A | | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 14.1 | | | HCM Level of Service | | | | | B | | |
| HCM Volume to Capacity ratio | | 0.22 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | Sum of lost time (s) | | | | | 7.0 | | |
| Intersection Capacity Utilization | | 56.4% | | | ICU Level of Service | | | | | B | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
17: 21st Street & Webster Street

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 220 | 102 | 75 | 204 | 0 | 0 | 0 | 0 | 65 | 521 | 29 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 0.91 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 |
| Flt Protected | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 |
| Satd. Flow (prot) | 1863 | 1436 | 1797 | 1797 | 3360 | 3360 | 3360 | 3360 | 3360 | 3360 | 3360 | 3360 |
| Flt Permitted | 1.00 | 1.00 | 0.77 | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 |
| Satd. Flow (perm) | 1863 | 1436 | 1398 | 1398 | 3360 | 3360 | 3360 | 3360 | 3360 | 3360 | 3360 | 3360 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 239 | 111 | 82 | 222 | 0 | 0 | 0 | 0 | 71 | 537 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 239 | 91 | 0 | 304 | 0 | 0 | 0 | 0 | 0 | 637 | 0 |
| Confl. Peds. (#/hr) | 58 | 58 | 100 | 100 | 50 | 50 | 104 | 104 | 104 | 104 | 104 | 104 |
| Confl. Bikes (#/hr) | 8 | 8 | 6 | 6 | 10 | 10 | 28 | 28 | 28 | 28 | 28 | 28 |
| Turn Type | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm |
| Protected Phases | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Permitted Phases | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Actuated Green, G (s) | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 |
| Effective Green, g (s) | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 | 22.9 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 533 | 411 | 400 | 400 | 2062 | 2062 | 2062 | 2062 | 2062 | 2062 | 2062 | 2062 |
| v/s Ratio Prot | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| v/s Ratio Perm | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| v/c Ratio | 0.45 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| Uniform Delay, d1 | 23.4 | 21.8 | 26.0 | 26.0 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.6 | 0.3 | 8.3 | 8.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Delay (s) | 24.0 | 22.0 | 34.3 | 34.3 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 |
| Level of Service | C | C | C | C | A | A | A | A | A | A | A | A |
| Approach Delay (s) | 23.4 | 23.4 | 34.3 | 34.3 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 |
| Approach LOS | C | C | C | C | A | A | A | A | A | A | A | A |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 19.1 | 19.1 | 34.3 | 34.3 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 | 9.6 |
| HCM Volume to Capacity ratio | 0.45 | 0.45 | 0.45 | 0.45 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| Actuated Cycle Length (s) | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 |
| Intersection Capacity Utilization | 60.3% | 60.3% | 60.3% | 60.3% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% |
| Analysis Period (min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| c Critical Lane Group | | | | | | | | | | | | |
















HCM Signalized Intersection Capacity Analysis
18: 21st Street & Franklin Street

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 13 | 113 | 1 | 0 | 109 | 99 | 21 | 358 | 191 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 0.97 | 1.00 | 1.00 | 0.94 | 0.94 | 1.00 | 0.94 | 0.94 | 1.00 | 1.00 | 1.00 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 0.99 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.94 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 |
| Flt Protected | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1843 | 1682 | 1682 | 1682 | 3134 | 3134 | 3134 | 3134 | 3134 | 3134 | 3134 | 3134 |
| Flt Permitted | 0.97 | 1.00 | 1.00 | 1.00 | 0.99 | 0.99 | 1.00 | 0.99 | 0.99 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1800 | 1682 | 1682 | 1682 | 3134 | 3134 | 3134 | 3134 | 3134 | 3134 | 3134 | 3134 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 14 | 123 | 1 | 0 | 118 | 108 | 23 | 385 | 208 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 158 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 138 | 0 | 0 | 181 | 0 | 0 | 458 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | 71 | 82 | 82 | 88 | 88 | 88 | 88 | 75 | 75 | 75 | 75 |
| Confl. Bikes (#/hr) | 8 | 8 | 2 | 2 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Turn Type | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm | Perm |
| Protected Phases | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Permitted Phases | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Actuated Green, G (s) | 26.2 | 26.2 | 26.2 | 26.2 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 |
| Effective Green, g (s) | 26.2 | 26.2 | 26.2 | 26.2 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 |
| Actuated g/C Ratio | 0.58 | 0.58 | 0.58 | 0.58 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lane Grp Cap (vph) | 1048 | 979 | 979 | 979 | 752 | 752 | 752 | 752 | 752 | 752 | 752 | 752 |
| v/s Ratio Prot | 0.08 | 0.11 | 0.11 | 0.11 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| v/s Ratio Perm | 0.13 | 0.13 | 0.13 | 0.13 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| v/c Ratio | 0.43 | 0.43 | 0.43 | 0.43 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Uniform Delay, d1 | 0.44 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Progression Factor | 0.44 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.2 | 0.4 | 0.4 | 0.4 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Delay (s) | 2.1 | 4.8 | 4.8 | 4.8 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 |
| Level of Service | A | A | A | A | B | B | B | B | B | B | B | B |
| Approach Delay (s) | 2.1 | 4.8 | 4.8 | 4.8 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 | 16.2 |
| Approach LOS | A | A | A | A | B | B | B | B | B | B | B | B |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 11.6 | 11.6 | 11.6 | 11.6 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 |
| HCM Volume to Capacity ratio | 0.31 | 0.31 | 0.31 | 0.31 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Actuated Cycle Length (s) | 45.0 | 45.0 | 45.0 | 45.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| Intersection Capacity Utilization | 45.4% | 45.4% | 45.4% | 45.4% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% | 25.0% |
| Analysis Period (min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
22: 20th Street & Franklin Street

Near-Term plus Project (I) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | | | |
| Volume (vph) | 38 | 338 | 0 | 0 | 421 | 113 | 65 | 401 | 257 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Lane Util. Factor | | 0.95 | | | 0.91 | 0.91 | | 0.95 | 1.00 | | | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.92 | | 1.00 | 0.92 | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Frt | | 1.00 | | | 1.00 | 0.85 | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (prot) | | 3512 | | | 3370 | 1319 | | 3483 | 1459 | | | |
| Flt Permitted | | 0.88 | | | 1.00 | 1.00 | | 0.99 | 1.00 | | | |
| Satd. Flow (perm) | | 3107 | | | 3370 | 1319 | | 3483 | 1459 | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.94 | 0.92 | 0.92 | 0.93 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 41 | 367 | 0 | 0 | 458 | 120 | 71 | 436 | 276 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 1 | 34 | 0 | 0 | 211 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 408 | 0 | 0 | 469 | 74 | 0 | 507 | 65 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 42 | | 42 | 54 | | 54 | 58 | | 58 | 194 | | 194 |
| Confl. Bikes (#/hr) | | | | | | 7 | | | 5 | | | 8 |
| Turn Type | Perm | | | | Perm | Perm | | Perm | | | | |
| Protected Phases | | 2 | | | 2 | | | 1 | | | | |
| Permitted Phases | 2 | | | | | 2 | 1 | | 1 | | | |
| Actuated Green, G (s) | | 54.6 | | | 54.6 | 54.6 | | 18.4 | 18.4 | | | |
| Effective Green, g (s) | | 54.6 | | | 54.6 | 54.6 | | 18.4 | 18.4 | | | |
| Actuated g/C Ratio | | 0.68 | | | 0.68 | 0.68 | | 0.23 | 0.23 | | | |
| Clearance Time (s) | | 3.0 | | | 3.0 | 3.0 | | 4.0 | 4.0 | | | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | |
| Lane Grp Cap (vph) | 2121 | | | | 2300 | 900 | | 801 | 336 | | | |
| v/s Ratio Prot | | | | | c0.14 | | | | | | | |
| v/s Ratio Perm | 0.13 | | | | | 0.06 | | 0.15 | 0.04 | | | |
| v/c Ratio | 0.19 | | | | 0.20 | 0.08 | | 0.63 | 0.19 | | | |
| Uniform Delay, d1 | 4.6 | | | | 4.7 | 4.3 | | 27.8 | 24.8 | | | |
| Progression Factor | 1.00 | | | | 0.82 | 0.52 | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | 0.2 | | | | 0.2 | 0.2 | | 1.6 | 0.3 | | | |
| Delay (s) | 4.8 | | | | 4.0 | 2.4 | | 29.4 | 25.1 | | | |
| Level of Service | A | | | | A | A | | C | C | | | |
| Approach Delay (s) | 4.8 | | | | 3.7 | | | 27.9 | | | 0.0 | |
| Approach LOS | A | | | | A | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 14.7 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.31 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | Sum of lost time (s) | | | | | | 7.0 | | |
| Intersection Capacity Utilization | 58.0% | | | ICU Level of Service | | | | | | B | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

AECOM
Franklin - Webster Bikeway Supplementary Analysis

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

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Franklin - Webster Bikeway Supplementary Analysis

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

















AECOM
Franklin - Webster Bikeway Supplementary Analysis

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

AECOM
Franklin - Webster Bikeway Supplementary Analysis

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|---|--|--|---|--|--|--|--|--|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | | | | |  |  |
| Volume (vph) | 0 | 237 | 103 | 75 | 238 | 0 | 0 | 0 | 0 | 78 | 529 | 29 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | | |
| Frpb, ped/bikes | | 1.00 | 0.91 | | 1.00 | | | | | 0.99 | | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.98 | | | | | 0.97 | | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flt Protected | | 1.00 | 1.00 | | 0.99 | | | | | 0.99 | | |
| Satd. Flow (prot) | | 1863 | 1436 | | 1805 | | | | | 3345 | | |
| Flt Permitted | | 1.00 | 1.00 | | 0.79 | | | | | 0.99 | | |
| Satd. Flow (perm) | | 1863 | 1436 | | 1442 | | | | | 3345 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.25 | 0.25 | 0.25 | 0.92 | 0.97 | 0.92 |
| Adj. Flow (vph) | 0 | 258 | 112 | 82 | 259 | 0 | 0 | 0 | 0 | 85 | 545 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 258 | 93 | 0 | 341 | 0 | 0 | 0 | 0 | 0 | 660 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 100 | | 100 | 50 | | 50 | 104 | | 104 |
| Confl. Bikes (#/hr) | | | 8 | | | 6 | | | 10 | | | 28 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Permitted Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Actuated Green, G (s) | 25.0 | 25.0 | | 25.0 | 25.0 | | | | | | 47.0 | |
| Effective Green, g (s) | 25.0 | 25.0 | | 25.0 | 25.0 | | | | | | 47.0 | |
| Actuated g/C Ratio | 0.31 | 0.31 | | 0.31 | 0.31 | | | | | | 0.59 | |
| Clearance Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | | | | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | | | | | 3.0 | |
| Lane Grp Cap (vph) | 582 | 449 | | 451 | | | | | | 1965 | | |
| v/s Ratio Prot | 0.14 | | | | | | | | | | | |
| v/s Ratio Perm | | 0.07 | | c0.24 | | | | | | 0.20 | | |
| v/c Ratio | 0.44 | 0.21 | | 0.76 | | | | | | 0.34 | | |
| Uniform Delay, d1 | 21.9 | 20.2 | | 24.8 | | | | | | 8.5 | | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | | | | | | 1.26 | | |
| Incremental Delay, d2 | 0.5 | 0.2 | | 7.1 | | | | | | 0.4 | | |
| Delay (s) | 22.5 | 20.5 | | 31.8 | | | | | | 11.1 | | |
| Level of Service | C | C | | C | | | | | | B | | |
| Approach Delay (s) | 21.9 | | | 31.8 | | | 0.0 | | | 11.1 | | |
| Approach LOS | C | | | C | | | A | | | B | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 19.1 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.48 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | 62.7% | | | | ICU Level of Service | | B | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 13 | 121 | 1 | 0 | 134 | 108 | 21 | 380 | 200 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.97 | | | 0.94 | | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | | |
| Frt | | 1.00 | | | 0.94 | | | 0.95 | | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (prot) | | 1844 | | | 1694 | | | 3140 | | | | |
| Flt Permitted | | 0.97 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (perm) | | 1799 | | | 1694 | | | 3140 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.25 | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.25 | 0.25 | 0.25 |
| Adj. Flow (vph) | 14 | 132 | 1 | 0 | 146 | 117 | 23 | 409 | 217 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 163 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 147 | 0 | 0 | 218 | 0 | 0 | 486 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 71 | | 71 | 82 | | 82 | 88 | | 88 | 75 | | 75 |
| Confl. Bikes (#/hr) | | | 8 | | | 2 | | 40 | | | | 1 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | 2 | | | | 2 | | | | 1 | | | |
| Permitted Phases | 2 | | | | | | 1 | | | | | |
| Actuated Green, G (s) | 25.9 | | | | 25.9 | | | | 11.1 | | | |
| Effective Green, g (s) | 25.9 | | | | 25.9 | | | | 11.1 | | | |
| Actuated g/C Ratio | 0.58 | | | | 0.58 | | | | 0.25 | | | |
| Clearance Time (s) | 4.0 | | | | 4.0 | | | | 4.0 | | | |
| Vehicle Extension (s) | 2.0 | | | | 2.0 | | | | 2.0 | | | |
| Lane Grp Cap (vph) | 1035 | | | | 975 | | | | 775 | | | |
| v/s Ratio Prot | | | | | c0.13 | | | | | | | |
| v/s Ratio Perm | 0.08 | | | | | | | | 0.15 | | | |
| v/c Ratio | 0.14 | | | | 0.22 | | | | 0.63 | | | |
| Uniform Delay, d1 | 4.4 | | | | 4.7 | | | | 15.1 | | | |
| Progression Factor | 0.48 | | | | 1.00 | | | | 1.00 | | | |
| Incremental Delay, d2 | 0.3 | | | | 0.5 | | | | 1.1 | | | |
| Delay (s) | 2.4 | | | | 5.2 | | | | 16.2 | | | |
| Level of Service | A | | | | A | | | | B | | | |
| Approach Delay (s) | 2.4 | | | | 5.2 | | | | 16.2 | | 0.0 | |
| Approach LOS | A | | | | A | | | | B | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 11.6 | | | | HCM Level of Service | | | | B | | | |
| HCM Volume to Capacity ratio | 0.34 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | | Sum of lost time (s) | | | | 8.0 | | | |
| Intersection Capacity Utilization | 46.7% | | | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 17: 21st Street & Webster Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 391 | 76 | 59 | 74 | 0 | 0 | 0 | 0 | 315 | 489 | 36 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | 4.0 | | 4.0 | | | | | 4.0 | | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | | | | 0.95 | | |
| Frpb, ped/bikes | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.97 | | | | | 0.96 | | |
| Frt | | 1.00 | 0.85 | | 1.00 | | | | | 0.99 | | |
| Flt Protected | | 1.00 | 1.00 | | 0.98 | | | | | 0.98 | | |
| Satd. Flow (prot) | | 1863 | 1343 | | 1770 | | | | | 3284 | | |
| Flt Permitted | | 1.00 | 1.00 | | 0.53 | | | | | 0.98 | | |
| Satd. Flow (perm) | | 1863 | 1343 | | 956 | | | | | 3284 | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 425 | 83 | 64 | 80 | 0 | 0 | 0 | 0 | 342 | 532 | 39 |
| RTOR Reduction (vph) | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 425 | 50 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 911 | 0 |
| Confl. Peds. (#/hr) | 106 | | 106 | 134 | | 134 | 73 | | 73 | 52 | | 52 |
| Confl. Bikes (#/hr) | | | 3 | | | 7 | | | 21 | | | 1 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | Perm | |
| Protected Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Permitted Phases | 4 | | 4 | | 4 | | 2 | | 2 | | 2 | |
| Actuated Green, G (s) | 26.0 | | 26.0 | | 26.0 | | 46.0 | | 46.0 | | 46.0 | |
| Effective Green, g (s) | 26.0 | | 26.0 | | 26.0 | | 46.0 | | 46.0 | | 46.0 | |
| Actuated g/C Ratio | 0.32 | | 0.32 | | 0.32 | | 0.57 | | 0.57 | | 0.57 | |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | | 4.0 | | 4.0 | | 4.0 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | | 3.0 | | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 605 | | 436 | | 311 | | 1888 | | 1888 | | 1888 | |
| v/s Ratio Prot | c0.23 | | | | | | | | | | | |
| v/s Ratio Perm | | | 0.04 | | 0.15 | | 0.28 | | 0.28 | | 0.28 | |
| v/c Ratio | 0.70 | | 0.11 | | 0.46 | | 0.48 | | 0.48 | | 0.48 | |
| Uniform Delay, d1 | 23.6 | | 18.9 | | 21.5 | | 10.0 | | 10.0 | | 10.0 | |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | | 0.90 | | 0.90 | | 0.90 | |
| Incremental Delay, d2 | 3.7 | | 0.1 | | 1.1 | | 0.7 | | 0.7 | | 0.7 | |
| Delay (s) | 27.3 | | 19.0 | | 22.5 | | 9.7 | | 9.7 | | 9.7 | |
| Level of Service | C | | B | | C | | A | | A | | A | |
| Approach Delay (s) | 26.0 | | | | 22.5 | | 0.0 | | 9.7 | | 9.7 | |
| Approach LOS | C | | | | C | | A | | A | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 16.1 | | | | HCM Level of Service | | B | | | | | |
| HCM Volume to Capacity ratio | 0.56 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | | Sum of lost time (s) | | 8.0 | | | | | |
| Intersection Capacity Utilization | 72.8% | | | | ICU Level of Service | | C | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 18: 21st Street & Franklin Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 8 | 279 | 4 | 0 | 49 | 48 | 12 | 253 | 188 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | | 0.95 | | | | |
| Frpb, ped/bikes | | 1.00 | | | 0.94 | | | 0.95 | | | | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | | 1.00 | | | | |
| Frt | | 1.00 | | | 0.93 | | | 0.94 | | | | |
| Flt Protected | | 1.00 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (prot) | | 1852 | | | 1631 | | | 3129 | | | | |
| Flt Permitted | | 0.99 | | | 1.00 | | | 1.00 | | | | |
| Satd. Flow (perm) | | 1846 | | | 1631 | | | 3129 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 9 | 303 | 4 | 0 | 53 | 52 | 13 | 275 | 204 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 19 | 0 | 0 | 164 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 315 | 0 | 0 | 86 | 0 | 0 | 328 | 0 | 0 | 0 | 0 |
| Confl. Peds. (#/hr) | 58 | | 58 | 134 | | 134 | 73 | | 73 | 87 | | 87 |
| Confl. Bikes (#/hr) | | | | | 5 | | | 5 | | | | 2 |
| Turn Type | Perm | | | | | | Perm | | | | | |
| Protected Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Permitted Phases | 2 | | | 2 | | | 1 | | | 1 | | |
| Actuated Green, G (s) | 28.2 | | | 28.2 | | | 8.8 | | | 8.8 | | |
| Effective Green, g (s) | 28.2 | | | 28.2 | | | 8.8 | | | 8.8 | | |
| Actuated g/C Ratio | 0.63 | | | 0.63 | | | 0.20 | | | 0.20 | | |
| Clearance Time (s) | 4.0 | | | 4.0 | | | 4.0 | | | 4.0 | | |
| Vehicle Extension (s) | 2.0 | | | 2.0 | | | 2.0 | | | 2.0 | | |
| Lane Grp Cap (vph) | 1157 | | | 1022 | | | 612 | | | 612 | | |
| v/s Ratio Prot | c0.17 | | | | | | | | | | | |
| v/s Ratio Perm | 0.27 | | | 0.08 | | | 0.10 | | | 0.54 | | |
| v/c Ratio | 3.8 | | | 3.3 | | | 16.3 | | | 16.3 | | |
| Uniform Delay, d1 | 0.52 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| Progression Factor | 0.5 | | | 0.2 | | | 0.5 | | | 0.5 | | |
| Incremental Delay, d2 | 2.5 | | | 3.5 | | | 16.7 | | | 16.7 | | |
| Delay (s) | A | | | A | | | B | | | B | | |
| Level of Service | A | | | A | | | B | | | B | | |
| Approach Delay (s) | 2.5 | | | 3.5 | | | 16.7 | | | 0.0 | | |
| Approach LOS | A | | | A | | | B | | | A | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 10.3 | | | HCM Level of Service | | | B | | | | | |
| HCM Volume to Capacity ratio | 0.34 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 45.0 | | | Sum of lost time (s) | | | 8.0 | | | | | |
| Intersection Capacity Utilization | 46.9% | | | ICU Level of Service | | | A | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

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Kaiser Center Transportation Study

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APPENDIX G.11

Alternative Freeway Access Route Analysis Memo

AECOM

155 Grand Avenue, Suite 700, Oakland, CA 94612
T 510.763.2929 F 510.834.5220

Memorandum

Date: March 25, 2009

To: Margaret Stanzione, Community and Economic Development Agency,
City of Oakland
Gordon Lum, Transportation Services Division, Community and Economic
Development Agency, City of Oakland

From: Jeffrey Chan, PTP

Subject: Kaiser Center Redevelopment Project Transportation Impact Analysis –
Alternative Freeway Access Route Analysis

This memorandum summarizes the findings from the supplemental analysis considering the effect of high intersection delays on the diversion of Project-generated vehicles to alternative access routes to and from freeways. The analysis considers the following alternative routes:

- To / from I-580 Grand Avenue / Lakeshore Avenue On- and Off-Ramps;
- To SR 13 via Oakland Avenue / Harrison Avenue; and,
- To SB I-880 via the Embarcadero / 10th Avenue On-Ramp.

The following seven “diversion” intersections were selected for analysis:

45. Grand Avenue / El Embarcadero (*signalized*);
46. Lakeshore Avenue / El Embarcadero (*unsignalized*);
47. Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (*signalized*);
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (*signalized*);
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (*signalized*);
50. Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (*signalized*); and,
51. Oakland Avenue / Monte Vista Avenue (*unsignalized*).

All intersections are located outside of the Downtown⁽¹⁾ area. The alternative routes and selected study locations are illustrated in **Figure 1**.

⁽¹⁾ Downtown is defined in the Land Use and Transportation Element of the City of Oakland General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south and I-980 / Brush Street to the west.



KAISER CENTER TRANSPORTATION STUDY ALTERNATIVE FREEWAY ACCESS ROUTE MEMO

Figure 1
ALTERNATIVE ROUTES

Existing Conditions

Existing Conditions level of service (LOS) at each of the selected study locations is summarized in **Table 1**.

Table 1: Intersection Level of Service – Existing Conditions

| No. | Intersection | Traffic Control ^a | AM Peak Hour | | PM Peak Hour | |
|------------------|--|------------------------------|--------------|--------------------|--------------|--------------------|
| | | | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | |
| 45 | Grand Avenue / El Embarcadero | Signal | B | 15.7 | B | 17.4 |
| 46 | Lakeshore Avenue / El Embarcadero | OWSC | F | >50.0 | F | >50.0 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) / I-580 EB Off-Ramp | Signal | D | 40.2 | E | 59.7 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) / I-580 EB On-Ramp | Signal | C | 22.9 | D | 41.6 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) / Santa Clara Avenue / I-580 WB Off-Ramp | Signal | B | 19.5 | B | 12.9 |
| 50 | Harrison Street / MacArthur Blvd. (WB) / Santa Clara Avenue | Signal | C | 26.9 | B | 16.7 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | B | 11.4 | B | 12.1 |

Bold indicates intersections operating at LOS E or LOS F.

^a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

^b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

As shown in **Table 1**, the following intersections currently operate at LOS E or LOS F:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – LOS F; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E.

Near-Term (2015) Conditions

Near-Term (2015) Conditions LOS at each of the selected study locations is summarized in **Table 2**.

Table 2: Intersection Level of Service – Near-Term (2015) Conditions

| No. | Intersection | Traffic Control ^a | Existing Conditions | | | | Near-Term (2015) Conditions | | | |
|------------------|---|------------------------------|---------------------|--------------------|--------------|--------------------|-----------------------------|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 45 | Grand Avenue / El Embarcadero | Signal | B | 15.7 | B | 17.4 | C | 24.5 | E | 77.7 |
| 46 | Lakeshore Avenue / El Embarcadero | OWSC ^c | F | >50.0 | F | >50.0 | B | 16.3 | B | 15.2 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | D | 40.2 | E | 59.7 | D | 37.6 | F | >80.0 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | C | 22.9 | D | 41.6 | C | 27.1 | F | >80.0 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) | Signal | B | 19.5 | B | 12.9 | C | 23.2 | B | 15.1 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | C | 26.9 | B | 16.7 | D | 46.4 | B | 17.9 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | B | 11.4 | B | 12.1 | B | 13.9 | C | 20.2 |

Bold indicates intersections operating at LOS E or LOS F.

^a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

^b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

^c Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 2**, the following intersections would operate at LOS E or LOS F under Near-Term (2015) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS E;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) (PM) – LOS F.

LOS at some intersections, such as Lakeshore Avenue / El Embarcadero, would improve in the future, mostly as a result of improvements proposed under Measure DD.

Cumulative (2030) Conditions

Cumulative (2030) Conditions LOS at each of the selected study locations is summarized in **Table 3**.

Table 3: Intersection Level of Service – Cumulative (2030) Conditions

| No. | Intersection | Traffic Control ^a | Existing Conditions | | | | Cumulative (2030) Conditions | | | |
|------------------|---|------------------------------|---------------------|--------------------|--------------|--------------------|------------------------------|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 45 | Grand Avenue / El Embarcadero | Signal | B | 15.7 | B | 17.4 | D | 38.8 | F | >80.0 |
| 46 | Lakeshore Avenue / El Embarcadero | OWSC ^c | F | 51.9 | F | >80.0 | B | 18.7 | B | 16.2 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | D | 40.2 | E | 59.7 | D | 43.6 | F | >80.0 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | C | 22.9 | D | 41.6 | C | 29.1 | F | >80.0 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) | Signal | B | 19.5 | B | 12.9 | D | 51.0 | C | 20.4 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | C | 26.9 | B | 16.7 | E | 72.1 | C | 21.0 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | B | 11.4 | B | 12.1 | C | 18.7 | E | 48.8 |

Bold indicates intersections operating at LOS E or LOS F.

^a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

^b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

^c Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 3**, the following intersections would operate at LOS E or LOS F under Cumulative (2030) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS E;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) (PM) – LOS F.

LOS at some intersections, such as Lakeshore Avenue / El Embarcadero, would improve in the future, mostly as a result of improvements proposed under Measure DD.

Existing plus Project (Phase I and Phase II) Conditions

Existing plus Project (Phase I and Phase II) Conditions LOS at each of the selected study locations is summarized in **Table 4**.

Table 4: Intersection Level of Service – Existing plus Project Conditions

| | | | | | | | Existing plus Project (Phase I and Phase II) Conditions | | | |
|------------------|---|------------------------------|---------------------|--------------------|--------------|--------------------|---|--------------------|--------------|--------------------|
| | | | Existing Conditions | | | | | | | |
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| No. | Intersection | Traffic Control ^a | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 45 | Grand Avenue / El Embarcadero | Signal | B | 15.7 | B | 17.4 | B | 17.5 | B | 18.8 |
| 46 | Lakeshore Avenue / El Embarcadero | OWSC | F | >50.0 | F | >50.0 | F | >50.0 | F | >50.0 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | D | 40.2 | E | 59.7 | D | 39.3 | E | 76.7 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | C | 22.9 | D | 41.6 | C | 22.8 | D | 45.6 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) | Signal | B | 19.5 | B | 12.9 | C | 21.0 | B | 13.3 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | C | 26.9 | B | 16.7 | C | 30.6 | B | 16.8 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | B | 11.4 | B | 12.1 | B | 12.4 | B | 14.8 |

Bold indicates intersections operating at LOS E or LOS F.

^a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

^b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

As shown in **Table 4**, the following intersections would operate at LOS E or LOS F under Existing plus Project (Phase I and Phase II) Conditions:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – LOS F; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E.

The Project's impacts at each of the above intersections are discussed below:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM)
The intersection of Lakeshore Avenue / El Embarcadero would operate at LOS F in both the AM and PM peak hours under both Existing plus Project Conditions and Existing plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

The intersection satisfies California MUTCD peak hour traffic signal warrants under Existing plus Project (Phase I and Phase II) Conditions for both the AM and PM peak hours. However, the intersection satisfies peak hour traffic signal warrants even under Existing Conditions without the Project.

It should also be noted that this intersection would be signalized under Measure DD and would operate at acceptable conditions under Near-Term (2015) Conditions and Cumulative (2030) Conditions. Given these considerations, the Project impacts at this intersection are considered less than significant.

Mitigation: None required.

• **Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)**

The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS E in the PM peak hour during both Existing Conditions and Existing plus Project (Phase I and Phase II) Conditions.

Since the Project would cause an increase in average intersection delay of 17.0 seconds, which is greater than the four (4) second threshold of significance, and cause an increase in average delay on the critical northbound right movement greater than the six (6) second threshold of significance, the Project would potentially result in a significant impact at this intersection.

Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall reconstruct and restripe the right-turn channel on the northbound Grand Avenue approach to accommodate an additional right turn lane. After implementation of the mitigation measure, the intersection would operate at LOS C in the PM peak hour. During the AM peak hour, the intersection would continue to operate at LOS D.

Significance after Implementation of Mitigation: Less than significant.

The 95th percentile queues at LOS E or LOS F intersections under Existing plus Project (Phase I and Phase II) Conditions as shown in **Table 4**, are summarized in **Table 5**. In all cases, the storage capacity is taken as the distance to the nearest intersection, major driveway, or pedestrian crossing.

Table 5: 95th Percentile Queues – Existing plus Project (Phase I and Phase II) Conditions

| No. | Intersection | Lane Group | Existing Conditions | | | Existing plus Project (Phase I and Phase II) Conditions | | |
|-----|---|------------|---------------------|-------------------|--------------|---|-------------------|------------------|
| | | | Storage Cap. (ft) | Queue Length (ft) | | Storage Cap. (ft) | Queue Length (ft) | |
| | | | | AM Peak Hour | PM Peak Hour | | AM Peak Hour | PM Peak Hour |
| 46 | Lakeshore Avenue / El Embarcadero | EB L | 275 | 207 | 521 | 275 | 451 | >1,000 |
| | | EB R | 275 | 51 | 305 | 275 | 51 | 305 |
| 47 | Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp | NE T | 350 | -- | 374 | 350 | -- | 374 |
| | | NE R | 200 | -- | 621 | 200 | -- | 720 |
| | | SW L | 175 | -- | 283 | 175 | -- | 283 |
| | | SW T | 425 | -- | 162 | 425 | -- | 175 |
| | | SE LTR | 375 | -- | 306 | 375 | -- | 306 |
| | | | | | | | | |

Bold indicates exceedance of storage capacity.

SOURCE: AECOM, 2009.

As shown in **Table 5**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Existing plus Project (Phase I and Phase II) Conditions would exceed the available storage capacity:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – EBL; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (AM / PM) – NET (AM / PM), NER (PM), SWL (AM / PM).

It should be noted, however, that in general, the 95th percentile queues at the above locations already exceed the available storage capacity under Existing Conditions. At the following locations where 95th percentile queues exceed storage capacity under Existing plus Project (Phase I and Phase II) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – EBL
In the EBL lane group, the Project would cause an increase in 95th percentile queue length of 244 feet in the AM peak hour. In the PM peak hour, the queue length is infinitely long. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

As noted in the intersection impact discussion, the intersection would already meet signal warrants under Existing Conditions and is planned for improvements under Measure DD including signalization. After signalization, the 95th percentile queues on the EBL lane group would no longer exceed the storage capacity under Existing plus Project (Phase I and Phase II) Conditions.

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – NER
In the NER lane group, the Project would cause an increase in 95th percentile queue length of 99 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

Mitigation: After implementation of the mitigation measure proposed to mitigate intersection LOS impacts, the 95th percentile queues in the NER lane group would no longer exceed the storage capacity under Existing plus Project (Phase I and Phase II) Conditions.

Significance after Implementation of Mitigation: Less than significant.

Near-Term (2015) plus Project (Phase I) Conditions

Near-Term (2015) plus Project (Phase I) Conditions LOS at each of the selected study locations is summarized in **Table 6**.

As shown in **Table 6**, the following intersections would operate at LOS E or LOS F under Near-Term (2015) plus Project (Phase I) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS F;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – LOS F.

Table 6: Intersection Level of Service – Near-Term (2015) plus Project (Phase I) Conditions

| | | | Near-Term (2015) Conditions | | | | Near-Term (2015) plus Project (Phase I) Conditions | | | |
|------------------|---|------------------------------|-----------------------------|--------------------|--------------|--------------------|--|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| No. | Intersection | Traffic Control ^a | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 45 | Grand Avenue / El Embarcadero | Signal | C | 24.5 | E | 77.7 | C | 24.7 | F | >80.0 |
| 46 | Lakeshore Avenue / El Embarcadero | Signal ^c | B | 16.3 | B | 15.2 | B | 16.3 | B | 15.8 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | D | 37.6 | F | >80.0 | D | 37.3 | F | >80.0 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | C | 27.1 | F | >80.0 | C | 27.1 | F | >80.0 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) | Signal | C | 23.2 | B | 15.1 | C | 24.1 | B | 15.4 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | D | 46.4 | B | 17.9 | D | 48.7 | B | 18.0 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | B | 13.9 | C | 20.2 | B | 14.7 | C | 23.8 |

Bold indicates intersections operating at LOS E or LOS F.

^a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

^b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

^c Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

The Project's impacts at each of the above intersections are discussed below:

- **Intersection #45: Grand Avenue / El Embarcadero (PM)**

The intersection of Grand Avenue / El Embarcadero would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions. The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) Conditions. The intersection is located outside the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. It should be noted, however, that this intersection would undergo geometric changes as part of Measure DD and would already operate at LOS E with 77.7 seconds of average intersection delay under Near-Term (2015) Conditions as a direct result of these changes. The highest delays would be on the northeast Grand Avenue approach, which would have a limited amount of green time available due to the protected left-turn phase on the southwest Grand Avenue approach and the split northwest El Embarcadero approach. While the Project would add traffic to this approach, the poor operation of this approach is directly a result of the Measure DD changes to this intersection. Therefore, the Project's impacts at this intersection are considered less than significant.

Given that there is approximately 30 feet of right-of-way on the northeast Grand Avenue approach, an additional northeast through lane could be accommodated by restriping the

approach, which would improve operations to LOS C in the PM peak hour. In the AM peak hour, the intersection would continue to operate at LOS C.

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)
The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.20 under Near-Term (2015) Conditions and 1.23 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be three (3) percent, which is not above the three (3) percent threshold of significance, the Project would not potentially contribute to a significant near-term impact at this intersection.

Mitigation: None required.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (EB) (PM)
The intersection of Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.11 under Near-Term (2015) Conditions and 1.13 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be two (2) percent, which is below the three (3) percent threshold of significance, the Project would not potentially contribute to a significant near-term impact at this intersection.

Mitigation: None required.

The 95th percentile queues at LOS E or LOS F intersections under Near-Term (2015) plus Project (Phase I) Conditions as shown in **Table 6**, are summarized in **Table 7**.

Table 7: 95th Percentile Queues – Near-Term (2015) plus Project (Phase I) Conditions

| No. | Intersection | Lane Group | Near-Term (2015) Conditions | | | Near-Term (2015) plus Project (Phase I) Conditions | | |
|-----|---|------------|-----------------------------|-------------------|-----------------|--|-------------------|-----------------|
| | | | Storage Cap. (ft) | Queue Length (ft) | | Storage Cap. (ft) | Queue Length (ft) | |
| | | | | AM Peak Hour | PM Peak Hour | | AM Peak Hour | PM Peak Hour |
| 45 | Grand Avenue / El Embarcadero | NE TR | 600 | -- | 964 | 600 | -- | 1,005 |
| | | SW L | 325 | -- | 85 ^a | 325 | -- | 88 ^a |
| | | T | 325 | -- | 0 ^a | 325 | -- | 0 ^a |
| | | NW LR | 275 | -- | 241 | 275 | -- | 241 |
| 47 | Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp | NE T | 350 | -- | 167 | 350 | -- | 162 |
| | | R | 200 | -- | 420 | 200 | -- | 435 |
| | | SW L | 175 | -- | 462 | 175 | -- | 462 |
| | | T | 425 | -- | 242 | 425 | -- | 250 |
| | | SE LTR | 375 | -- | 553 | 375 | -- | 553 |
| 48 | Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp | NE TR | 250 | -- | 296 | 250 | -- | 309 |
| | | SW L | 150 | -- | 473 | 150 | -- | 473 |
| | | T | 150 | -- | 48 | 150 | -- | 48 |
| | | L | 475 | -- | 126 | 475 | -- | 126 |
| | | EB T | 475 | -- | 487 | 475 | -- | 487 |
| | | R | 475 | -- | 354 | 475 | -- | 363 |

Bold indicates exceedance of storage capacity.

^a Volume for 95th percentile queue is metered by upstream signal.

SOURCE: AECOM, 2009.

As shown in **Table 7**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Near-Term (2015) plus Project (Phase I) Conditions would exceed the available storage capacity:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR;
- Intersection #46: Lakeshore Avenue / El Embarcadero (PM) – NER, SWL, and SELTR; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR, SWL, and EBT.

It should be noted, however, that the 95th percentile queues at the above locations already exceed the available storage capacity under Near-Term (2015) Conditions. At the following location where 95th percentile queues exceed storage capacity under Near-Term (2015) plus Project (Phase I) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR
In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 41 feet in the PM peak hour. On the SWL and SWT lane groups, queues are short because the arrival of vehicles at the approach is controlled by the traffic signal at the upstream intersection. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

As noted in the intersection impact discussion, this intersection would undergo geometric changes as part of Measure DD. The 95th percentile queue length on the NETR lane group would already exceed the storage capacity under Near-Term (2015) Conditions as a direct result of these changes. Therefore, the Project's impacts at this intersection are considered less than significant.

If the northeast Grand Avenue approach were restriped to accommodate an additional through lane, the 95th percentile queues in the PM peak hour would be reduced to 596 feet, which would no longer exceed the storage capacity.

Mitigation: None required.

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Near-Term (2015) plus Project (Phase I and Phase II) Conditions LOS at each of the selected study locations is summarized in **Table 8**.

Table 8: Intersection Level of Service – Near-Term (2015) plus Project (Phase I and Phase II) Conditions

| No. | Intersection | Traffic Control ^a | Near-Term (2015) Conditions | | | | Near-Term (2015) plus Project (Phase I and Phase II) Conditions | | | |
|------------------|---|------------------------------|-----------------------------|--------------------|--------------|--------------------|---|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 45 | Grand Avenue / El Embarcadero | Signal | C | 24.5 | E | 77.7 | C | 25.5 | F | >80.0 |
| 46 | Lakeshore Avenue / El Embarcadero | Signal ^c | B | 16.3 | B | 15.2 | B | 16.4 | B | 17.0 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | D | 37.6 | F | >80.0 | D | 37.3 | F | >80.0 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | C | 27.1 | F | >80.0 | C | 27.2 | F | >80.0 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) | Signal | C | 23.2 | B | 15.1 | C | 27.8 | B | 15.8 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | D | 46.4 | B | 17.9 | D | 52.0 | B | 18.1 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | B | 13.9 | C | 20.2 | C | 15.9 | D | 30.9 |

Bold indicates intersections operating at LOS E or LOS F.

^a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

^b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

^c Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 8**, the following intersections would operate at LOS E or LOS F under Near-Term (2015) plus Project (Phase I and Phase II) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS F;

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F.

The Project's impacts at each of the above intersections are discussed below:

- Intersection #45: Grand Avenue / El Embarcadero (PM)
The intersection of Grand Avenue / El Embarcadero would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) Conditions. The intersection is located outside the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. It should be noted, however, that this intersection would undergo geometric changes as part of Measure DD and would already operate at LOS E with 77.7 seconds of average intersection delay under Near-Term (2015) Conditions as a direct result of these changes. The highest delays would be on the northeast Grand Avenue approach, which would have a limited amount of green time available due to the protected left-turn phase on the southwest Grand Avenue approach and the split northwest El Embarcadero approach. While the Project would add traffic to this approach, the poor operation of this approach is directly a result of the Measure DD changes to this intersection. Therefore, the Project's impacts at this intersection are considered less than significant.

Given that there is approximately 30 feet of right-of-way on the northeast Grand Avenue approach, an additional northeast through lane could be accommodated by restriping the approach, which would improve operations to LOS C in the PM peak hour. In the AM peak hour, the intersection would continue to operate at LOS C.

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)
The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.20 under Near-Term (2015) Conditions and 1.26 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be six (6) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: As proposed under Existing plus Project (Phase I and Phase II) Conditions, the Applicant, Owners, or Successors-in-Interest of the Project shall reconstruct and restripe the right-turn channel on the northbound Grand Avenue approach to accommodate an additional right turn lane. After implementation of the mitigation measure, the intersection would still operate at LOS E in the PM peak hour, but the Project's impacts at this intersection would be mitigated. During the AM peak hour, the intersection would continue to operate at LOS D.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (EB) (PM)
The intersection of Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.11 under Near-Term (2015) Conditions and 1.15 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be four (4) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall retime the signal at this intersection, increasing green time to the critical southbound left-turn movement from Lakeshore Avenue and eastbound through movement from MacArthur Boulevard. After implementation of the mitigation measure, the intersection would still operate at LOS E in the PM peak hour, but the Project's impacts at this intersection would be mitigated.

Significance after Implementation of Mitigation: Less than significant.

The 95th percentile queues at LOS E or LOS F intersections under Near-Term (2015) plus Project (Phase I) Conditions as shown in **Table 8**, are summarized in **Table 9**.

As shown in **Table 9**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Near-Term (2015) plus Project (Phase I and Phase II) Conditions would exceed the available storage capacity:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR;
- Intersection #46: Lakeshore Avenue / El Embarcadero (PM) – NER, SWL, and SELTR; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR, SWL, and EBT.

It should be noted, however, that the 95th percentile queues at the above locations already exceed the available storage capacity under Near-Term (2015) Conditions. At the following location where 95th percentile queues exceed storage capacity under Near-Term (2015) plus Project (Phase I) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR
In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 41 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

As noted in the intersection impact discussion, this intersection would undergo geometric changes as part of Measure DD. The 95th percentile queue length on the NETR lane group would already exceed the storage capacity under Near-Term (2015) Conditions as a direct result of these changes. Therefore, the Project's impacts at this intersection are considered less than significant.

Table 9: 95th Percentile Queues – Near-Term (2015) plus Project (Phase I and Phase II) Conditions

| No. | Intersection | Lane Group | Near-Term (2015) Conditions | | | Near-Term (2015) plus Project
(Phase I and Phase II) Conditions | | |
|-----|---|------------|-----------------------------|-------------------|-----------------|--|-------------------|-----------------|
| | | | Storage
Cap.
(ft) | Queue Length (ft) | | Storage
Cap.
(ft) | Queue Length (ft) | |
| | | | | AM Peak
Hour | PM Peak
Hour | | AM Peak
Hour | PM Peak
Hour |
| 45 | Grand Avenue /
El Embarcadero | NE TR | 600 | -- | 964 | 600 | -- | 1,057 |
| | | SW L | 325 | -- | 85 ^a | 325 | -- | 89 ^a |
| | | T | 325 | -- | 0 ^a | 325 | -- | 0 ^a |
| | | NW LR | 275 | -- | 241 | 275 | -- | 241 |
| 47 | Grand Avenue /
MacArthur Boulevard (EB) /
I-580 EB Off-Ramp | NE T | 350 | -- | 167 | 350 | -- | 154 |
| | | R | 200 | -- | 420 | 200 | -- | 452 |
| | | SW L | 175 | -- | 462 | 175 | -- | 462 |
| | | T | 425 | -- | 242 | 425 | -- | 258 |
| | | SE LTR | 375 | -- | 553 | 375 | -- | 553 |
| 48 | Lakeshore Avenue /
MacArthur Boulevard (EB) /
I-580 EB Off-Ramp | NE TR | 250 | -- | 296 | 250 | -- | 326 |
| | | SW L | 150 | -- | 473 | 150 | -- | 473 |
| | | T | 150 | -- | 48 | 150 | -- | 48 |
| | | L | 475 | -- | 126 | 475 | -- | 124 |
| | | EB T | 475 | -- | 487 | 475 | -- | 488 |
| | | R | 475 | -- | 354 | 475 | -- | 364 |

Bold indicates exceedance of storage capacity.^a Volume for 95th percentile queue is metered by upstream signal.

SOURCE: AECOM, 2009.

If the northeast Grand Avenue approach were restriped to accommodate an additional through lane, the 95th percentile queues in the PM peak hour would be reduced to 632 feet, which would still exceed the storage capacity, but mitigate the Project's impacts at this intersection

Mitigation: None required.**Cumulative (2030) plus Project (Phase I and Phase II) Conditions**

Cumulative (2030) plus Project (Phase I and Phase II) Conditions LOS at each of the selected study locations is summarized in **Table 10**.

Table 10: Intersection Level of Service – Cumulative (2030) plus Project (Phase I and Phase II) Conditions

| | | | Cumulative (2030) Conditions | | | | Cumulative (2030) plus Project
(Phase I and Phase II)
Conditions | | | |
|------------------|--|---------------------------------|------------------------------|--------------------|--------------|--------------------|--|--------------------|--------------|--------------------|
| No. | Intersection | Traffic
Control ^a | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 45 | Grand Avenue /
El Embarcadero | Signal | D | 38.8 | F | >80.0 | D | 41.4 | F | >80.0 |
| 46 | Lakeshore Avenue /
El Embarcadero | Signal ^c | B | 18.7 | B | 16.2 | B | 18.7 | B | 18.2 |
| 47 | Grand Avenue /
MacArthur Blvd. (EB) | Signal | D | 43.6 | F | >80.0 | D | 44.0 | F | >80.0 |
| 48 | Lakeshore Avenue /
MacArthur Blvd. (EB) | Signal | C | 29.1 | F | >80.0 | C | 29.0 | F | >80.0 |
| 49 | Oakland Avenue / MacArthur
Blvd. (WB) | Signal | D | 51.0 | C | 20.4 | E | 69.0 | C | 23.3 |
| 50 | Harrison Street /
MacArthur Blvd. (WB) | Signal | E | 72.1 | C | 21.0 | F | >80.0 | C | 21.3 |
| 51 | Oakland Avenue /
Monte Vista Avenue | AWSC | C | 18.7 | E | 48.8 | C | 22.7 | F | >50.0 |

Bold indicates intersections operating at LOS E or LOS F.

^a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

^b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

^c Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 10**, the following intersections would operate at LOS E or LOS F under Cumulative (2030) plus Project (Phase I and Phase II) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS F;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F;
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F;
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM) – LOS E;
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – LOS F; and,
- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM) – LOS F.

The Project's impacts at each of the above intersections are discussed below:

- Intersection #45: Grand Avenue / El Embarcadero (PM)
The intersection of Grand Avenue / El Embarcadero would operate at LOS F in the PM peak hour under both Cumulative (2030) Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.01 under Cumulative (2030) Conditions and 1.06 under Cumulative (2030) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be five (5) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

It should be noted, however, that this intersection would undergo geometric changes as part of Measure DD and would already operate at LOS F with greater than 80.0 seconds of average intersection delay under Cumulative (2030) Conditions as a direct result of these changes. The highest delays would be on the northeast Grand Avenue approach, which would have a limited amount of green time available due to the protected left-turn phase on the southwest Grand Avenue approach and the split northwest El Embarcadero approach. While the Project would add traffic to this approach, the poor operation of this approach is directly a result of the Measure DD changes to this intersection. Therefore, the Project's impacts at this intersection are considered less than significant.

Given that there is approximately 30 feet of right-of-way on the northeast Grand Avenue approach, an additional northeast through lane could be accommodated by restriping the approach, which would improve operations to LOS C in the PM peak hour. In the AM peak hour, the intersection would continue to operate at LOS C.

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)
The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS F in the PM peak hour under both Cumulative (2030) Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.61 under Cumulative (2030) Conditions and 1.66 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be five (5) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: As proposed under Existing plus Project (Phase I and Phase II) Conditions and Near-Term (2015) plus Project (Phase I and Phase II) Conditions, the Applicant, Owners, or Successors-in-Interest of the Project shall reconstruct and restripe the right-turn channel on the northbound Grand Avenue approach to accommodate an additional right turn lane. In addition, they shall restripe the eastbound MacArthur Boulevard / I-580 EB Off-Ramp approach to accommodate an additional through lane. After implementation of the mitigation measure, the intersection would still operate at LOS F in the PM peak hour, but the Project's impacts at this intersection would be mitigated. During the AM peak hour, the intersection would continue to operate at LOS C.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (EB) (PM)
The intersection of Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp would operate at LOS F in the PM peak hour under both Cumulative (2030) Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.32 under Near-Term (2015) Conditions and 1.37 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be five (5) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall redesign the I-580 EB On-Ramp with an additional lane and restripe the approaches at this intersection as follows:

- The southbound Lakeshore Avenue approach would be restriped from the existing configuration of one exclusive left-turn lane and two through lanes to two exclusive left-turn lanes and one through lane; and,
- The median on the northeast Lakeshore Avenue approach would be narrowed and restriped from the existing configuration of one through lane and one shared through-right lane to one through lane and two exclusive right-turn lanes.

After implementation of the mitigation measure, the intersection would still operate at LOS F in the PM peak hour, but the Project's impacts at this intersection would be mitigated. In the AM peak hour, the intersection would operate at LOS C.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM)
The intersection of Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp would operate at LOS E in the AM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS D in the AM peak hour under Cumulative (2030) Conditions. The intersection is located outside the Downtown area.

Because the Project would cause the intersection to degrade from LOS D to LOS E, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall retime the signal to increase the green time to the northwest MacArthur Boulevard approach. After implementation of the mitigation measure, the intersection would operate at LOS C.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM)
The intersection of Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue would operate at LOS F in the AM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS E in the AM peak hour under Cumulative (2030) Conditions. The intersection is located outside the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall restripe the southwest Harrison Street approach to accommodate an additional through lane. After implementation of the mitigation measure, the intersection would operate at LOS D in the AM peak hour and LOS B in the PM peak hour.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM)

The intersection of Oakland Avenue / Monte Vista Avenue would operate at LOS F in the PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS E in the PM peak hour under Cumulative (2030) Conditions. The intersection is located outside the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: The delays at the intersection are primarily on the eastbound Oakland Avenue approach. The Applicant, Owners, or Successors-in-Interest of the Project shall signalize the intersection. After implementation of the mitigation measure, the intersection would operate at LOS B in the PM peak hour. In the AM peak hour, the intersection would operate at LOS B.

Significance after Implementation of Mitigation: Less than significant.

The 95th percentile queues at LOS E or LOS F intersections under Cumulative (2030) plus Project (Phase I) Conditions as shown in **Table 10**, are summarized in **Table 11**.

As shown in **Table 11**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would exceed the available storage capacity:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – NER, SWL, and SELTR;
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR, SWL, and EBT;
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM) – NWTR and NELT;
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – NWL, NWT, and SWTR; and,
- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM) – EBTR.

Table 11: 95th Percentile Queues – Cumulative (2030) plus Project (Phase I and Phase II) Conditions

| No. | Intersection | Lane Group | Cumulative (2030) Conditions | | | Cumulative (2030) plus Project (Phase I and Phase II) Conditions | | |
|-----|---|------------|------------------------------|-------------------|-----------------|--|-------------------|-----------------|
| | | | Storage Cap. (ft) | Queue Length (ft) | | Storage Cap. (ft) | Queue Length (ft) | |
| | | | | AM Peak Hour | PM Peak Hour | | AM Peak Hour | PM Peak Hour |
| 45 | Grand Avenue / El Embarcadero | NE TR | 600 | -- | 1,031 | 600 | -- | 1,121 |
| | | SW L | 325 | -- | 89 ^a | 325 | -- | 92 ^a |
| | | T | 325 | -- | 0 ^a | 325 | -- | 0 ^a |
| | | NW LR | 275 | -- | 249 | 275 | -- | 249 |
| 47 | Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp | NE T | 350 | -- | 173 | 350 | -- | 163 |
| | | R | 200 | -- | 477 | 200 | -- | 508 |
| | | SW L | 175 | -- | 770 | 175 | -- | 770 |
| | | T | 425 | -- | 257 | 425 | -- | 273 |
| | | SE LTR | 375 | -- | 904 | 375 | -- | 904 |
| 48 | Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp | NE TR | 250 | -- | 314 | 250 | -- | 344 |
| | | SW L | 150 | -- | 497 | 150 | -- | 497 |
| | | T | 150 | -- | 50 | 150 | -- | 50 |
| | | L | 475 | -- | 86 | 475 | -- | 86 |
| | | EB T | 475 | -- | 478 | 475 | -- | 484 |
| | | R | 475 | -- | 309 | 475 | -- | 320 |
| 49 | Oakland Avenue / MacArthur Boulevard (WB) | NW TR | 175 | 610 | -- | 175 | 663 | -- |
| | | NE LT | 200 | 204 | -- | 200 | 205 | -- |
| 50 | Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue | NW L | 250 | 375 | -- | 250 | 373 | -- |
| | | T | 250 | 379 | -- | 250 | 379 | -- |
| | | SW TR | 300 | 655 | -- | 300 | 680 | -- |
| 51 | Oakland Avenue / Monte Vista Avenue ^b | NB LTR | 250 | -- | 5 | 250 | -- | 5 |
| | | SB LTR | 275 | -- | 15 | 275 | -- | 15 |
| | | EB L | 50 | -- | 28 | 50 | -- | 28 |
| | | TR | 150 | -- | 313 | 150 | -- | 508 |
| | | WB LTR | 350 | -- | 35 | 350 | -- | 38 |

Bold indicates exceedance of storage capacity.^a Volume for 95th percentile queue is metered by upstream signal.^b For all-way stop intersections, queue length represents average queue.

SOURCE: AECOM, 2009.

It should be noted, however, that the 95th percentile queues at the above locations already exceed the available storage capacity under Cumulative (2030) Conditions. At the following location where 95th percentile queues exceed storage capacity under Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR

In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 90 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue

length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

As noted in the intersection impact discussion, this intersection would undergo geometric changes as part of Measure DD. The 95th percentile queue length on the NETR lane group would already exceed the storage capacity under Cumulative (2030) Conditions as a direct result of these changes. Therefore, the Project's impacts at this intersection are considered less than significant.

If the northeast Grand Avenue approach were restriped to accommodate an additional through lane, the 95th percentile queues in the PM peak hour would be reduced to 682 feet, which would still exceed the storage capacity, but mitigate the Project's impacts at this intersection

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – NER
In the NER lane group, the Project would cause an increase in 95th percentile queue length of 31 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be reduced to 330 feet in the PM peak hour, which would no longer exceed the available storage capacity.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR
In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 30 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would still exceed the available storage capacity. Given geometric constraints after implementation of that mitigation measure, it would not be possible to make further changes to lane configuration to mitigate the Project's queuing impacts at this intersection. Therefore, the Project's impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and unavoidable.

- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM) – NWTR
In the EBTR lane group, the Project would cause an increase in 95th percentile queue length of 195 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be reduced to 337 feet, which would no longer exceed the available storage capacity.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM) – EBTR

In the EBTR lane group, the Project would cause an increase in 95th percentile queue length of 195 feet in the PM peak hour. Since the Project would cause an increase in the average queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be 299 feet, which would still exceed the available storage capacity, but mitigate the Project's impacts at this intersection.

For the other lane groups, installation of a signal at this intersection would not result in 95th percentile queues that exceed the available storage capacity in the PM peak hour, except for the EBL lane group, which is currently striped as a 50-foot turn pocket. In the PM peak hour, the 95th percentile queues on the EBL lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be 112 feet. Therefore, the Applicant, Owners, or Successors-in-Interest of the Project shall restripe the pocket with 125 feet of storage capacity.

Significance after Implementation of Mitigation: Less than significant.

Kaiser Center Redevelopment Project Transportation Study

Alternative Freeway Access Route Analysis Technical Appendices

- A: Intersection Turning Movement Counts
- B: Level of Service Calculation Worksheets
- C: Queue Calculation Worksheets

Appendix A

Intersection Turning Movement Counts

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | |
|---------------|-----------------------|--------------|------------|-------|-------------|
| PROJECT: | OAKLAND TRAFFIC STUDY | SURVEY DATE: | 2008/11/12 | DAY: | WEDNESDAY |
| N-S Approach: | GRAND AVENUE | SURVEY TIME: | 7:00 午前 | TO | 9:00 午前 |
| E-W Approach: | EL EMBARCADERO | CITY: | OAKLAND | FILE: | 2811065-1AM |

PEAK HOUR

08:00 午前 TO 09:00 午前

0

1,088

155

0

0

0

0

302

0

443

0

459

292

TOTAL
2,739

NORTH

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.85

1,243

761

PHF= 0.90

0

745

0

447

PHF= #DIV/0!

1,531

751

PHF= 0.93

EL EMBARCADERO

GRAND AVENUE

| TIME PERIOD | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL |
|---------------------|------------|------|-------|------------|-------|-------|-----------|------|-------|-----------|------|-------|-------|
| From To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| SURVEY DATA | | | | | | | | | | | | | |
| 7:00 AM --- 7:15 午前 | 0 | 73 | 58 | 19 | 91 | 0 | 0 | 0 | 0 | 37 | 0 | 47 | 325 |
| 7:15 午前 --- 7:30 午前 | 0 | 144 | 90 | 35 | 191 | 0 | 0 | 0 | 0 | 73 | 0 | 103 | 636 |
| 7:30 午前 --- 7:45 午前 | 0 | 233 | 132 | 76 | 375 | 0 | 0 | 0 | 0 | 128 | 0 | 175 | 1,119 |
| 7:45 午前 --- 8:00 午前 | 0 | 326 | 193 | 121 | 558 | 0 | 0 | 0 | 0 | 215 | 0 | 251 | 1,664 |
| 8:00 午前 --- 8:15 午前 | 0 | 436 | 267 | 150 | 779 | 0 | 0 | 0 | 0 | 318 | 0 | 330 | 2,280 |
| 8:15 午前 --- 8:30 午前 | 0 | 550 | 350 | 192 | 1,041 | 0 | 0 | 0 | 0 | 443 | 0 | 412 | 2,988 |
| 8:30 午前 --- 8:45 午前 | 0 | 646 | 423 | 235 | 1,321 | 0 | 0 | 0 | 0 | 534 | 0 | 491 | 3,650 |
| 8:45 午前 --- 9:00 午前 | 0 | 785 | 485 | 276 | 1,646 | 0 | 0 | 0 | 0 | 658 | 0 | 553 | 4,403 |
| TOTAL BY PERIOD | | | | | | | | | | | | | |
| 7:00 AM --- 7:15 午前 | 0 | 73 | 58 | 19 | 91 | 0 | 0 | 0 | 0 | 37 | 0 | 47 | 325 |
| 7:15 午前 --- 7:30 午前 | 0 | 71 | 32 | 16 | 100 | 0 | 0 | 0 | 0 | 36 | 0 | 56 | 311 |
| 7:30 午前 --- 7:45 午前 | 0 | 89 | 42 | 41 | 184 | 0 | 0 | 0 | 0 | 55 | 0 | 72 | 483 |
| 7:45 午前 --- 8:00 午前 | 0 | 93 | 61 | 45 | 183 | 0 | 0 | 0 | 0 | 87 | 0 | 76 | 545 |
| 8:00 午前 --- 8:15 午前 | 0 | 110 | 74 | 29 | 221 | 0 | 0 | 0 | 0 | 103 | 0 | 79 | 616 |
| 8:15 午前 --- 8:30 午前 | 0 | 114 | 83 | 42 | 262 | 0 | 0 | 0 | 0 | 125 | 0 | 82 | 708 |
| 8:30 午前 --- 8:45 午前 | 0 | 96 | 73 | 43 | 280 | 0 | 0 | 0 | 0 | 91 | 0 | 79 | 662 |
| 8:45 午前 --- 9:00 午前 | 0 | 139 | 62 | 41 | 325 | 0 | 0 | 0 | 0 | 124 | 0 | 62 | 753 |
| HOURLY TOTALS | | | | | | | | | | | | | |
| 7:00 AM --- 8:00 午前 | 0 | 326 | 193 | 121 | 558 | 0 | 0 | 0 | 0 | 215 | 0 | 251 | 1,664 |
| 7:15 午前 --- 8:15 午前 | 0 | 363 | 209 | 131 | 688 | 0 | 0 | 0 | 0 | 281 | 0 | 283 | 1,955 |
| 7:30 午前 --- 8:30 午前 | 0 | 406 | 260 | 157 | 850 | 0 | 0 | 0 | 0 | 370 | 0 | 309 | 2,352 |
| 7:45 午前 --- 8:45 午前 | 0 | 413 | 291 | 159 | 946 | 0 | 0 | 0 | 0 | 406 | 0 | 316 | 2,531 |
| 8:00 午前 --- 9:00 午前 | 0 | 459 | 292 | 155 | 1,088 | 0 | 0 | 0 | 0 | 443 | 0 | 302 | 2,739 |

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B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | |
|---------------|-----------------------|--------------|------------|-------|-------------|
| PROJECT: | OAKLAND TRAFFIC STUDY | SURVEY DATE: | 2008/11/06 | DAY: | THURSDAY |
| N-S Approach: | GRAND AVENUE | SURVEY TIME: | 4:00 午後 | TO | 6:00 午後 |
| E-W Approach: | EL EMBARCADERO | CITY: | OAKLAND | FILE: | 2811065-1PM |

PEAK HOUR

05:00 午後 TO 06:00 午後

0

723

235

0

0

0

255

0

245

0

1,000

700

TOTAL
3,158

EL EMBARCADERO

GRAND AVENUE

NORTH

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.90

958

1,255

PHF= 0.89

500

935

PHF= #DIV/0!

968

1,700

PHF= 0.92

| TIME PERIOD | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL |
|---------------------|------------|-------|-------|------------|-------|-------|-----------|------|-------|-----------|------|-------|-------|
| From To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| SURVEY DATA | | | | | | | | | | | | | |
| 4:00 PM --- 4:15 午後 | 0 | 142 | 114 | 47 | 143 | 0 | 0 | 0 | 0 | 48 | 0 | 47 | 541 |
| 4:15 午後 --- 4:30 午後 | 0 | 285 | 219 | 95 | 275 | 0 | 0 | 0 | 0 | 99 | 0 | 92 | 1,065 |
| 4:30 午後 --- 4:45 午後 | 0 | 498 | 392 | 164 | 429 | 0 | 0 | 0 | 0 | 154 | 0 | 129 | 1,766 |
| 4:45 午後 --- 5:00 午後 | 0 | 681 | 541 | 206 | 565 | 0 | 0 | 0 | 0 | 197 | 0 | 189 | 2,379 |
| 5:00 午後 --- 5:15 午後 | 0 | 891 | 665 | 270 | 738 | 0 | 0 | 0 | 0 | 255 | 0 | 271 | 3,090 |
| 5:15 午後 --- 5:30 午後 | 0 | 1,145 | 874 | 328 | 915 | 0 | 0 | 0 | 0 | 316 | 0 | 350 | 3,928 |
| 5:30 午後 --- 5:45 午後 | 0 | 1,412 | 1,070 | 381 | 1,083 | 0 | 0 | 0 | 0 | 375 | 0 | 407 | 4,728 |
| 5:45 午後 --- 6:00 午後 | 0 | 1,681 | 1,241 | 441 | 1,288 | 0 | 0 | 0 | 0 | 442 | 0 | 444 | 5,537 |
| TOTAL BY PERIOD | | | | | | | | | | | | | |
| 4:00 PM --- 4:15 午後 | 0 | 142 | 114 | 47 | 143 | 0 | 0 | 0 | 0 | 48 | 0 | 47 | 541 |
| 4:15 午後 --- 4:30 午後 | 0 | 143 | 105 | 48 | 132 | 0 | 0 | 0 | 0 | 51 | 0 | 45 | 524 |
| 4:30 午後 --- 4:45 午後 | 0 | 213 | 173 | 69 | 154 | 0 | 0 | 0 | 0 | 55 | 0 | 37 | 701 |
| 4:45 午後 --- 5:00 午後 | 0 | 183 | 149 | 42 | 136 | 0 | 0 | 0 | 0 | 43 | 0 | 60 | 613 |
| 5:00 午後 --- 5:15 午後 | 0 | 210 | 124 | 64 | 173 | 0 | 0 | 0 | 0 | 58 | 0 | 82 | 711 |
| 5:15 午後 --- 5:30 午後 | 0 | 254 | 209 | 58 | 177 | 0 | 0 | 0 | 0 | 61 | 0 | 79 | 838 |
| 5:30 午後 --- 5:45 午後 | 0 | 267 | 196 | 53 | 168 | 0 | 0 | 0 | 0 | 59 | 0 | 57 | 800 |
| 5:45 午後 --- 6:00 午後 | 0 | 269 | 171 | 60 | 205 | 0 | 0 | 0 | 0 | 67 | 0 | 37 | 809 |
| HOURLY TOTALS | | | | | | | | | | | | | |
| 4:00 PM --- 5:00 午後 | 0 | 681 | 541 | 206 | 565 | 0 | 0 | 0 | 0 | 197 | 0 | 189 | 2,379 |
| 4:15 午後 --- 5:15 午後 | 0 | 749 | 551 | 223 | 595 | 0 | 0 | 0 | 0 | 207 | 0 | 224 | 2,549 |
| 4:30 午後 --- 5:30 午後 | 0 | 860 | 655 | 233 | 640 | 0 | 0 | 0 | 0 | 217 | 0 | 258 | 2,863 |
| 4:45 午後 --- 5:45 午後 | 0 | 914 | 678 | 217 | 654 | 0 | 0 | 0 | 0 | 221 | 0 | 278 | 2,962 |
| 5:00 午後 --- 6:00 午後 | 0 | 1,000 | 700 | 235 | 723 | 0 | 0 | 0 | 0 | 245 | 0 | 255 | 3,158 |

Telephone: (510)232-1271 Fax: (510)232-1272

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | |
|---------------|-----------------------|--------------|------------|-------|-------------|
| PROJECT: | OAKLAND TRAFFIC STUDY | SURVEY DATE: | 2008/11/12 | DAY: | WEDNESDAY |
| N-S Approach: | LAKESHORE AVENUE | SURVEY TIME: | 7:00 午前 | TO | 9:00 午前 |
| E-W Approach: | EL EMBARCADERO | CITY: | OAKLAND | FILE: | 2811065-2AM |

PEAK HOUR

08:00 午前 TO 09:00 午前

262

572

0

180

0

261

TOTAL

2,193

0

0

0

471

447

0

NORTH

EL EMBARCADERO

LAKESHORE AVENUE

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.94

834

627

PHF=

#DIV/0!

733

441

PHF=

0.95

833

918

PHF= 0.96

| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | |
|-----------------|-----|------------|------|-------|------------|------|-------|-----------|------|-------|-----------|------|-------|-------|-------|
| From | To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| SURVEY DATA | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 62 | 60 | 0 | 0 | 67 | 25 | 35 | 0 | 32 | 0 | 0 | 0 | 281 |
| 7:15 午前 | --- | 7:30 午前 | 127 | 150 | 0 | 0 | 186 | 47 | 59 | 0 | 57 | 0 | 0 | 0 | 626 |
| 7:30 午前 | --- | 7:45 午前 | 218 | 250 | 0 | 0 | 343 | 85 | 87 | 0 | 108 | 0 | 0 | 0 | 1,091 |
| 7:45 午前 | --- | 8:00 午前 | 336 | 372 | 0 | 0 | 494 | 128 | 123 | 0 | 175 | 0 | 0 | 0 | 1,628 |
| 8:00 午前 | --- | 8:15 午前 | 461 | 479 | 0 | 0 | 627 | 184 | 176 | 0 | 238 | 0 | 0 | 0 | 2,165 |
| 8:15 午前 | --- | 8:30 午前 | 586 | 587 | 0 | 0 | 759 | 258 | 224 | 0 | 302 | 0 | 0 | 0 | 2,716 |
| 8:30 午前 | --- | 8:45 午前 | 693 | 702 | 0 | 0 | 908 | 331 | 273 | 0 | 365 | 0 | 0 | 0 | 3,272 |
| 8:45 午前 | --- | 9:00 午前 | 807 | 819 | 0 | 0 | 1,066 | 390 | 303 | 0 | 436 | 0 | 0 | 0 | 3,821 |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 62 | 60 | 0 | 0 | 67 | 25 | 35 | 0 | 32 | 0 | 0 | 0 | 281 |
| 7:15 午前 | --- | 7:30 午前 | 65 | 90 | 0 | 0 | 119 | 22 | 24 | 0 | 25 | 0 | 0 | 0 | 345 |
| 7:30 午前 | --- | 7:45 午前 | 91 | 100 | 0 | 0 | 157 | 38 | 28 | 0 | 51 | 0 | 0 | 0 | 465 |
| 7:45 午前 | --- | 8:00 午前 | 118 | 122 | 0 | 0 | 151 | 43 | 36 | 0 | 67 | 0 | 0 | 0 | 537 |
| 8:00 午前 | --- | 8:15 午前 | 125 | 107 | 0 | 0 | 133 | 56 | 53 | 0 | 63 | 0 | 0 | 0 | 537 |
| 8:15 午前 | --- | 8:30 午前 | 125 | 108 | 0 | 0 | 132 | 74 | 48 | 0 | 64 | 0 | 0 | 0 | 551 |
| 8:30 午前 | --- | 8:45 午前 | 107 | 115 | 0 | 0 | 149 | 73 | 49 | 0 | 63 | 0 | 0 | 0 | 556 |
| 8:45 午前 | --- | 9:00 午前 | 114 | 117 | 0 | 0 | 158 | 59 | 30 | 0 | 71 | 0 | 0 | 0 | 549 |
| HOURLY TOTALS | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 8:00 午前 | 336 | 372 | 0 | 0 | 494 | 128 | 123 | 0 | 175 | 0 | 0 | 0 | 1,628 |
| 7:15 午前 | --- | 8:15 午前 | 399 | 419 | 0 | 0 | 560 | 159 | 141 | 0 | 206 | 0 | 0 | 0 | 1,884 |
| 7:30 午前 | --- | 8:30 午前 | 459 | 437 | 0 | 0 | 573 | 211 | 165 | 0 | 245 | 0 | 0 | 0 | 2,090 |
| 7:45 午前 | --- | 8:45 午前 | 475 | 452 | 0 | 0 | 565 | 246 | 186 | 0 | 257 | 0 | 0 | 0 | 2,181 |
| 8:00 午前 | --- | 9:00 午前 | 471 | 447 | 0 | 0 | 572 | 262 | 180 | 0 | 261 | 0 | 0 | 0 | 2,193 |

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B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | |
|---------------|-----------------------|--------------|------------|-------|-------------|
| PROJECT: | OAKLAND TRAFFIC STUDY | SURVEY DATE: | 2008/11/06 | DAY: | THURSDAY |
| N-S Approach: | LAKESHORE AVENUE | SURVEY TIME: | 4:00 午後 | TO | 6:00 午後 |
| E-W Approach: | EL EMBARCADERO | CITY: | OAKLAND | FILE: | 2811065-2PM |

PEAK HOUR

05:00 午後 TO 06:00 午後

148

466

0

311

0

623

0

0

0

350

665

0

TOTAL
2,563

↑

NORTH

EL EMBARCADERO

LAKESHORE AVENUE

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.85

614

976

PHF=

#DIV/0!

498

934

PHF=

0.87

1,089

1,015

PHF=

0.90

| TIME PERIOD | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL |
|---------------------|------------|-------|-------|------------|------|-------|-----------|------|-------|-----------|------|-------|-------|
| From To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| SURVEY DATA | | | | | | | | | | | | | |
| 4:00 PM --- 4:15 午後 | 61 | 136 | 0 | 0 | 120 | 35 | 67 | 0 | 95 | 0 | 0 | 0 | 514 |
| 4:15 午後 --- 4:30 午後 | 127 | 258 | 0 | 0 | 221 | 65 | 124 | 0 | 191 | 0 | 0 | 0 | 986 |
| 4:30 午後 --- 4:45 午後 | 194 | 396 | 0 | 0 | 325 | 91 | 185 | 0 | 376 | 0 | 0 | 0 | 1,567 |
| 4:45 午後 --- 5:00 午後 | 261 | 525 | 0 | 0 | 448 | 127 | 274 | 0 | 475 | 0 | 0 | 0 | 2,110 |
| 5:00 午後 --- 5:15 午後 | 355 | 713 | 0 | 0 | 582 | 173 | 359 | 0 | 578 | 0 | 0 | 0 | 2,760 |
| 5:15 午後 --- 5:30 午後 | 459 | 866 | 0 | 0 | 692 | 207 | 443 | 0 | 761 | 0 | 0 | 0 | 3,428 |
| 5:30 午後 --- 5:45 午後 | 541 | 1,059 | 0 | 0 | 798 | 241 | 526 | 0 | 926 | 0 | 0 | 0 | 4,091 |
| 5:45 午後 --- 6:00 午後 | 611 | 1,190 | 0 | 0 | 914 | 275 | 585 | 0 | 1,098 | 0 | 0 | 0 | 4,673 |
| TOTAL BY PERIOD | | | | | | | | | | | | | |
| 4:00 PM --- 4:15 午後 | 61 | 136 | 0 | 0 | 120 | 35 | 67 | 0 | 95 | 0 | 0 | 0 | 514 |
| 4:15 午後 --- 4:30 午後 | 66 | 122 | 0 | 0 | 101 | 30 | 57 | 0 | 96 | 0 | 0 | 0 | 472 |
| 4:30 午後 --- 4:45 午後 | 67 | 138 | 0 | 0 | 104 | 26 | 61 | 0 | 185 | 0 | 0 | 0 | 581 |
| 4:45 午後 --- 5:00 午後 | 67 | 129 | 0 | 0 | 123 | 36 | 89 | 0 | 99 | 0 | 0 | 0 | 543 |
| 5:00 午後 --- 5:15 午後 | 94 | 188 | 0 | 0 | 134 | 46 | 85 | 0 | 103 | 0 | 0 | 0 | 650 |
| 5:15 午後 --- 5:30 午後 | 104 | 153 | 0 | 0 | 110 | 34 | 84 | 0 | 183 | 0 | 0 | 0 | 668 |
| 5:30 午後 --- 5:45 午後 | 82 | 193 | 0 | 0 | 106 | 34 | 83 | 0 | 165 | 0 | 0 | 0 | 663 |
| 5:45 午後 --- 6:00 午後 | 70 | 131 | 0 | 0 | 116 | 34 | 59 | 0 | 172 | 0 | 0 | 0 | 582 |
| HOURLY TOTALS | | | | | | | | | | | | | |
| 4:00 PM --- 5:00 午後 | 261 | 525 | 0 | 0 | 448 | 127 | 274 | 0 | 475 | 0 | 0 | 0 | 2,110 |
| 4:15 午後 --- 5:15 午後 | 294 | 577 | 0 | 0 | 462 | 138 | 292 | 0 | 483 | 0 | 0 | 0 | 2,246 |
| 4:30 午後 --- 5:30 午後 | 332 | 608 | 0 | 0 | 471 | 142 | 319 | 0 | 570 | 0 | 0 | 0 | 2,442 |
| 4:45 午後 --- 5:45 午後 | 347 | 663 | 0 | 0 | 473 | 150 | 341 | 0 | 550 | 0 | 0 | 0 | 2,524 |
| 5:00 午後 --- 6:00 午後 | 350 | 665 | 0 | 0 | 466 | 148 | 311 | 0 | 623 | 0 | 0 | 0 | 2,563 |

Telephone: (510)232-1271 Fax: (510)232-1272

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | |
|--|--|-------------------------|--|-------------------|--|
| PROJECT: OAKLAND TRAFFIC STUDY | | SURVEY DATE: 2008/11/06 | | DAY: THURSDAY | |
| N-S Approach: GRAND AVENUE | | SURVEY TIME: 4:00 午後 | | TO 6:00 午後 | |
| E-W Approach: MacARTHUR BLVD / I-580 EB OFF-RAMP | | CITY: OAKLAND | | FILE: 2811065-3PM | |

PEAK HOUR

05:00 午後 TO 06:00 午後

0

738

350

298

768

224

0

0

0

0

696

560

MacARTHUR BLVD

MacARTHUR BLVD / I-580 EB OFF-RAMP

GRAND AVENUE

TOTAL
3,634

NORTH

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.94

1,088

994

PHF= #DIV/0!

0

0

1,290

1,678

PHF= 0.91

962

1,256

PHF= 0.95

| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL |
|-----------------|-------------|------------|-------|-------|------------|-------|-------|-----------|-------|-------|-----------|------|-------|-------|
| From | To | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| SURVEY DATA | | | | | | | | | | | | | | |
| 4:00 PM | --- 4:15 午後 | 0 | 115 | 72 | 80 | 134 | 0 | 85 | 158 | 62 | 0 | 0 | 0 | 706 |
| 4:15 午後 | --- 4:30 午後 | 0 | 232 | 140 | 145 | 263 | 0 | 176 | 286 | 110 | 0 | 0 | 0 | 1,352 |
| 4:30 午後 | --- 4:45 午後 | 0 | 351 | 260 | 219 | 420 | 0 | 267 | 479 | 181 | 0 | 0 | 0 | 2,177 |
| 4:45 午後 | --- 5:00 午後 | 0 | 497 | 365 | 302 | 568 | 0 | 339 | 687 | 214 | 0 | 0 | 0 | 2,972 |
| 5:00 午後 | --- 5:15 午後 | 0 | 656 | 492 | 379 | 740 | 0 | 415 | 898 | 277 | 0 | 0 | 0 | 3,857 |
| 5:15 午後 | --- 5:30 午後 | 0 | 843 | 633 | 476 | 925 | 0 | 493 | 1,105 | 325 | 0 | 0 | 0 | 4,800 |
| 5:30 午後 | --- 5:45 午後 | 0 | 1,007 | 799 | 565 | 1,104 | 0 | 563 | 1,272 | 371 | 0 | 0 | 0 | 5,681 |
| 5:45 午後 | --- 6:00 午後 | 0 | 1,193 | 925 | 652 | 1,306 | 0 | 637 | 1,455 | 438 | 0 | 0 | 0 | 6,606 |
| TOTAL BY PERIOD | | | | | | | | | | | | | | |
| 4:00 PM | --- 4:15 午後 | 0 | 115 | 72 | 80 | 134 | 0 | 85 | 158 | 62 | 0 | 0 | 0 | 706 |
| 4:15 午後 | --- 4:30 午後 | 0 | 117 | 68 | 65 | 129 | 0 | 91 | 128 | 48 | 0 | 0 | 0 | 646 |
| 4:30 午後 | --- 4:45 午後 | 0 | 119 | 120 | 74 | 157 | 0 | 91 | 193 | 71 | 0 | 0 | 0 | 825 |
| 4:45 午後 | --- 5:00 午後 | 0 | 146 | 105 | 83 | 148 | 0 | 72 | 208 | 33 | 0 | 0 | 0 | 795 |
| 5:00 午後 | --- 5:15 午後 | 0 | 159 | 127 | 77 | 172 | 0 | 76 | 211 | 63 | 0 | 0 | 0 | 885 |
| 5:15 午後 | --- 5:30 午後 | 0 | 187 | 141 | 97 | 185 | 0 | 78 | 207 | 48 | 0 | 0 | 0 | 943 |
| 5:30 午後 | --- 5:45 午後 | 0 | 164 | 166 | 89 | 179 | 0 | 70 | 167 | 46 | 0 | 0 | 0 | 881 |
| 5:45 午後 | --- 6:00 午後 | 0 | 186 | 126 | 87 | 202 | 0 | 74 | 183 | 67 | 0 | 0 | 0 | 925 |
| HOURLY TOTALS | | | | | | | | | | | | | | |
| 4:00 PM | --- 5:00 午後 | 0 | 497 | 365 | 302 | 568 | 0 | 339 | 687 | 214 | 0 | 0 | 0 | 2,972 |
| 4:15 午後 | --- 5:15 午後 | 0 | 541 | 420 | 299 | 606 | 0 | 330 | 740 | 215 | 0 | 0 | 0 | 3,151 |
| 4:30 午後 | --- 5:30 午後 | 0 | 611 | 493 | 331 | 662 | 0 | 317 | 819 | 215 | 0 | 0 | 0 | 3,448 |
| 4:45 午後 | --- 5:45 午後 | 0 | 656 | 539 | 346 | 684 | 0 | 296 | 793 | 190 | 0 | 0 | 0 | 3,504 |
| 5:00 午後 | --- 6:00 午後 | 0 | 696 | 560 | 350 | 738 | 0 | 298 | 768 | 224 | 0 | 0 | 0 | 3,634 |

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B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | | | | | |
|---|-----|-----------------------------------|--------|--------|---|--------|------------|-----------|--------|--------|-------------|-----------|--------|-------|-------|
| PROJECT: | | OAKLAND TRAFFIC STUDY | | | SURVEY DATE: | | 2008/11/12 | | DAY: | | WEDNESDAY | | | | |
| N-S Approach: | | LAKESHORE AVENUE | | | SURVEY TIME: | | 7:00 午前 | | TO | | 9:00 午前 | | | | |
| E-W Approach: | | MacARTHUR BLVD / I-580 EB ON-RAMP | | | CITY: | | OAKLAND | | FILE: | | 2811065-4AM | | | | |
| <div>PEAK HOUR
08:00 午前 TO 09:00 午前</div> <div><div>654</div><div>31</div><div>229</div></div> <div><div>260</div><div>443</div><div>196</div><div>184</div></div> <div>TOTAL
2,626</div> <div>MacARTHUR BLVD</div> <div>MacARTHUR BLVD</div> <div>I-580 EB ON-RAMP</div> <div>LAKESHORE AVENUE</div> <div>340</div> <div>259</div> <div>30</div> | | | | | <div>ARRIVAL / DEPARTURE VOLUMES</div> <div>PHF= 0.87</div> <div>914</div> <div>600</div> <div>PHF= #DIV/0!</div> <div>0</div> <div>1,083</div> <div>PHF= 0.87</div> <div>838</div> <div>629</div> <div>PHF= 0.95</div> <div>0</div> <div>1,188</div> | | | | | | | | | | |
| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | | WESTBOUND | | TOTAL | |
| From | To | Thur | To S80 | To Mac | Thru | To Mac | To S80 | Left | To S80 | To Mac | Right | Left | To S80 | | |
| SURVEY DATA | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 28 | 58 | 7 | 71 | 5 | 57 | 30 | 57 | 20 | 18 | 0 | 0 | 351 |
| 7:15 午前 | --- | 7:30 午前 | 84 | 112 | 10 | 191 | 8 | 133 | 55 | 132 | 45 | 40 | 0 | 0 | 810 |
| 7:30 午前 | --- | 7:45 午前 | 151 | 165 | 15 | 365 | 17 | 213 | 85 | 233 | 81 | 68 | 0 | 0 | 1,393 |
| 7:45 午前 | --- | 8:00 午前 | 230 | 237 | 25 | 511 | 21 | 307 | 118 | 365 | 122 | 110 | 0 | 0 | 2,046 |
| 8:00 午前 | --- | 8:15 午前 | 320 | 298 | 34 | 666 | 29 | 357 | 178 | 474 | 171 | 150 | 0 | 0 | 2,677 |
| 8:15 午前 | --- | 8:30 午前 | 405 | 360 | 43 | 817 | 33 | 427 | 228 | 582 | 222 | 202 | 0 | 0 | 3,319 |
| 8:30 午前 | --- | 8:45 午前 | 489 | 436 | 49 | 996 | 43 | 494 | 298 | 682 | 263 | 244 | 0 | 0 | 3,994 |
| 8:45 午前 | --- | 9:00 午前 | 570 | 496 | 55 | 1,165 | 52 | 536 | 378 | 808 | 318 | 294 | 0 | 0 | 4,672 |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 7:15 午前 | 28 | 58 | 7 | 71 | 5 | 57 | 30 | 57 | 20 | 18 | 0 | 0 | 351 |
| 7:15 午前 | --- | 7:30 午前 | 56 | 54 | 3 | 120 | 3 | 76 | 25 | 75 | 25 | 22 | 0 | 0 | 459 |
| 7:30 午前 | --- | 7:45 午前 | 67 | 53 | 5 | 174 | 9 | 80 | 30 | 101 | 36 | 28 | 0 | 0 | 583 |
| 7:45 午前 | --- | 8:00 午前 | 79 | 72 | 10 | 146 | 4 | 94 | 33 | 132 | 41 | 42 | 0 | 0 | 653 |
| 8:00 午前 | --- | 8:15 午前 | 90 | 61 | 9 | 155 | 8 | 50 | 60 | 109 | 49 | 40 | 0 | 0 | 631 |
| 8:15 午前 | --- | 8:30 午前 | 85 | 62 | 9 | 151 | 4 | 70 | 50 | 108 | 51 | 52 | 0 | 0 | 642 |
| 8:30 午前 | --- | 8:45 午前 | 84 | 76 | 6 | 179 | 10 | 67 | 70 | 100 | 41 | 42 | 0 | 0 | 675 |
| 8:45 午前 | --- | 9:00 午前 | 81 | 60 | 6 | 169 | 9 | 42 | 80 | 126 | 55 | 50 | 0 | 0 | 678 |
| HOURLY TOTALS | | | | | | | | | | | | | | | |
| 7:00 AM | --- | 8:00 午前 | 230 | 237 | 25 | 511 | 21 | 307 | 118 | 365 | 122 | 110 | 0 | 0 | 2,046 |
| 7:15 午前 | --- | 8:15 午前 | 292 | 240 | 27 | 595 | 24 | 300 | 148 | 417 | 151 | 132 | 0 | 0 | 2,326 |
| 7:30 午前 | --- | 8:30 午前 | 321 | 248 | 33 | 626 | 25 | 294 | 173 | 450 | 177 | 162 | 0 | 0 | 2,509 |
| 7:45 午前 | --- | 8:45 午前 | 338 | 271 | 34 | 631 | 26 | 281 | 213 | 449 | 182 | 176 | 0 | 0 | 2,601 |
| 8:00 午前 | --- | 9:00 午前 | 340 | 259 | 30 | 654 | 31 | 229 | 260 | 443 | 196 | 184 | 0 | 0 | 2,626 |
| Telephone: (510)232-1271 Fax: (510)232-1272 | | | | | | | | | | | | | | | |

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

| PROJECT: | OAKLAND TRAFFIC STUDY | SURVEY DATE: | 2008/11/06 | DAY: | THURSDAY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------------------------------|---|------------|------------|-------------|--------|------------|-----------|--------|-----------|-------|-----------|--------|-----------|-------|-------|------|----|------|--------|--------|------|--------|--------|------|--------|--------|-------|------|--------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|----|-----|---|-----|---|----|---|-----|----|----|---|---|-----|---------|-----|---------|-----|-----|---|-----|---|-----|----|-----|-----|----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-------|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-------|-----|-----|---|---|-------|---------|-----|---------|-----|-----|-----|-----|----|-----|-----|-------|-----|-----|---|---|-------|-----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|----|-----|---|-----|---|----|---|-----|----|----|---|---|-----|---------|-----|---------|----|----|---|----|---|----|----|-----|----|----|---|---|-----|---------|-----|---------|----|-----|---|----|---|----|-----|-----|----|----|---|---|-----|---------|-----|---------|----|-----|----|-----|---|----|----|-----|----|----|---|---|-----|---------|-----|---------|-----|-----|----|-----|---|----|----|-----|-----|----|---|---|-----|---------|-----|---------|----|-----|----|----|---|----|-----|-----|-----|----|---|---|-----|---------|-----|---------|-----|-----|----|-----|---|----|----|-----|-----|----|---|---|-----|---------|-----|---------|----|----|----|-----|---|----|----|-----|-----|----|---|---|-----|---------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---------|-----|---------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|---|---|-------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| N-S Approach: | LAKESHORE AVENUE | SURVEY TIME: | 4:00 午後 | TO | 6:00 午後 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E-W Approach: | MacARTHUR BLVD / I-580 EB ON-RAMP | CITY: | OAKLAND | FILE: | 2811065-4PM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div>PEAK HOUR
04:45 午後 TO 05:45 午後</div> <div><div>456</div><div>19</div><div>263</div></div> <div><div>329</div><div>761</div><div>424</div><div>163</div></div> <div>TOTAL
3,414</div> <div>MacARTHUR BLVD</div> <div>MacARTHUR BLVD</div> <div>I-580 EB ON-RAMP</div> <div>LAKESHORE AVENUE</div> <div>444</div> <div>483</div> <div>72</div> | | <div>ARRIVAL / DEPARTURE VOLUMES</div> <div>PHF= 0.87</div> <div>738</div> <div>773</div> <div>PHF= #DIV/0!</div> <div>0</div> <div>1,677</div> <div>PHF= 0.94</div> <div>619</div> <div>999</div> <div>PHF= 0.91</div> <div>0</div> <div>2,022</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><tr><th colspan="2">TIME PERIOD</th><th colspan="3">NORTHBOUND</th><th colspan="3">SOUTHBOUND</th><th colspan="4">EASTBOUND</th><th colspan="2">WESTBOUND</th><th rowspan="3">TOTAL</th></tr><tr><th>From</th><th>To</th><th>Thru</th><th>To S80</th><th>To Mac</th><th>Thru</th><th>To Mac</th><th>To S80</th><th>Left</th><th>To S80</th><th>To Mac</th><th>Right</th><th>Left</th><th>To S80</th></tr><tr><td colspan="15">SURVEY DATA</td></tr><tr><td>4:00 PM</td><td>---</td><td>4:15 午後</td><td>84</td><td>121</td><td>0</td><td>104</td><td>0</td><td>76</td><td>8</td><td>176</td><td>86</td><td>42</td><td>0</td><td>0</td><td>697</td></tr><tr><td>4:15 午後</td><td>---</td><td>4:30 午後</td><td>166</td><td>206</td><td>7</td><td>191</td><td>6</td><td>138</td><td>50</td><td>311</td><td>129</td><td>83</td><td>0</td><td>0</td><td>1,287</td></tr><tr><td>4:30 午後</td><td>---</td><td>4:45 午後</td><td>253</td><td>309</td><td>11</td><td>279</td><td>11</td><td>206</td><td>191</td><td>447</td><td>194</td><td>128</td><td>0</td><td>0</td><td>2,029</td></tr><tr><td>4:45 午後</td><td>---</td><td>5:00 午後</td><td>351</td><td>424</td><td>27</td><td>385</td><td>18</td><td>272</td><td>264</td><td>629</td><td>280</td><td>183</td><td>0</td><td>0</td><td>2,833</td></tr><tr><td>5:00 午後</td><td>---</td><td>5:15 午後</td><td>461</td><td>567</td><td>40</td><td>522</td><td>20</td><td>344</td><td>318</td><td>832</td><td>395</td><td>224</td><td>0</td><td>0</td><td>3,723</td></tr><tr><td>5:15 午後</td><td>---</td><td>5:30 午後</td><td>560</td><td>675</td><td>63</td><td>619</td><td>24</td><td>405</td><td>435</td><td>1,017</td><td>496</td><td>267</td><td>0</td><td>0</td><td>4,561</td></tr><tr><td>5:30 午後</td><td>---</td><td>5:45 午後</td><td>697</td><td>792</td><td>83</td><td>735</td><td>30</td><td>469</td><td>520</td><td>1,208</td><td>618</td><td>291</td><td>0</td><td>0</td><td>5,443</td></tr><tr><td>5:45 午後</td><td>---</td><td>6:00 午後</td><td>790</td><td>879</td><td>100</td><td>848</td><td>36</td><td>537</td><td>591</td><td>1,362</td><td>750</td><td>329</td><td>0</td><td>0</td><td>6,222</td></tr><tr><td colspan="15">TOTAL BY PERIOD</td></tr><tr><td>4:00 PM</td><td>---</td><td>4:15 午後</td><td>84</td><td>121</td><td>0</td><td>104</td><td>0</td><td>76</td><td>8</td><td>176</td><td>86</td><td>42</td><td>0</td><td>0</td><td>697</td></tr><tr><td>4:15 午後</td><td>---</td><td>4:30 午後</td><td>82</td><td>85</td><td>7</td><td>87</td><td>6</td><td>62</td><td>42</td><td>135</td><td>43</td><td>41</td><td>0</td><td>0</td><td>590</td></tr><tr><td>4:30 午後</td><td>---</td><td>4:45 午後</td><td>87</td><td>103</td><td>4</td><td>88</td><td>5</td><td>68</td><td>141</td><td>136</td><td>65</td><td>45</td><td>0</td><td>0</td><td>742</td></tr><tr><td>4:45 午後</td><td>---</td><td>5:00 午後</td><td>98</td><td>115</td><td>16</td><td>106</td><td>7</td><td>66</td><td>73</td><td>182</td><td>86</td><td>55</td><td>0</td><td>0</td><td>804</td></tr><tr><td>5:00 午後</td><td>---</td><td>5:15 午後</td><td>110</td><td>143</td><td>13</td><td>137</td><td>2</td><td>72</td><td>54</td><td>203</td><td>115</td><td>41</td><td>0</td><td>0</td><td>890</td></tr><tr><td>5:15 午後</td><td>---</td><td>5:30 午後</td><td>99</td><td>108</td><td>23</td><td>97</td><td>4</td><td>61</td><td>117</td><td>185</td><td>101</td><td>43</td><td>0</td><td>0</td><td>838</td></tr><tr><td>5:30 午後</td><td>---</td><td>5:45 午後</td><td>137</td><td>117</td><td>20</td><td>116</td><td>6</td><td>64</td><td>85</td><td>191</td><td>122</td><td>24</td><td>0</td><td>0</td><td>882</td></tr><tr><td>5:45 午後</td><td>---</td><td>6:00 午後</td><td>93</td><td>87</td><td>17</td><td>113</td><td>6</td><td>68</td><td>71</td><td>154</td><td>132</td><td>38</td><td>0</td><td>0</td><td>779</td></tr><tr><td colspan="15">HOURLY TOTALS</td></tr><tr><td>4:00 PM</td><td>---</td><td>5:00 午後</td><td>351</td><td>424</td><td>27</td><td>385</td><td>18</td><td>272</td><td>264</td><td>629</td><td>280</td><td>183</td><td>0</td><td>0</td><td>2,833</td></tr><tr><td>4:15 午後</td><td>---</td><td>5:15 午後</td><td>377</td><td>446</td><td>40</td><td>418</td><td>20</td><td>268</td><td>310</td><td>656</td><td>309</td><td>182</td><td>0</td><td>0</td><td>3,026</td></tr><tr><td>4:30 午後</td><td>---</td><td>5:30 午後</td><td>394</td><td>469</td><td>56</td><td>428</td><td>18</td><td>267</td><td>385</td><td>706</td><td>367</td><td>184</td><td>0</td><td>0</td><td>3,274</td></tr><tr><td>4:45 午後</td><td>---</td><td>5:45 午後</td><td>444</td><td>483</td><td>72</td><td>456</td><td>19</td><td>263</td><td>329</td><td>761</td><td>424</td><td>163</td><td>0</td><td>0</td><td>3,414</td></tr><tr><td>5:00 午後</td><td>---</td><td>6:00 午後</td><td>439</td><td>455</td><td>73</td><td>463</td><td>18</td><td>265</td><td>327</td><td>733</td><td>470</td><td>146</td><td>0</td><td>0</td><td>3,389</td></tr><tr><td colspan="15">Telephone: (510)232-1271 Fax: (510)232-1272</td></tr></table> | | TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | | WESTBOUND | | TOTAL | From | To | Thru | To S80 | To Mac | Thru | To Mac | To S80 | Left | To S80 | To Mac | Right | Left | To S80 | SURVEY DATA | | | | | | | | | | | | | | | 4:00 PM | --- | 4:15 午後 | 84 | 121 | 0 | 104 | 0 | 76 | 8 | 176 | 86 | 42 | 0 | 0 | 697 | 4:15 午後 | --- | 4:30 午後 | 166 | 206 | 7 | 191 | 6 | 138 | 50 | 311 | 129 | 83 | 0 | 0 | 1,287 | 4:30 午後 | --- | 4:45 午後 | 253 | 309 | 11 | 279 | 11 | 206 | 191 | 447 | 194 | 128 | 0 | 0 | 2,029 | 4:45 午後 | --- | 5:00 午後 | 351 | 424 | 27 | 385 | 18 | 272 | 264 | 629 | 280 | 183 | 0 | 0 | 2,833 | 5:00 午後 | --- | 5:15 午後 | 461 | 567 | 40 | 522 | 20 | 344 | 318 | 832 | 395 | 224 | 0 | 0 | 3,723 | 5:15 午後 | --- | 5:30 午後 | 560 | 675 | 63 | 619 | 24 | 405 | 435 | 1,017 | 496 | 267 | 0 | 0 | 4,561 | 5:30 午後 | --- | 5:45 午後 | 697 | 792 | 83 | 735 | 30 | 469 | 520 | 1,208 | 618 | 291 | 0 | 0 | 5,443 | 5:45 午後 | --- | 6:00 午後 | 790 | 879 | 100 | 848 | 36 | 537 | 591 | 1,362 | 750 | 329 | 0 | 0 | 6,222 | TOTAL BY PERIOD | | | | | | | | | | | | | | | 4:00 PM | --- | 4:15 午後 | 84 | 121 | 0 | 104 | 0 | 76 | 8 | 176 | 86 | 42 | 0 | 0 | 697 | 4:15 午後 | --- | 4:30 午後 | 82 | 85 | 7 | 87 | 6 | 62 | 42 | 135 | 43 | 41 | 0 | 0 | 590 | 4:30 午後 | --- | 4:45 午後 | 87 | 103 | 4 | 88 | 5 | 68 | 141 | 136 | 65 | 45 | 0 | 0 | 742 | 4:45 午後 | --- | 5:00 午後 | 98 | 115 | 16 | 106 | 7 | 66 | 73 | 182 | 86 | 55 | 0 | 0 | 804 | 5:00 午後 | --- | 5:15 午後 | 110 | 143 | 13 | 137 | 2 | 72 | 54 | 203 | 115 | 41 | 0 | 0 | 890 | 5:15 午後 | --- | 5:30 午後 | 99 | 108 | 23 | 97 | 4 | 61 | 117 | 185 | 101 | 43 | 0 | 0 | 838 | 5:30 午後 | --- | 5:45 午後 | 137 | 117 | 20 | 116 | 6 | 64 | 85 | 191 | 122 | 24 | 0 | 0 | 882 | 5:45 午後 | --- | 6:00 午後 | 93 | 87 | 17 | 113 | 6 | 68 | 71 | 154 | 132 | 38 | 0 | 0 | 779 | HOURLY TOTALS | | | | | | | | | | | | | | | 4:00 PM | --- | 5:00 午後 | 351 | 424 | 27 | 385 | 18 | 272 | 264 | 629 | 280 | 183 | 0 | 0 | 2,833 | 4:15 午後 | --- | 5:15 午後 | 377 | 446 | 40 | 418 | 20 | 268 | 310 | 656 | 309 | 182 | 0 | 0 | 3,026 | 4:30 午後 | --- | 5:30 午後 | 394 | 469 | 56 | 428 | 18 | 267 | 385 | 706 | 367 | 184 | 0 | 0 | 3,274 | 4:45 午後 | --- | 5:45 午後 | 444 | 483 | 72 | 456 | 19 | 263 | 329 | 761 | 424 | 163 | 0 | 0 | 3,414 | 5:00 午後 | --- | 6:00 午後 | 439 | 455 | 73 | 463 | 18 | 265 | 327 | 733 | 470 | 146 | 0 | 0 | 3,389 | Telephone: (510)232-1271 Fax: (510)232-1272 | | | | | | | | | | | | | | |
| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | | WESTBOUND | | TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From | To | Thru | To S80 | To Mac | Thru | To Mac | To S80 | Left | To S80 | To Mac | Right | Left | To S80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SURVEY DATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 4:15 午後 | 84 | 121 | 0 | 104 | 0 | 76 | 8 | 176 | 86 | 42 | 0 | 0 | 697 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 4:30 午後 | 166 | 206 | 7 | 191 | 6 | 138 | 50 | 311 | 129 | 83 | 0 | 0 | 1,287 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 4:45 午後 | 253 | 309 | 11 | 279 | 11 | 206 | 191 | 447 | 194 | 128 | 0 | 0 | 2,029 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:00 午後 | 351 | 424 | 27 | 385 | 18 | 272 | 264 | 629 | 280 | 183 | 0 | 0 | 2,833 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 5:15 午後 | 461 | 567 | 40 | 522 | 20 | 344 | 318 | 832 | 395 | 224 | 0 | 0 | 3,723 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:15 午後 | --- | 5:30 午後 | 560 | 675 | 63 | 619 | 24 | 405 | 435 | 1,017 | 496 | 267 | 0 | 0 | 4,561 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:30 午後 | --- | 5:45 午後 | 697 | 792 | 83 | 735 | 30 | 469 | 520 | 1,208 | 618 | 291 | 0 | 0 | 5,443 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:45 午後 | --- | 6:00 午後 | 790 | 879 | 100 | 848 | 36 | 537 | 591 | 1,362 | 750 | 329 | 0 | 0 | 6,222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 4:15 午後 | 84 | 121 | 0 | 104 | 0 | 76 | 8 | 176 | 86 | 42 | 0 | 0 | 697 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 4:30 午後 | 82 | 85 | 7 | 87 | 6 | 62 | 42 | 135 | 43 | 41 | 0 | 0 | 590 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 4:45 午後 | 87 | 103 | 4 | 88 | 5 | 68 | 141 | 136 | 65 | 45 | 0 | 0 | 742 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:00 午後 | 98 | 115 | 16 | 106 | 7 | 66 | 73 | 182 | 86 | 55 | 0 | 0 | 804 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 5:15 午後 | 110 | 143 | 13 | 137 | 2 | 72 | 54 | 203 | 115 | 41 | 0 | 0 | 890 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:15 午後 | --- | 5:30 午後 | 99 | 108 | 23 | 97 | 4 | 61 | 117 | 185 | 101 | 43 | 0 | 0 | 838 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:30 午後 | --- | 5:45 午後 | 137 | 117 | 20 | 116 | 6 | 64 | 85 | 191 | 122 | 24 | 0 | 0 | 882 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:45 午後 | --- | 6:00 午後 | 93 | 87 | 17 | 113 | 6 | 68 | 71 | 154 | 132 | 38 | 0 | 0 | 779 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HOURLY TOTALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 PM | --- | 5:00 午後 | 351 | 424 | 27 | 385 | 18 | 272 | 264 | 629 | 280 | 183 | 0 | 0 | 2,833 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:15 午後 | --- | 5:15 午後 | 377 | 446 | 40 | 418 | 20 | 268 | 310 | 656 | 309 | 182 | 0 | 0 | 3,026 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:30 午後 | --- | 5:30 午後 | 394 | 469 | 56 | 428 | 18 | 267 | 385 | 706 | 367 | 184 | 0 | 0 | 3,274 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4:45 午後 | --- | 5:45 午後 | 444 | 483 | 72 | 456 | 19 | 263 | 329 | 761 | 424 | 163 | 0 | 0 | 3,414 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 午後 | --- | 6:00 午後 | 439 | 455 | 73 | 463 | 18 | 265 | 327 | 733 | 470 | 146 | 0 | 0 | 3,389 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Telephone: (510)232-1271 Fax: (510)232-1272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

WILTEC

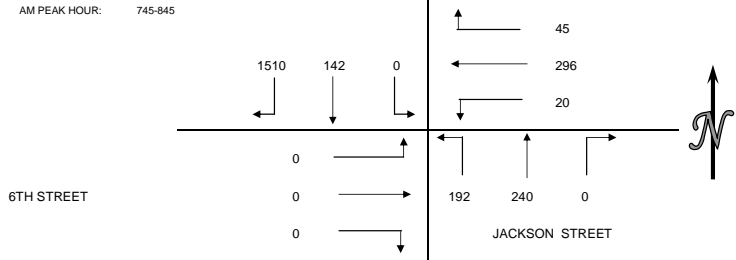
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
PROJECT: 1938 BROADWAY TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 23, 2008
PERIOD*: 7:00 AM TO 9:00 AM
INTERSECTION: N/S JACKSON STREET
E/W 6TH STREET
CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-715 | 277 | 19 | 0 | 7 | 65 | 3 | 0 | 33 | 38 | 0 | 0 | 0 | 442 |
| 715-730 | 373 | 36 | 0 | 10 | 71 | 6 | 0 | 33 | 43 | 0 | 0 | 0 | 572 |
| 730-745 | 336 | 19 | 0 | 9 | 81 | 2 | 0 | 42 | 61 | 0 | 0 | 0 | 550 |
| 745-800 | 392 | 33 | 0 | 9 | 77 | 5 | 0 | 69 | 57 | 0 | 0 | 0 | 642 |
| 800-815 | 368 | 26 | 0 | 11 | 73 | 5 | 0 | 54 | 47 | 0 | 0 | 0 | 584 |
| 815-830 | 399 | 39 | 0 | 13 | 77 | 3 | 0 | 65 | 41 | 0 | 0 | 0 | 637 |
| 830-845 | 351 | 44 | 0 | 12 | 69 | 7 | 0 | 52 | 47 | 0 | 0 | 0 | 582 |
| 845-900 | 320 | 42 | 0 | 7 | 96 | 5 | 0 | 66 | 50 | 0 | 0 | 0 | 586 |
| HOUR TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 700-800 | 1378 | 107 | 0 | 35 | 294 | 16 | 0 | 177 | 199 | 0 | 0 | 0 | 2206 |
| 715-815 | 1469 | 114 | 0 | 39 | 302 | 18 | 0 | 198 | 208 | 0 | 0 | 0 | 2348 |
| 730-830 | 1495 | 117 | 0 | 42 | 308 | 15 | 0 | 230 | 206 | 0 | 0 | 0 | 2413 |
| 745-845 | 1510 | 142 | 0 | 45 | 296 | 20 | 0 | 240 | 192 | 0 | 0 | 0 | 2445 |
| 800-900 | 1438 | 151 | 0 | 43 | 315 | 20 | 0 | 237 | 185 | 0 | 0 | 0 | 2389 |

PHF 0.946115 0.806818 0.865385 0.961039 0.714286 0.869565 0.842105



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 700-715 | 0 | 1 | 0 | 2 | 3 |
| 715-730 | 0 | 8 | 0 | 1 | 9 |
| 730-745 | 0 | 8 | 0 | 0 | 8 |
| 745-800 | 0 | 15 | 1 | 1 | 17 |
| 800-815 | 1 | 19 | 0 | 0 | 20 |
| 815-830 | 1 | 11 | 1 | 0 | 13 |
| 830-845 | 0 | 12 | 0 | 1 | 13 |
| 845-900 | 0 | 14 | 0 | 1 | 15 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 700-800 | 0 | 32 | 1 | 4 | 37 |
| 715-815 | 1 | 50 | 1 | 2 | 54 |
| 730-830 | 2 | 53 | 2 | 1 | 58 |
| 745-845 | 2 | 57 | 2 | 2 | 63 |
| 800-900 | 2 | 56 | 1 | 2 | 61 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 700-715 | 0 | 0 | 0 | 1 | 1 |
| 715-730 | 0 | 0 | 0 | 0 | 0 |
| 730-745 | 0 | 0 | 0 | 0 | 0 |
| 745-800 | 0 | 0 | 0 | 0 | 0 |
| 800-815 | 0 | 0 | 0 | 0 | 0 |
| 815-830 | 0 | 0 | 0 | 0 | 0 |
| 830-845 | 0 | 0 | 0 | 0 | 0 |
| 845-900 | 0 | 0 | 0 | 0 | 0 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 700-800 | 0 | 0 | 0 | 1 | 1 |
| 715-815 | 0 | 0 | 0 | 0 | 0 |
| 730-830 | 0 | 0 | 0 | 0 | 0 |
| 745-845 | 0 | 0 | 0 | 0 | 0 |
| 800-900 | 0 | 0 | 0 | 0 | 0 |

WILTEC

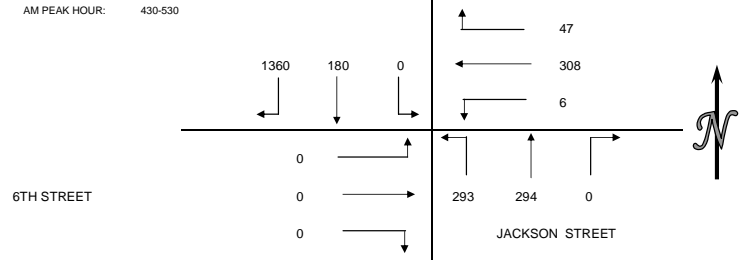
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
PROJECT: 1938 BROADWAY TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 23, 2008
PERIOD*: 4:00 PM TO 6:00 PM
INTERSECTION: N/S JACKSON STREET
E/W 6TH STREET
CITY: OAKLAND

| VEHICLE COUNTS | | | | | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 15 MIN COUNTS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-415 | 335 | 42 | 0 | 7 | 101 | 1 | 0 | 60 | 73 | 0 | 0 | 0 | 619 |
| 415-430 | 307 | 29 | 0 | 9 | 67 | 1 | 0 | 52 | 70 | 0 | 0 | 0 | 535 |
| 430-445 | 345 | 45 | 0 | 11 | 97 | 2 | 0 | 79 | 87 | 0 | 0 | 0 | 666 |
| 445-500 | 329 | 43 | 0 | 11 | 53 | 1 | 0 | 82 | 74 | 0 | 0 | 0 | 593 |
| 500-515 | 348 | 49 | 0 | 11 | 99 | 0 | 0 | 76 | 72 | 0 | 0 | 0 | 655 |
| 515-530 | 338 | 43 | 0 | 14 | 59 | 3 | 0 | 57 | 60 | 0 | 0 | 0 | 574 |
| 530-545 | 336 | 48 | 0 | 9 | 83 | 1 | 0 | 56 | 52 | 0 | 0 | 0 | 585 |
| 545-600 | 304 | 52 | 0 | 19 | 83 | 4 | 0 | 59 | 69 | 0 | 0 | 0 | 590 |
| HOUR TOTALS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| PERIOD | SBRT | SBTH | SBLT | WBRT | WBTH | WBLT | NBRT | NBTH | NBLT | EBRT | EBTH | EBLT | TOTAL |
| 400-500 | 1316 | 159 | 0 | 38 | 318 | 5 | 0 | 273 | 304 | 0 | 0 | 0 | 2413 |
| 415-515 | 1329 | 166 | 0 | 42 | 316 | 4 | 0 | 289 | 303 | 0 | 0 | 0 | 2449 |
| 430-530 | 1360 | 180 | 0 | 47 | 308 | 6 | 0 | 294 | 293 | 0 | 0 | 0 | 2488 |
| 445-545 | 1351 | 183 | 0 | 45 | 294 | 5 | 0 | 271 | 258 | 0 | 0 | 0 | 2407 |
| 500-600 | 1326 | 192 | 0 | 53 | 324 | 8 | 0 | 248 | 253 | 0 | 0 | 0 | 2404 |

PHF 0.977011 0.918367 0.839286 0.777778 0.5 0.896341 0.841954



| PEDESTRIAN COUNTS | | | | | |
|-------------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 400-415 | 0 | 11 | 0 | 0 | 11 |
| 415-430 | 0 | 3 | 0 | 0 | 3 |
| 430-445 | 0 | 7 | 0 | 0 | 7 |
| 445-500 | 0 | 3 | 0 | 0 | 3 |
| 500-515 | 0 | 9 | 0 | 0 | 9 |
| 515-530 | 0 | 4 | 0 | 0 | 4 |
| 530-545 | 0 | 6 | 0 | 0 | 6 |
| 545-600 | 0 | 8 | 0 | 0 | 8 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 400-500 | 0 | 24 | 0 | 0 | 24 |
| 415-515 | 0 | 22 | 0 | 0 | 22 |
| 430-530 | 0 | 23 | 0 | 0 | 23 |
| 445-545 | 0 | 22 | 0 | 0 | 22 |
| 500-600 | 0 | 27 | 0 | 0 | 27 |

| BICYCLE COUNTS | | | | | |
|----------------|-----------|----------|-----------|----------|-------|
| 15 MIN COUNTS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 400-415 | 0 | 0 | 0 | 0 | 0 |
| 415-430 | 0 | 0 | 0 | 1 | 1 |
| 430-445 | 0 | 0 | 0 | 0 | 0 |
| 445-500 | 0 | 0 | 0 | 0 | 0 |
| 500-515 | 0 | 2 | 0 | 0 | 2 |
| 515-530 | 0 | 0 | 0 | 0 | 0 |
| 530-545 | 0 | 2 | 0 | 0 | 2 |
| 545-600 | 0 | 0 | 0 | 0 | 0 |
| HOUR TOTALS | NORTH LEG | EAST LEG | SOUTH LEG | WEST LEG | TOTAL |
| 400-500 | 0 | 0 | 0 | 1 | 1 |
| 415-515 | 0 | 2 | 0 | 1 | 3 |
| 430-530 | 0 | 2 | 0 | 0 | 2 |
| 445-545 | 0 | 4 | 0 | 0 | 4 |
| 500-600 | 0 | 4 | 0 | 0 | 4 |

PEAK HOUR ITM SUMMARY

#013 MacArthur Blvd & Harrison Avenue

| | | | | | |
|----------------|-----------------|------------|---------------------------|----------|---------|
| LOCATION #: | 013 | QTD PRJ #: | 080170 | AM PEAK: | 800 AM |
| NORTH / SOUTH: | MacArthur Blvd | DATE: | Wednesday, April 16, 2008 | MD PEAK: | 1230 PM |
| EAST / WEST: | Harrison Avenue | VICINITY: | OAKLAND, CA | PM PEAK: | 500 PM |



| | | | |
|-------|---|---|---|
| LN | 0 | 0 | 0 |
| AM | 0 | 0 | 0 |
| MD | 0 | 0 | 0 |
| PM | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 0 |

MacArthur Blvd

| | |
|-------|------|
| TOTAL | 3327 |
| PM | 1023 |
| MD | 1025 |
| AM | 1279 |

| | | | |
|-------|-----|-----|-----|
| TOTAL | PM | MD | AM |
| 2394 | 650 | 909 | 835 |

Harrison Avenue

| | | | | |
|-------|-----|-----|-----|-----|
| TOTAL | PM | MD | AM | LN |
| 66 | 25 | 27 | 14 | 0.5 |
| 1795 | 473 | 622 | 700 | 1.5 |
| 0 | 0 | 0 | 0 | 0 |

Harrison Avenue

| | | | | |
|----|----|----|----|-------|
| LN | AM | MD | PM | TOTAL |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 |

| | | | |
|----|----|----|-------|
| AM | MD | PM | TOTAL |
| 0 | 0 | 0 | 0 |

| | | | |
|-------|----|----|----|
| TOTAL | PM | MD | AM |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

MacArthur Blvd

| | | | |
|-------|-----|------|---|
| TOTAL | 599 | 3261 | 0 |
| PM | 177 | 998 | 0 |
| MD | 287 | 998 | 0 |
| AM | 135 | 1265 | 0 |
| LN | 1.5 | 2.5 | 0 |

| | | | | | | | | | | | |
|----------|---------|----|---------|----------|----------|----|---------|----------|---------|----|---------|
| AM COUNT | 7:00 AM | TO | 9:00 AM | MD COUNT | 12:00 PM | TO | 2:00 PM | PM COUNT | 4:00 PM | TO | 6:00 PM |
|----------|---------|----|---------|----------|----------|----|---------|----------|---------|----|---------|



QUALITY TRAFFIC DATA, LLC

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VEHICLE TURNING MOVEMENT COUNT

#013 MacArthur Blvd & Harrison Avenue - AM PEAK

| | | | |
|----------------|-----------------|------------|---------------------------|
| LOCATION #: | 013 | QTD PRJ #: | 080170 |
| NORTH / SOUTH: | MacArthur Blvd | DATE: | Wednesday, April 16, 2008 |
| EAST / WEST: | Harrison Avenue | VICINITY: | OAKLAND, CA |

| DIRECTION: | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTALS: |
|------------|-----|-----|----|----|----|----|----|----|----|----|-----|-----|---------|
| LANES: | 1.5 | 2.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.5 | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | 38 | 290 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 119 | 5 | 452 |
| 7:15 AM | 42 | 296 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 177 | 3 | 518 |
| 7:30 AM | 97 | 302 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 188 | 8 | 595 |
| 7:45 AM | 62 | 298 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 112 | 6 | 478 |
| 8:00 AM | 44 | 291 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 110 | 2 | 447 |
| 8:15 AM | 34 | 338 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 178 | 3 | 553 |
| 8:30 AM | 29 | 345 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 226 | 5 | 605 |
| 8:45 AM | 28 | 291 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 186 | 4 | 509 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |

| VOLUME STATS: | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | |
|---------------------|-------|------|----|-------|----|----|-------|----|----|-------|------|----|-------|
| TOTAL: | 374 | 2451 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1296 | 36 | 4157 |
| P.H.V: ₁ | 135 | 1265 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 700 | 14 | 2114 |
| P.H.F: ₂ | 0.936 | | | 0.000 | | | 0.000 | | | 0.773 | | | 0.874 |

(1) Peak Hour Volume (Peak Hour Begins At 800 AM)

(2) Peak Hour Factor (directional aggregate)



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VEHICLE TURNING MOVEMENT COUNT

#013 MacArthur Blvd & Harrison Avenue - PM PEAK

| | | | |
|----------------|-----------------|------------|---------------------------|
| LOCATION #: | 013 | QTD PRJ #: | 080170 |
| NORTH / SOUTH: | MacArthur Blvd | DATE: | Wednesday, April 16, 2008 |
| EAST / WEST: | Harrison Avenue | VICINITY: | OAKLAND, CA |

| DIRECTION: | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTALS: |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| LANES: | 1.5 | 2.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.5 | |
| 4:00 PM | 34 | 220 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 127 | 8 | 389 |
| 4:15 PM | 41 | 232 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 134 | 9 | 416 |
| 4:30 PM | 55 | 251 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 4 | 410 |
| 4:45 PM | 51 | 231 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 105 | 4 | 391 |
| 5:00 PM | 57 | 236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 115 | 14 | 422 |
| 5:15 PM | 46 | 261 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 112 | 7 | 426 |
| 5:30 PM | 38 | 252 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 129 | 2 | 421 |
| 5:45 PM | 36 | 249 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 117 | 2 | 404 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |
| VOLUME STATS: | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | |
| TOTAL: | 358 | 1932 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 939 | 50 | 3279 |
| P.H.V: ₁ | 177 | 998 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 473 | 25 | 1673 |
| P.H.F: ₂ | 0.957 | 0.957 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.950 | 0.950 | 0.982 | 0.982 |

(1) Peak Hour Volume (Peak Hour Begins At 500 PM)

(2) Peak Hour Factor (directional aggregate)



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BAYMETRICS TRAFFIC RESOURCES

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | |
|----------------------------------|--|--|--|-------------------------------|--|--|--|-----------------------|--|--|--|
| PROJECT: 412 COURT ST. TS | | | | SURVEY DATE: 7/31/2007 | | | | DAY: TUESDAY | | | |
| N-S Approach: MONTE VISTA | | | | SURVEY TIME: 7:00 AM | | | | TO 9:00 AM | | | |
| E-W Approach: OAKLAND | | | | CITY: OAKLAND | | | | FILE: OLMVOLAM | | | |

PEAK HOUR

08:00 AM

 TO

09:00 AM

TOTAL
917

OAKLAND
MONTE VISTA

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.91

120 202

PHF= 0.84

223 206

539 434

PHF= 0.96

58 52

PHF= 0.81

| TIME PERIOD | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL | |
|------------------------|-----|------------|------|-------|------------|------|-------|-----------|------|-------|-----------|------|-------|-------|-------|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| SURVEY DATA | | | | | | | | | | | | | | | |
| 07:00 AM | --- | 07:15 AM | 0 | 1 | 3 | 7 | 5 | 4 | 25 | 59 | 2 | 2 | 56 | 3 | 167 |
| 07:15 AM | --- | 07:30 AM | 2 | 1 | 10 | 17 | 13 | 10 | 55 | 127 | 3 | 5 | 107 | 5 | 355 |
| 07:30 AM | --- | 07:45 AM | 3 | 2 | 15 | 29 | 24 | 15 | 79 | 199 | 3 | 9 | 155 | 10 | 543 |
| 07:45 AM | --- | 08:00 AM | 3 | 4 | 23 | 39 | 33 | 22 | 114 | 284 | 7 | 11 | 207 | 14 | 761 |
| 08:00 AM | --- | 08:15 AM | 7 | 10 | 29 | 53 | 45 | 25 | 156 | 380 | 10 | 15 | 247 | 20 | 997 |
| 08:15 AM | --- | 08:30 AM | 10 | 13 | 36 | 70 | 53 | 33 | 203 | 468 | 13 | 17 | 300 | 22 | 1,238 |
| 08:30 AM | --- | 08:45 AM | 13 | 18 | 40 | 81 | 60 | 43 | 241 | 553 | 13 | 20 | 344 | 25 | 1,451 |
| 08:45 AM | --- | 09:00 AM | 15 | 22 | 45 | 89 | 70 | 55 | 283 | 646 | 15 | 24 | 385 | 29 | 1,678 |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | |
| 07:00 AM | --- | 07:15 AM | 0 | 1 | 3 | 7 | 5 | 4 | 25 | 59 | 2 | 2 | 56 | 3 | 167 |
| 07:15 AM | --- | 07:30 AM | 2 | 0 | 7 | 10 | 8 | 6 | 30 | 68 | 1 | 3 | 51 | 2 | 188 |
| 07:30 AM | --- | 07:45 AM | 1 | 1 | 5 | 12 | 11 | 5 | 24 | 72 | 0 | 4 | 48 | 5 | 188 |
| 07:45 AM | --- | 08:00 AM | 0 | 2 | 8 | 10 | 9 | 7 | 35 | 85 | 4 | 2 | 52 | 4 | 218 |
| 08:00 AM | --- | 08:15 AM | 4 | 6 | 6 | 14 | 12 | 3 | 42 | 96 | 3 | 4 | 40 | 6 | 236 |
| 08:15 AM | --- | 08:30 AM | 3 | 3 | 7 | 17 | 8 | 8 | 47 | 88 | 3 | 2 | 53 | 2 | 241 |
| 08:30 AM | --- | 08:45 AM | 3 | 5 | 4 | 11 | 7 | 10 | 38 | 85 | 0 | 3 | 44 | 3 | 213 |
| 08:45 AM | --- | 09:00 AM | 2 | 4 | 5 | 8 | 10 | 12 | 42 | 93 | 2 | 4 | 41 | 4 | 227 |
| HOURLY TOTALS | | | | | | | | | | | | | | | |
| 07:00 AM | --- | 08:00 AM | 3 | 4 | 23 | 39 | 33 | 22 | 114 | 284 | 7 | 11 | 207 | 14 | 761 |
| 07:15 AM | --- | 08:15 AM | 7 | 9 | 26 | 46 | 40 | 21 | 131 | 321 | 8 | 13 | 191 | 17 | 830 |
| 07:30 AM | --- | 08:30 AM | 8 | 12 | 26 | 53 | 40 | 23 | 148 | 341 | 10 | 12 | 193 | 17 | 883 |
| 07:45 AM | --- | 08:45 AM | 10 | 16 | 25 | 52 | 36 | 28 | 162 | 354 | 10 | 11 | 189 | 15 | 908 |
| 08:00 AM | --- | 09:00 AM | 12 | 18 | 22 | 50 | 37 | 33 | 169 | 362 | 8 | 13 | 178 | 15 | 917 |

BAYMETRICS TRAFFIC RESOURCES

INTERSECTION TURNING MOVEMENT SUMMARY

| | | | | | | | | | | | |
|----------------------------------|--|--|--|-------------------------------|--|--|--|-----------------------|--|--|--|
| PROJECT: 412 COURT ST. TS | | | | SURVEY DATE: 7/31/2007 | | | | DAY: TUESDAY | | | |
| N-S Approach: MONTE VISTA | | | | SURVEY TIME: 4:00 PM | | | | TO 6:00 PM | | | |
| E-W Approach: OAKLAND | | | | CITY: OAKLAND | | | | FILE: OLMVOLPM | | | |

PEAK HOUR
05:00 PM TO 06:00 PM

TOTAL
917

OAKLAND
MONTE VISTA

ARRIVAL / DEPARTURE VOLUMES

PHF= 0.91

120 202

PHF= 0.84

223 206

539 434

PHF= 0.96

58 52

PHF= 0.81

| TIME PERIOD | | | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | TOTAL |
|------------------------|-----|----------|------------|------|-------|------------|------|-------|-----------|------|-------|-----------|------|-------|-------|
| From | To | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| SURVEY DATA | | | | | | | | | | | | | | | |
| 04:00 PM | --- | 04:15 PM | 0 | 1 | 3 | 7 | 5 | 4 | 25 | 59 | 2 | 2 | 56 | 3 | 167 |
| 04:15 PM | --- | 04:30 PM | 2 | 1 | 10 | 17 | 13 | 10 | 55 | 127 | 3 | 5 | 107 | 5 | 355 |
| 04:30 PM | --- | 04:45 PM | 3 | 2 | 15 | 29 | 24 | 15 | 79 | 199 | 3 | 9 | 155 | 10 | 543 |
| 04:45 PM | --- | 05:00 PM | 3 | 4 | 23 | 39 | 33 | 22 | 114 | 284 | 7 | 11 | 207 | 14 | 761 |
| 05:00 PM | --- | 05:15 PM | 7 | 10 | 29 | 53 | 45 | 25 | 156 | 380 | 10 | 15 | 247 | 20 | 997 |
| 05:15 PM | --- | 05:30 PM | 10 | 13 | 36 | 70 | 53 | 33 | 203 | 468 | 13 | 17 | 300 | 22 | 1,238 |
| 05:30 PM | --- | 05:45 PM | 13 | 18 | 40 | 81 | 60 | 43 | 241 | 553 | 13 | 20 | 344 | 25 | 1,451 |
| 05:45 PM | --- | 06:00 PM | 15 | 22 | 45 | 89 | 70 | 55 | 283 | 646 | 15 | 24 | 385 | 29 | 1,678 |
| TOTAL BY PERIOD | | | | | | | | | | | | | | | |
| 04:00 PM | --- | 04:15 PM | 0 | 1 | 3 | 7 | 5 | 4 | 25 | 59 | 2 | 2 | 56 | 3 | 167 |
| 04:15 PM | --- | 04:30 PM | 2 | 0 | 7 | 10 | 8 | 6 | 30 | 68 | 1 | 3 | 51 | 2 | 188 |
| 04:30 PM | --- | 04:45 PM | 1 | 1 | 5 | 12 | 11 | 5 | 24 | 72 | 0 | 4 | 48 | 5 | 188 |
| 04:45 PM | --- | 05:00 PM | 0 | 2 | 8 | 10 | 9 | 7 | 35 | 85 | 4 | 2 | 52 | 4 | 218 |
| 05:00 PM | --- | 05:15 PM | 4 | 6 | 6 | 14 | 12 | 3 | 42 | 96 | 3 | 4 | 40 | 6 | 236 |
| 05:15 PM | --- | 05:30 PM | 3 | 3 | 7 | 17 | 8 | 8 | 47 | 88 | 3 | 2 | 53 | 2 | 241 |
| 05:30 PM | --- | 05:45 PM | 3 | 5 | 4 | 11 | 7 | 10 | 38 | 85 | 0 | 3 | 44 | 3 | 213 |
| 05:45 PM | --- | 06:00 PM | 2 | 4 | 5 | 8 | 10 | 12 | 42 | 93 | 2 | 4 | 41 | 4 | 227 |
| HOURLY TOTALS | | | | | | | | | | | | | | | |
| 04:00 PM | --- | 05:00 PM | 3 | 4 | 23 | 39 | 33 | 22 | 114 | 284 | 7 | 11 | 207 | 14 | 761 |
| 04:15 PM | --- | 05:15 PM | 7 | 9 | 26 | 46 | 40 | 21 | 131 | 321 | 8 | 13 | 191 | 17 | 830 |
| 04:30 PM | --- | 05:30 PM | 8 | 12 | 26 | 53 | 40 | 23 | 148 | 341 | 10 | 12 | 193 | 17 | 883 |
| 04:45 PM | --- | 05:45 PM | 10 | 16 | 25 | 52 | 36 | 28 | 162 | 354 | 10 | 11 | 189 | 15 | 908 |
| 05:00 PM | --- | 06:00 PM | 12 | 18 | 22 | 50 | 37 | 33 | 169 | 362 | 8 | 13 | 178 | 15 | 917 |

Tel : (510) 232-1271
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Appendix B

Level of Service Calculation Worksheets

Existing Conditions AM Peak Hour

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (EB) & Grand Avenue

Existing AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|------|------|-------|------|----------------------|-------|
| Lane Configurations | | | ↕↕ | ↕ | ↕ | ↕↕ |
| Volume (vph) | 0 | 0 | 459 | 292 | 155 | 1088 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | | 0.95 | 1.00 | 1.00 | 0.95 |
| Flt Protected | | | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Permitted | | | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | | | 3539 | 1583 | 1770 | 3539 |
| Flt Permitted | | | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | | | 3539 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 499 | 317 | 168 | 1183 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 176 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 499 | 141 | 168 | 1183 |
| Turn Type | | | Perm | Prot | | |
| Protected Phases | | | 2 | 1 | 2 | 4 |
| Permitted Phases | | | | 2 | 2 | 4 |
| Actuated Green, G (s) | | | 35.6 | 35.6 | 11.9 | 60.1 |
| Effective Green, g (s) | | | 35.6 | 35.6 | 11.9 | 60.1 |
| Actuated g/C Ratio | | | 0.44 | 0.44 | 0.15 | 0.75 |
| Clearance Time (s) | | | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 1575 | 704 | 263 | 2659 |
| v/s Ratio Prot | | | 0.14 | | c0.09 | c0.33 |
| v/s Ratio Perm | | | | 0.09 | | |
| v/c Ratio | | | 0.32 | 0.20 | 0.64 | 0.44 |
| Uniform Delay, d1 | | | 14.3 | 13.5 | 32.0 | 3.7 |
| Progression Factor | | | 1.00 | 1.00 | 1.26 | 0.08 |
| Incremental Delay, d2 | | | 0.5 | 0.6 | 4.3 | 0.1 |
| Delay (s) | | | 14.9 | 14.2 | 44.5 | 0.4 |
| Level of Service | | | B | B | D | A |
| Approach Delay (s) | 0.0 | | 14.6 | | | 5.9 |
| Approach LOS | A | | B | | | A |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 9.2 | | HCM Level of Service | A |
| HCM Volume to Capacity ratio | | | 0.48 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | | | 68.9% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
46: El Embarcadero (EB) & Lakeshore Drive

Existing AM
Kaiser Center Transportation Study

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | ↕ | ↕ | ↕ | ↕↕ | ↕↕ | |
| Volume (veh/h) | 180 | 261 | 0 | 918 | 572 | 0 |
| Sign Control | Stop | Stop | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 196 | 284 | 0 | 998 | 622 | 0 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1121 | 311 | 622 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1121 | 311 | 622 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 2 | 59 | 100 | | | |
| cM capacity (veh/h) | 200 | 685 | 955 | | | |
| Direction, Lane # | | | | | | |
| Volume Total | 196 | 284 | 499 | 499 | 311 | 311 |
| Volume Left | 196 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 284 | 0 | 0 | 0 | 0 |
| cSH | 200 | 685 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.98 | 0.41 | 0.29 | 0.29 | 0.18 | 0.18 |
| Queue Length 95th (ft) | 207 | 51 | 0 | 0 | 0 | 0 |
| Control Delay (s) | 106.9 | 13.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | F | B | | | | |
| Approach Delay (s) | 51.9 | | 0.0 | | 0.0 | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 11.9 | | | |
| Intersection Capacity Utilization | | | 42.0% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Existing AM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|-------|------|----------------------|-------|------|
| Lane Configurations | | | ↕↕ | ↕↕ | ↕ | ↕ | ↕↕ | ↕ | ↕ | ↕↕ | |
| Volume (vph) | 0 | 0 | 395 | 626 | 270 | 0 | 571 | 182 | 277 | 980 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4895 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4895 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 429 | 680 | 293 | 0 | 621 | 198 | 301 | 1065 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 165 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1356 | 0 | 0 | 621 | 33 | 301 | 1065 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | 1 | 1 | 2 |
| Protected Phases | | | 4 | 4 | | | 2 | | | | |
| Permitted Phases | | | | | | | | 2 | | | |
| Actuated Green, G (s) | | | | 34.9 | | | 17.5 | 17.5 | 40.6 | 62.1 | |
| Effective Green, g (s) | | | | 34.9 | | | 17.5 | 17.5 | 40.6 | 62.1 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.17 | 0.17 | 0.38 | 0.59 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1612 | | | 584 | 261 | 678 | 2073 | |
| v/s Ratio Prot | | | | c0.28 | | | c0.18 | | 0.17 | c0.30 | |
| v/s Ratio Perm | | | | | | | | 0.02 | | | |
| v/c Ratio | | | | 0.84 | | | 1.06 | 0.13 | 0.44 | 0.51 | |
| Uniform Delay, d1 | | | | 33.0 | | | 44.3 | 37.7 | 24.3 | 13.0 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.2 | | | 55.2 | 1.0 | 2.1 | 0.9 | |
| Delay (s) | | | | 37.1 | | | 99.5 | 38.7 | 26.4 | 13.9 | |
| Level of Service | | | | D | | | F | D | C | B | |
| Approach Delay (s) | 0.0 | | | 37.1 | | | 84.8 | | | 16.7 | |
| Approach LOS | A | | | D | | | F | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 40.2 | | | | | HCM Level of Service | D | |
| HCM Volume to Capacity ratio | | | | 0.75 | | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | | | | Sum of lost time (s) | 13.0 | |
| Intersection Capacity Utilization | | | | 67.0% | | | | | ICU Level of Service | C | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Existing AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|-----------------------------------|-------|-------|------|-------|------|-------|------|------|----------------------|-------|
| Lane Configurations | ↕ | ↕↕ | ↕ | ↕ | ↕↕ | ↕ | ↕ | ↕ | ↕ | ↕↕ |
| Volume (vph) | 260 | 443 | 196 | 184 | 340 | 259 | 30 | 229 | 31 | 654 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | | 3.5 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | 1.00 | | | | 1.00 |
| Flt Protected | 1.00 | 0.99 | 0.85 | 0.85 | 1.00 | 0.85 | | | | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 |
| Satd. Flow (prot) | 1610 | 3177 | 1441 | 1583 | 3539 | 1583 | | | | 1770 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 |
| Satd. Flow (perm) | 1610 | 3177 | 1441 | 1583 | 3539 | 1583 | | | | 1770 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 283 | 482 | 213 | 200 | 370 | 282 | 33 | 249 | 34 | 711 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 76 | 0 | 3 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 255 | 531 | 192 | 124 | 370 | 312 | 0 | 0 | 283 | 711 |
| Turn Type | Split | | | | Prot | Perm | Perm | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | 4 | | | 2 | | |
| Actuated Green, G (s) | 28.1 | 28.1 | 28.1 | 28.1 | 43.2 | 43.2 | | | | 22.2 |
| Effective Green, g (s) | 28.1 | 28.1 | 28.1 | 28.1 | 43.2 | 43.2 | | | | 22.2 |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.27 | 0.27 | 0.41 | 0.41 | | | | 0.21 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | | 3.5 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 |
| Lane Grp Cap (vph) | 427 | 842 | 382 | 420 | 1442 | 645 | | | | 371 |
| v/s Ratio Prot | 0.16 | c0.17 | 0.13 | | 0.10 | | | | | c0.16 |
| v/s Ratio Perm | | | | 0.08 | | c0.20 | | | | |
| v/c Ratio | 0.60 | 0.63 | 0.50 | 0.30 | 0.26 | 0.48 | | | | 0.76 |
| Uniform Delay, d1 | 34.0 | 34.4 | 33.0 | 31.1 | 20.8 | 23.2 | | | | 39.4 |
| Progression Factor | 0.75 | 0.75 | 0.75 | 0.59 | 1.00 | 1.00 | | | | 1.00 |
| Incremental Delay, d2 | 1.7 | 1.2 | 0.8 | 0.3 | 0.4 | 2.6 | | | | 9.0 |
| Delay (s) | 27.1 | 26.9 | 25.4 | 18.6 | 21.2 | 25.8 | | | | 48.4 |
| Level of Service | C | C | C | B | C | C | | | | D |
| Approach Delay (s) | | 25.3 | | | 23.3 | | | | | 19.8 |
| Approach LOS | | C | | | C | | | | | B |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | | 22.9 | | | | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | | 0.59 | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | | | | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization | | | | 57.7% | | | | | ICU Level of Service | B |
| Analysis Period (min) | | | | 15 | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Existing AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2104 | 103 | 381 | 333 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Fr't | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 6363 | | | 4953 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 6363 | | | 4953 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2287 | 112 | 414 | 362 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2391 | 0 | 0 | 775 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | Perm | | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 38.0 | | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3022 | | | 2105 | | | | |
| v/s Ratio Prot | | | | | c0.38 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.16 | | | | |
| v/c Ratio | | | | | 0.79 | | | 0.37 | | | | |
| Uniform Delay, d1 | | | | | 17.7 | | | 15.7 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.16 | | | | |
| Incremental Delay, d2 | | | | | 2.2 | | | 0.4 | | | | |
| Delay (s) | | | | | 19.9 | | | 18.6 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 19.9 | | | 18.6 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 19.5 | | | | | B | | | |
| HCM Volume to Capacity ratio | | | | 0.59 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 80.0 | | | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 73.3% | | | | | | D | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Existing AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 973 | 1418 | 0 | 0 | 0 | 0 | 0 | 990 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Fr't | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4755 | | | | | | 3523 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4755 | | | | | | 3523 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1058 | 1541 | 0 | 0 | 0 | 0 | 0 | 1076 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 630 | 1959 | 0 | 0 | 0 | 0 | 0 | 1106 | 0 |
| Turn Type | | | | | Perm | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2734 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.31 | |
| v/s Ratio Perm | | | | c0.41 | 0.41 | | | | | | | |
| v/c Ratio | | | | 0.72 | 0.72 | | | | | | 0.97 | |
| Uniform Delay, d1 | | | | 12.3 | 12.3 | | | | | | 26.6 | |
| Progression Factor | | | | 1.39 | 1.38 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 3.4 | 1.1 | | | | | | 19.6 | |
| Delay (s) | | | | 20.6 | 18.0 | | | | | | 46.2 | |
| Level of Service | | | | C | B | | | | | | D | |
| Approach Delay (s) | | 0.0 | | 18.7 | | | | 0.0 | | | 46.2 | |
| Approach LOS | | A | | B | | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 26.9 | | | | | C | | | |
| HCM Volume to Capacity ratio | | | | 0.81 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 80.0 | | | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 73.3% | | | | | | D | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Existing AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Sign Control | | Stop | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 74 | 189 | 6 | 9 | 391 | 13 | 9 | 6 | 8 | 18 | 14 | 13 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 80 | 205 | 7 | 10 | 425 | 14 | 10 | 7 | 9 | 20 | 15 | 14 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 80 | 212 | 449 | 25 | 49 | | | | | | | |
| Volume Left (vph) | 80 | 0 | 10 | 10 | 20 | | | | | | | |
| Volume Right (vph) | 0 | 7 | 14 | 9 | 14 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.6 | 5.1 | 4.6 | 5.6 | 5.6 | | | | | | | |
| Degree Utilization, x | 0.13 | 0.30 | 0.57 | 0.04 | 0.08 | | | | | | | |
| Capacity (veh/h) | 627 | 689 | 772 | 555 | 569 | | | | | | | |
| Control Delay (s) | 8.2 | 9.0 | 13.4 | 8.8 | 9.0 | | | | | | | |
| Approach Delay (s) | 8.8 | | 13.4 | 8.8 | 9.0 | | | | | | | |
| Approach LOS | A | | B | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 11.4 | | | | | | | | | |
| HCM Level of Service | | | B | | | | | | | | | |
| Intersection Capacity Utilization | | | 45.5% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

AECOM

Synchro 7 - Report










HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Existing AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|--------|------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 443 | 302 | 459 | 0 | 0 | 800 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Lane Util. Factor | 0.97 | 1.00 | 0.95 | | | 0.95 |
| Fr't | 1.00 | 0.85 | 1.00 | | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 3433 | 1583 | 3539 | | | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 3433 | 1583 | 3539 | | | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 482 | 328 | 499 | 0 | 0 | 870 |
| RTOR Reduction (vph) | 0 | 169 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 482 | 159 | 499 | 0 | 0 | 870 |
| Turn Type | | custom | | | | |
| Protected Phases | | 4 | | 2 | | 2 |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 20.5 | 35.6 | 35.6 | | | 35.6 |
| Effective Green, g (s) | 20.5 | 35.6 | 35.6 | | | 35.6 |
| Actuated g/C Ratio | 0.26 | 0.44 | 0.44 | | | 0.44 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 880 | 704 | 1575 | | | 1575 |
| v/s Ratio Prot | c0.14 | | 0.14 | | | c0.25 |
| v/s Ratio Perm | | 0.10 | | | | |
| v/c Ratio | 0.55 | 0.23 | 0.32 | | | 0.55 |
| Uniform Delay, d1 | 25.7 | 13.7 | 14.3 | | | 16.3 |
| Progression Factor | 1.00 | 1.00 | 0.13 | | | 1.00 |
| Incremental Delay, d2 | 0.7 | 0.7 | 0.5 | | | 1.4 |
| Delay (s) | 26.4 | 14.4 | 2.4 | | | 17.7 |
| Level of Service | C | B | A | | | B |
| Approach Delay (s) | 21.6 | | 2.4 | | | 17.7 |
| Approach LOS | C | | A | | | B |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 15.7 | | | | B |
| HCM Volume to Capacity ratio | | 0.55 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | 23.9 |
| Intersection Capacity Utilization | | 68.9% | | | | C |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

| | | | | | | |
|-----------------------------------|--|---|---|---|--|--|
| |  |  |  |  |  |  |
| Movement | EBL | EBT | WBT | WBR | SEL | SER |
| Lane Configurations | |  |  |  | | |
| Sign Control | | Stop | Stop | | Stop | |
| Volume (vph) | 471 | 0 | 572 | 262 | 0 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 512 | 0 | 622 | 285 | 0 | 0 |
| Direction, Lane # | EB 1 | WB 1 | WB 2 | WB 3 | | |
| Volume Total (vph) | 512 | 311 | 311 | 285 | | |
| Volume Left (vph) | 512 | 0 | 0 | 0 | | |
| Volume Right (vph) | 0 | 0 | 0 | 285 | | |
| Hadj (s) | 0.23 | 0.03 | 0.03 | -0.67 | | |
| Departure Headway (s) | 4.8 | 4.9 | 4.9 | 3.2 | | |
| Degree Utilization, x | 0.68 | 0.42 | 0.42 | 0.25 | | |
| Capacity (veh/h) | 751 | 726 | 727 | 1112 | | |
| Control Delay (s) | 17.1 | 10.2 | 10.2 | 6.1 | | |
| Approach Delay (s) | 17.1 | 8.9 | | | | |
| Approach LOS | C | A | | | | |
| Intersection Summary | | | | | | |
| Delay | | 11.9 | | | | |
| HCM Level of Service | | B | | | | |
| Intersection Capacity Utilization | | 49.0% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

Existing Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (EB) & Grand Avenue

Existing PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|------|------|-------|-------|----------------------|-------|
| Lane Configurations | | | ↑↑ | ↑↑ | ↑ | ↑↑ |
| Volume (vph) | 0 | 0 | 1000 | 700 | 235 | 723 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | | 0.95 | 1.00 | 1.00 | 0.95 |
| Flt Protected | | | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Permitted | | | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | | | 3539 | 1583 | 1770 | 3539 |
| Satd. Flow (perm) | | | 3539 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 1087 | 761 | 255 | 786 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 274 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 1087 | 487 | 255 | 786 |
| Turn Type | | | Perm | Prot | | |
| Protected Phases | | | 2 | 1 | 2 | 4 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 37.0 | 37.0 | 14.9 | 57.1 |
| Effective Green, g (s) | | | 37.0 | 37.0 | 14.9 | 57.1 |
| Actuated g/C Ratio | | | 0.46 | 0.46 | 0.19 | 0.71 |
| Clearance Time (s) | | | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 1637 | 732 | 330 | 2526 |
| v/s Ratio Prot | | | 0.31 | | c0.14 | c0.22 |
| v/s Ratio Perm | | | | c0.31 | | |
| v/c Ratio | | | 0.66 | 0.67 | 0.77 | 0.31 |
| Uniform Delay, d1 | | | 16.7 | 16.7 | 30.9 | 4.2 |
| Progression Factor | | | 1.00 | 1.00 | 1.34 | 0.08 |
| Incremental Delay, d2 | | | 2.1 | 4.7 | 9.9 | 0.1 |
| Delay (s) | | | 18.8 | 21.4 | 51.3 | 0.4 |
| Level of Service | | | B | C | D | A |
| Approach Delay (s) | 0.0 | | 19.9 | | | 12.9 |
| Approach LOS | A | | B | | | B |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 17.4 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.58 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | | | 63.0% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
46: El Embarcadero (EB) & Lakeshore Drive

Existing PM
Kaiser Center Transportation Study

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | ↑ | ↑ | ↑ | ↑↑ | ↑↑ | ↑ |
| Volume (veh/h) | 311 | 623 | 0 | 1015 | 466 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| Grade | 0% | 0% | 0% | 0% | 0% | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 338 | 677 | 0 | 1103 | 507 | 0 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1058 | 253 | 507 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1058 | 253 | 507 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 9 | 100 | | | |
| cM capacity (veh/h) | 220 | 746 | 1054 | | | |
| Direction, Lane # | | | | | | |
| Volume Total | 338 | 677 | 552 | 552 | 253 | 253 |
| Volume Left | 338 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 677 | 0 | 0 | 0 | 0 |
| cSH | 220 | 746 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 1.54 | 0.91 | 0.32 | 0.32 | 0.15 | 0.15 |
| Queue Length 95th (ft) | 521 | 305 | 0 | 0 | 0 | 0 |
| Control Delay (s) | 303.5 | 38.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | F | E | | | | |
| Approach Delay (s) | 126.4 | | 0.0 | | 0.0 | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 48.9 | | | |
| Intersection Capacity Utilization | | | 58.1% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Existing PM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|-------|-------|----------------------|------|------|
| Lane Configurations | | | ↑↑ | ↑↑ | ↑ | ↑ | ↑↑ | ↑↑ | ↑ | ↑↑ | ↑ |
| Volume (vph) | 0 | 0 | 298 | 768 | 224 | 0 | 696 | 560 | 350 | 738 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | | 0.94 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | |
| Flt Protected | | | 0.97 | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flt Permitted | | | 0.96 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | 4913 | 3539 | 1583 | 1770 | 3539 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 324 | 835 | 243 | 0 | 757 | 609 | 380 | 802 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 106 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1364 | 0 | 0 | 757 | 503 | 380 | 802 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 2 | | |
| Permitted Phases | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 29.4 | | | 21.0 | 21.0 | 26.6 | 51.6 | |
| Effective Green, g (s) | | | | 29.4 | | | 21.0 | 21.0 | 26.6 | 51.6 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.23 | 0.23 | 0.30 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1605 | | | 826 | 369 | 523 | 2029 | |
| v/s Ratio Prot | | | | c0.28 | | | 0.21 | | c0.21 | 0.23 | |
| v/s Ratio Perm | | | | | | | c0.32 | | | | |
| v/c Ratio | | | | 0.85 | | | 0.92 | 1.36 | 0.73 | 0.40 | |
| Uniform Delay, d1 | | | | 28.2 | | | 33.6 | 34.5 | 28.4 | 10.6 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.4 | | | 16.6 | 180.3 | 5.0 | 0.1 | |
| Delay (s) | | | | 32.7 | | | 50.2 | 214.8 | 33.4 | 10.7 | |
| Level of Service | | | | C | | | D | F | C | B | |
| Approach Delay (s) | 0.0 | | | 32.7 | | | 123.6 | | | 18.0 | |
| Approach LOS | A | | | C | | | F | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 59.7 | | | | | HCM Level of Service | E | |
| HCM Volume to Capacity ratio | | | | 0.95 | | | | | | | |
| Actuated Cycle Length (s) | | | | 90.0 | | | | | Sum of lost time (s) | 13.0 | |
| Intersection Capacity Utilization | | | | 74.4% | | | | | ICU Level of Service | D | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Existing PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|-----------------------------------|-------|-------|------|-------|------|----------------------|------|------|-------|------|
| Lane Configurations | ↑ | ↑↑ | ↑ | ↑ | ↑↑ | ↑ | ↑ | ↑ | ↑ | ↑↑ |
| Volume (vph) | 329 | 761 | 424 | 163 | 444 | 483 | 72 | 263 | 19 | 456 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | 1.00 | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.99 | 0.85 | 0.85 | 1.00 | 0.85 | | | 1.00 | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3164 | 1441 | 1583 | 3539 | 1583 | | | 1770 | 3539 |
| Satd. Flow (perm) | 1610 | 3164 | 1441 | 1583 | 3539 | 1583 | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 358 | 827 | 461 | 177 | 483 | 525 | 78 | 286 | 21 | 496 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 36 | 0 | 6 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 322 | 928 | 396 | 141 | 483 | 597 | 0 | 0 | 307 | 496 |
| Turn Type | Split | | | | Prot | Perm | | | Prot | Prot |
| Protected Phases | 4 | 4 | 4 | | 2 | Perm | | | 1 | 1 |
| Permitted Phases | | | | | | | | | | 6 |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | 37.0 | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | 37.0 | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | 0.31 | 0.41 | 0.41 | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 984 | 448 | 492 | 1455 | 651 | | | 236 | 2084 |
| v/s Ratio Prot | 0.20 | c0.29 | 0.27 | | 0.14 | | | | c0.17 | 0.14 |
| v/s Ratio Perm | | | | 0.09 | | c0.38 | | | | |
| v/c Ratio | 0.64 | 0.94 | 0.88 | 0.29 | 0.33 | 0.92 | | | 1.30 | 0.24 |
| Uniform Delay, d1 | 26.7 | 30.2 | 29.5 | 23.4 | 18.1 | 25.1 | | | 39.0 | 8.8 |
| Progression Factor | 0.76 | 0.79 | 0.78 | 0.66 | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.1 | 7.6 | 8.6 | 0.5 | 0.6 | 20.0 | | | 162.8 | 0.3 |
| Delay (s) | 22.4 | 31.6 | 31.7 | 16.0 | 18.7 | 45.0 | | | 201.8 | 9.1 |
| Level of Service | C | C | C | B | B | D | | | F | A |
| Approach Delay (s) | | 28.5 | | | 33.3 | | | | | 82.8 |
| Approach LOS | | C | | | C | | | | | F |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | | 41.6 | | HCM Level of Service | | | D | |
| HCM Volume to Capacity ratio | | | | 0.99 | | | | | | |
| Actuated Cycle Length (s) | | | | 90.0 | | Sum of lost time (s) | | | 13.0 | |
| Intersection Capacity Utilization | | | | 84.2% | | ICU Level of Service | | | E | |
| Analysis Period (min) | | | | 15 | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Existing PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1213 | 172 | 242 | 745 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Fr't | | | | | 0.98 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6288 | | | 5024 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6288 | | | 5024 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1318 | 187 | 263 | 810 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 20 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1477 | 0 | 0 | 1053 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3144 | | | 1842 | | | | |
| v/s Ratio Prot | | | | | c0.23 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.21 | | | | |
| v/c Ratio | | | | | 0.47 | | | 0.57 | | | | |
| Uniform Delay, d1 | | | | | 9.8 | | | 15.2 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.5 | | | 1.3 | | | | |
| Delay (s) | | | | | 10.3 | | | 16.5 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 10.3 | | | 16.5 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 12.9 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.51 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | 8.0 | | | | |
| Intersection Capacity Utilization | | | | 51.0% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
50: Santa Clara Avenue & Harrison Street

Existing PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 475 | 1008 | 0 | 0 | 0 | 0 | 0 | 526 | 48 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Fr't | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4782 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4782 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 516 | 1096 | 0 | 0 | 0 | 0 | 0 | 572 | 52 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 79 | 21 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 313 | 1199 | 0 | 0 | 0 | 0 | 0 | 613 | 0 |
| Turn Type | | | | | Perm | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2311 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.18 | |
| v/s Ratio Perm | | | | 0.21 | 0.25 | | | | | | | |
| v/c Ratio | | | | 0.43 | 0.52 | | | | | | 0.46 | |
| Uniform Delay, d1 | | | | 10.1 | 10.7 | | | | | | 13.8 | |
| Progression Factor | | | | 1.89 | 1.46 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 1.6 | 0.7 | | | | | | 1.1 | |
| Delay (s) | | | | 20.7 | 16.3 | | | | | | 15.0 | |
| Level of Service | | | | C | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | 17.4 | | | | 0.0 | | | 15.0 | |
| Approach LOS | | A | | B | | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 16.7 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.49 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 8.0 | |
| Intersection Capacity Utilization | | | | 51.0% | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Existing PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Sign Control | | Stop | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 169 | 362 | 8 | 13 | 178 | 15 | 12 | 18 | 22 | 50 | 37 | 33 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 184 | 393 | 9 | 14 | 193 | 16 | 13 | 20 | 24 | 54 | 40 | 36 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 184 | 402 | 224 | 57 | 130 | | | | | | | |
| Volume Left (vph) | 184 | 0 | 14 | 13 | 54 | | | | | | | |
| Volume Right (vph) | 0 | 9 | 16 | 24 | 36 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.17 | -0.05 | | | | | | | |
| Departure Headway (s) | 5.9 | 5.3 | 5.3 | 5.9 | 5.8 | | | | | | | |
| Degree Utilization, x | 0.30 | 0.60 | 0.33 | 0.09 | 0.21 | | | | | | | |
| Capacity (veh/h) | 595 | 661 | 654 | 534 | 562 | | | | | | | |
| Control Delay (s) | 10.1 | 14.7 | 10.8 | 9.5 | 10.4 | | | | | | | |
| Approach Delay (s) | 13.3 | | 10.8 | 9.5 | 10.4 | | | | | | | |
| Approach LOS | B | | B | A | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 12.1 | | | | | | | | | | |
| HCM Level of Service | | B | | | | | | | | | | |
| Intersection Capacity Utilization | | 52.3% | | | | | | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Existing PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|--------|-------|------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 245 | 255 | 1000 | 0 | 0 | 713 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Lane Util. Factor | 0.97 | 1.00 | 0.95 | | | 0.95 |
| Fr't | 1.00 | 0.85 | 1.00 | | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 3433 | 1583 | 3539 | | | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 3433 | 1583 | 3539 | | | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 266 | 277 | 1087 | 0 | 0 | 775 |
| RTOR Reduction (vph) | 0 | 149 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 266 | 128 | 1087 | 0 | 0 | 775 |
| Turn Type | | custom | | | | |
| Protected Phases | 4 | | 2 | | | 2 |
| Permitted Phases | | 2 | | | | |
| Actuated Green, G (s) | 16.1 | 37.0 | 37.0 | | | 37.0 |
| Effective Green, g (s) | 16.1 | 37.0 | 37.0 | | | 37.0 |
| Actuated g/C Ratio | 0.20 | 0.46 | 0.46 | | | 0.46 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 691 | 732 | 1637 | | | 1637 |
| v/s Ratio Prot | c0.08 | | c0.31 | | | 0.22 |
| v/s Ratio Perm | | 0.08 | | | | |
| v/c Ratio | 0.38 | 0.18 | 0.66 | | | 0.47 |
| Uniform Delay, d1 | 27.7 | 12.6 | 16.7 | | | 14.8 |
| Progression Factor | 1.00 | 1.00 | 0.19 | | | 1.00 |
| Incremental Delay, d2 | 0.4 | 0.5 | 1.6 | | | 1.0 |
| Delay (s) | 28.0 | 13.1 | 4.8 | | | 15.8 |
| Level of Service | C | B | A | | | B |
| Approach Delay (s) | 20.4 | | 4.8 | | | 15.8 |
| Approach LOS | C | | A | | | B |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 11.8 | | | |
| HCM Volume to Capacity ratio | | | 0.58 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | 26.9 |
| Intersection Capacity Utilization | | | 63.0% | | | |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|------|--------------|---------------|----------------------|------|------|
| Lane Configurations | | <div>↰</div> | <div>↑↑</div> | <div>↱</div> | | |
| Sign Control | | Stop | Stop | | Stop | |
| Volume (vph) | 350 | 0 | 466 | 148 | 0 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 380 | 0 | 507 | 161 | 0 | 0 |
| Direction, Lane # | EB 1 | WB 1 | WB 2 | WB 3 | | |
| Volume Total (vph) | 380 | 253 | 253 | 161 | | |
| Volume Left (vph) | 380 | 0 | 0 | 0 | | |
| Volume Right (vph) | 0 | 0 | 0 | 161 | | |
| Hadj (s) | 0.23 | 0.03 | 0.03 | -0.67 | | |
| Departure Headway (s) | 4.7 | 4.8 | 4.8 | 3.2 | | |
| Degree Utilization, x | 0.49 | 0.34 | 0.34 | 0.14 | | |
| Capacity (veh/h) | 761 | 739 | 740 | 1121 | | |
| Control Delay (s) | 12.2 | 9.0 | 9.0 | 5.5 | | |
| Approach Delay (s) | 12.2 | 8.2 | | | | |
| Approach LOS | B | A | | | | |
| Intersection Summary | | | | | | |
| Delay | | 9.6 | | | | |
| HCM Level of Service | | A | | | | |
| Intersection Capacity Utilization | | 38.9% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

Near-Term Conditions AM Peak Hour

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

AECOM Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis Near-Term AM
 48: MacArthur Blvd (EB) & Lakeshore Drive Kaiser Center Transportation Study

AECOM Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

AECOM Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis Near-Term AM
 50: MacArthur Blvd (WB) & Harrison Street Kaiser Center Transportation Study

AECOM Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 90 | 231 | 7 | 11 | 478 | 16 | 11 | 7 | 10 | 22 | 17 | 16 |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 92 | 236 | 7 | 12 | 503 | 17 | 12 | 7 | 11 | 23 | 18 | 17 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 92 | 243 | 532 | 29 | 58 | | | | | | | |
| Volume Left (vph) | 92 | 0 | 12 | 12 | 23 | | | | | | | |
| Volume Right (vph) | 0 | 7 | 17 | 11 | 17 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.7 | 5.2 | 4.7 | 5.9 | 5.9 | | | | | | | |
| Degree Utilization, x | 0.15 | 0.35 | 0.69 | 0.05 | 0.09 | | | | | | | |
| Capacity (veh/h) | 611 | 669 | 756 | 533 | 543 | | | | | | | |
| Control Delay (s) | 8.5 | 9.8 | 17.4 | 9.2 | 9.5 | | | | | | | |
| Approach Delay (s) | 9.5 | | 17.4 | 9.2 | 9.5 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 13.9 | | | | | | | | | | |
| HCM Level of Service | | B | | | | | | | | | | |
| Intersection Capacity Utilization | | 53.3% | | ICU Level of Service | | | | | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|-------|----------------------|------|-------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 361 | 213 | 521 | 286 | 115 | 1094 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Frt | 0.95 | 0.95 | 1.00 | 1.00 | | |
| Flt Protected | 0.97 | 1.00 | 0.95 | 0.95 | 0.95 | 0.95 |
| Satd. Flow (prot) | 1716 | 3351 | 1770 | 3539 | | |
| Flt Permitted | 0.97 | 1.00 | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1716 | 3351 | 1770 | 3539 | | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 380 | 224 | 548 | 301 | 121 | 1152 |
| RTOR Reduction (vph) | 38 | 0 | 122 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 566 | 0 | 727 | 0 | 121 | 1152 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 23.1 | | 14.6 | | 10.3 | 28.9 |
| Effective Green, g (s) | 23.1 | | 14.6 | | 10.3 | 28.9 |
| Actuated g/C Ratio | 0.38 | | 0.24 | | 0.17 | 0.48 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 661 | | 815 | | 304 | 1705 |
| v/s Ratio Prot | c0.33 | | c0.22 | | 0.07 | c0.33 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.86 | | 0.89 | | 0.40 | 0.68 |
| Uniform Delay, d1 | 16.9 | | 21.9 | | 22.1 | 11.9 |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 10.6 | | 14.2 | | 3.9 | 2.2 |
| Delay (s) | 27.5 | | 36.1 | | 26.0 | 14.1 |
| Level of Service | C | | D | | C | B |
| Approach Delay (s) | 27.5 | | 36.1 | | 15.2 | |
| Approach LOS | C | | D | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 24.5 | | HCM Level of Service | | C |
| HCM Volume to Capacity ratio | | 0.85 | | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 73.0% | | ICU Level of Service | | C |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↑ | ↱ | ↰ | ↱ |
| Volume (vph) | 350 | 233 | 416 | 206 | 187 | 199 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.95 | 0.95 | 0.97 | 0.97 |
| Adj. Flow (vph) | 357 | 238 | 438 | 217 | 193 | 205 |
| RTOR Reduction (vph) | 0 | 0 | 102 | 0 | 0 | 160 |
| Lane Group Flow (vph) | 357 | 238 | 553 | 0 | 193 | 45 |
| Turn Type | | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.0 | 31.2 | 13.2 | | 10.9 | 10.9 |
| Effective Green, g (s) | 14.0 | 31.2 | 13.2 | | 10.9 | 10.9 |
| Actuated g/C Ratio | 0.28 | 0.62 | 0.26 | | 0.22 | 0.22 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 495 | 2204 | 886 | | 385 | 344 |
| v/s Ratio Prot | c0.20 | 0.07 | c0.16 | | c0.11 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.72 | 0.11 | 0.62 | | 0.50 | 0.13 |
| Uniform Delay, d1 | 16.3 | 3.8 | 16.3 | | 17.2 | 15.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.1 | 0.0 | 1.4 | | 1.0 | 0.2 |
| Delay (s) | 21.4 | 3.8 | 17.6 | | 18.2 | 16.0 |
| Level of Service | C | A | B | | B | B |
| Approach Delay (s) | 14.4 | 17.6 | | | 17.1 | |
| Approach LOS | B | B | | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 16.3 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.62 | | | | |
| Actuated Cycle Length (s) | | 50.1 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 57.8% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

Near-Term Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term PM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 597 | 490 | 1038 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4963 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4963 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.95 | 0.95 | 0.92 | 0.97 | 0.97 | 0.95 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 333 | 1434 | 149 | 0 | 589 | 615 | 516 | 1093 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 56 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1905 | 0 | 0 | 589 | 559 | 516 | 1093 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.6 | 17.6 | 29.4 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.6 | 17.6 | 29.4 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.20 | 0.20 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1654 | | | 692 | 310 | 578 | 2005 | |
| v/s Ratio Prot | | | | c0.38 | | | 0.17 | | c0.29 | 0.31 | |
| v/s Ratio Perm | | | | | | | c0.35 | | | | |
| v/c Ratio | | | | 1.15 | | | 0.85 | 1.80 | 0.89 | 0.55 | |
| Uniform Delay, d1 | | | | 30.0 | | | 34.9 | 36.2 | 28.8 | 12.2 | |
| Progression Factor | | | | 1.00 | | | 1.24 | 1.22 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 75.7 | | | 1.3 | 363.3 | 16.0 | 0.3 | |
| Delay (s) | | | | 105.7 | | | 44.6 | 407.5 | 44.8 | 12.5 | |
| Level of Service | | | | F | | | D | F | D | B | |
| Approach Delay (s) | 0.0 | | | 105.7 | | | 230.0 | | | 22.9 | |
| Approach LOS | A | | | F | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 109.1 | | | | | | | F | |
| HCM Volume to Capacity ratio | | | 1.20 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | | |
| Intersection Capacity Utilization | | | 88.6% | | | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|---|-------|-------|-------|------|--------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 414 | 1092 | 609 | 169 | 346 | 475 | 71 | 329 | 24 | 243 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.98 | 0.85 | | 0.91 | | | | 1.00 | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3127 | 1441 | | 3214 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3127 | 1441 | | 3214 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 436 | 1149 | 641 | 178 | 364 | 500 | 75 | 346 | 25 | 256 |
| RTOR Reduction (vph) | 0 | 0 | 17 | 0 | 7 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 392 | 1405 | 590 | 0 | 932 | 0 | 0 | 0 | 371 | 256 |
| Turn Type | Split | | Prot | | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 973 | 448 | | 1321 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.24 | c0.45 | 0.41 | | c0.29 | | | | c0.21 | 0.07 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.78 | 1.44 | 1.32 | | 0.86dr | | | | 1.57 | 0.12 |
| Uniform Delay, d1 | 28.2 | 31.0 | 31.0 | | 22.0 | | | | 39.0 | 8.2 |
| Progression Factor | 0.64 | 0.65 | 0.63 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.1 | 200.3 | 144.6 | | 3.2 | | | | 276.9 | 0.1 |
| Delay (s) | 19.1 | 220.6 | 164.2 | | 25.2 | | | | 315.9 | 8.3 |
| Level of Service | B | F | F | | C | | | | F | A |
| Approach Delay (s) | 173.5 | | | | 25.2 | | | | | 190.3 |
| Approach LOS | F | | | | C | | | | | F |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | 141.1 | | | | | | F | |
| HCM Volume to Capacity ratio | | | 1.11 | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | |
| Intersection Capacity Utilization | | | 91.2% | | | | | | F | |
| Analysis Period (min) | | | 15 | | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Near-Term PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1650 | 234 | 329 | 1013 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 0.98 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6285 | | | 5024 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6285 | | | 5024 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.95 | 0.95 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1684 | 246 | 346 | 1066 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1920 | 0 | 0 | 1405 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3143 | | | 1842 | | | | |
| v/s Ratio Prot | | | | | c0.31 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.28 | | | | |
| v/c Ratio | | | | | 0.61 | | | 0.76 | | | | |
| Uniform Delay, d1 | | | | | 10.8 | | | 16.7 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.9 | | | 3.1 | | | | |
| Delay (s) | | | | | 11.7 | | | 19.8 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | 0.0 | | | | 11.7 | | | 19.8 | | | 0.0 | |
| Approach LOS | A | | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 15.1 | | | | B | | | | |
| HCM Volume to Capacity ratio | | | | 0.68 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | 8.0 | | | | |
| Intersection Capacity Utilization | | | 60.7% | | | | | B | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
50: Santa Clara Avenue & Harrison Street

Near-Term PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|-------|------|------|----------------------|------|------|------|------|------|------|------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 646 | 1371 | 0 | 0 | 0 | 0 | 0 | 715 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4778 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4778 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.95 | 0.99 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 680 | 1385 | 0 | 0 | 0 | 0 | 0 | 753 | 68 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 41 | 26 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 455 | 1543 | 0 | 0 | 0 | 0 | 0 | 810 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | 2 | | | | | | | | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | | 23.0 |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | | 23.0 |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | | 0.38 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | | 4.0 |
| Lane Grp Cap (vph) | | | | 736 | 2309 | | | | | | | 1340 |
| v/s Ratio Prot | | | | | | | | | | | | c0.23 |
| v/s Ratio Perm | | | | 0.30 | 0.32 | | | | | | | |
| v/c Ratio | | | | 0.62 | 0.67 | | | | | | | 0.60 |
| Uniform Delay, d1 | | | | 11.4 | 11.8 | | | | | | | 14.8 |
| Progression Factor | | | | 1.47 | 1.41 | | | | | | | 1.00 |
| Incremental Delay, d2 | | | | 3.0 | 1.2 | | | | | | | 2.0 |
| Delay (s) | | | | 19.8 | 17.9 | | | | | | | 16.9 |
| Level of Service | | | | B | B | | | | | | | B |
| Approach Delay (s) | | 0.0 | | 18.3 | | | | 0.0 | | | 16.9 | |
| Approach LOS | | A | | B | | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 17.9 | | | HCM Level of Service | | | | | | B | | |
| HCM Volume to Capacity ratio | 0.64 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | Sum of lost time (s) | | | | | | 8.0 | | |
| Intersection Capacity Utilization | 60.7% | | | ICU Level of Service | | | | | | B | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 230 | 492 | 11 | 18 | 242 | 20 | 16 | 24 | 30 | 68 | 50 | 45 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 242 | 518 | 12 | 19 | 255 | 21 | 17 | 25 | 32 | 72 | 53 | 47 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 242 | 529 | 295 | 74 | 172 | | | | | | | |
| Volume Left (vph) | 242 | 0 | 19 | 17 | 72 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 21 | 32 | 47 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.18 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.3 | 5.8 | 5.8 | 6.6 | 6.4 | | | | | | | |
| Degree Utilization, x | 0.42 | 0.85 | 0.47 | 0.14 | 0.31 | | | | | | | |
| Capacity (veh/h) | 560 | 617 | 596 | 495 | 521 | | | | | | | |
| Control Delay (s) | 12.6 | 31.1 | 13.9 | 10.7 | 12.3 | | | | | | | |
| Approach Delay (s) | 25.3 | | 13.9 | 10.7 | 12.3 | | | | | | | |
| Approach LOS | D | | B | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 20.2 | | | | | | | | | | |
| HCM Level of Service | | C | | | | | | | | | | |
| Intersection Capacity Utilization | | 67.3% | | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 192 | 170 | 1093 | 756 | 149 | 823 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 |
| Frt | 0.94 | | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1700 | | 3322 | | 1770 | 3539 |
| Flt Permitted | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1700 | | 3322 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 202 | 179 | 1151 | 796 | 157 | 866 |
| RTOR Reduction (vph) | 44 | 0 | 105 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 337 | 0 | 1842 | 0 | 157 | 866 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 23.3 | | 41.5 | | 13.2 | 58.7 |
| Effective Green, g (s) | 23.3 | | 41.5 | | 13.2 | 58.7 |
| Actuated g/C Ratio | 0.26 | | 0.46 | | 0.15 | 0.65 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 440 | | 1532 | | 260 | 2308 |
| v/s Ratio Prot | c0.20 | | c0.55 | | c0.09 | 0.24 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.76 | | 1.20 | | 0.60 | 0.38 |
| Uniform Delay, d1 | 30.8 | | 24.2 | | 36.0 | 7.2 |
| Progression Factor | 1.00 | | 1.00 | | 0.98 | 0.36 |
| Incremental Delay, d2 | 7.7 | | 97.5 | | 3.1 | 0.4 |
| Delay (s) | 38.6 | | 121.8 | | 38.4 | 3.0 |
| Level of Service | D | | F | | D | A |
| Approach Delay (s) | 38.6 | | 121.8 | | | 8.4 |
| Approach LOS | D | | F | | | A |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 77.7 | | HCM Level of Service | | E |
| HCM Volume to Capacity ratio | | 0.97 | | | | |
| Actuated Cycle Length (s) | | 90.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 93.8% | | ICU Level of Service | | F |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 254 | 299 | 247 | 109 | 385 | 447 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 267 | 315 | 260 | 115 | 405 | 471 |
| RTOR Reduction (vph) | 0 | 0 | 93 | 0 | 0 | 325 |
| Lane Group Flow (vph) | 267 | 315 | 282 | 0 | 405 | 146 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 12.1 | 25.5 | 9.4 | | 15.1 | 15.1 |
| Effective Green, g (s) | 12.1 | 25.5 | 9.4 | | 15.1 | 15.1 |
| Actuated g/C Ratio | 0.25 | 0.52 | 0.19 | | 0.31 | 0.31 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 441 | 1857 | 653 | | 550 | 492 |
| v/s Ratio Prot | c0.15 | 0.09 | c0.08 | | c0.23 | |
| v/s Ratio Perm | | | | | | 0.09 |
| v/c Ratio | 0.61 | 0.17 | 0.43 | | 0.74 | 0.30 |
| Uniform Delay, d1 | 16.1 | 6.0 | 17.3 | | 15.0 | 12.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.3 | 0.0 | 0.5 | | 5.1 | 0.3 |
| Delay (s) | 18.5 | 6.1 | 17.7 | | 20.1 | 13.1 |
| Level of Service | B | A | B | | C | B |
| Approach Delay (s) | | 11.8 | 17.7 | | 16.3 | |
| Approach LOS | | B | B | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 15.2 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.62 | | | | |
| Actuated Cycle Length (s) | | 48.6 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 55.7% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Cumulative Conditions AM Peak Hour

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Cumulative AM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|-------|--------|------|------|-------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 722 | 760 | 238 | 0 | 490 | 274 | 345 | 1367 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 737 | 776 | 243 | 0 | 500 | 280 | 352 | 1395 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 158 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1734 | 0 | 0 | 500 | 122 | 352 | 1395 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1698 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.35 | | | c0.14 | | 0.20 | c0.39 | |
| v/s Ratio Perm | | | | | | | | 0.08 | | | |
| v/c Ratio | | | | 1.17dl | | | 0.86 | 0.47 | 0.54 | 0.69 | |
| Uniform Delay, d1 | | | | 34.8 | | | 43.0 | 40.0 | 26.4 | 16.1 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 27.4 | | | 14.9 | 5.9 | 3.2 | 2.0 | |
| Delay (s) | | | | 62.2 | | | 57.9 | 46.0 | 29.6 | 18.1 | |
| Level of Service | | | | E | | | E | D | C | B | |
| Approach Delay (s) | 0.0 | | | 62.2 | | | 53.6 | | | 20.4 | |
| Approach LOS | A | | | E | | | D | | | C | |

| Intersection Summary | | | | | | | | | | | |
|---|-------|--|--|--|--|--|--|--|--|--|--|
| HCM Average Control Delay | 43.6 | | | | | | | | | | |
| HCM Volume to Capacity ratio | 0.86 | | | | | | | | | | |
| Actuated Cycle Length (s) | 106.0 | | | | | | | | | | |
| Intersection Capacity Utilization | 84.9% | | | | | | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|------------------------|-------|-------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 291 | 539 | 239 | 228 | 398 | 208 | 24 | 372 | 50 | 496 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3097 | 1441 | | 3344 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3097 | 1441 | | 3344 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 297 | 550 | 244 | 233 | 406 | 212 | 24 | 380 | 51 | 506 |
| RTOR Reduction (vph) | 0 | 0 | 91 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 267 | 734 | 232 | 0 | 639 | 0 | 0 | 0 | 431 | 506 |
| Turn Type | Split | | | Prot | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | | 4 | | | | 2 | 1 | 6 |
| Permitted Phases | | | | | 2 | | | | | |
| Actuated Green, G (s) | 30.9 | 30.9 | 30.9 | | 33.6 | | | | 29.0 | 66.1 |
| Effective Green, g (s) | 30.9 | 30.9 | 30.9 | | 33.6 | | | | 29.0 | 66.1 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.32 | | | | 0.27 | 0.62 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 469 | 903 | 420 | | 1060 | | | | 484 | 2207 |
| v/s Ratio Prot | 0.17 | c0.24 | 0.16 | | c0.19 | | | | c0.24 | 0.14 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.57 | 0.81 | 0.55 | | 0.60 | | | | 0.89 | 0.23 |
| Uniform Delay, d1 | 31.9 | 34.9 | 31.7 | | 30.6 | | | | 37.0 | 8.8 |
| Progression Factor | 0.75 | 0.76 | 0.62 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.8 | 3.1 | 0.8 | | 2.5 | | | | 18.2 | 0.2 |
| Delay (s) | 24.7 | 29.4 | 20.6 | | 33.1 | | | | 55.2 | 9.0 |
| Level of Service | C | C | C | | C | | | | E | A |
| Approach Delay (s) | | 26.3 | | | 33.1 | | | | | 30.2 |
| Approach LOS | | C | | | C | | | | | C |

| Intersection Summary | | | | | | | | | | | |
|-----------------------------------|-------|--|--|--|--|--|--|--|--|--|--|
| HCM Average Control Delay | 29.1 | | | | | | | | | | |
| HCM Volume to Capacity ratio | 0.76 | | | | | | | | | | |
| Actuated Cycle Length (s) | 106.0 | | | | | | | | | | |
| Intersection Capacity Utilization | 74.2% | | | | | | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Cumulative AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 3040 | 149 | 551 | 481 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 1.00 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 6363 | | | 4953 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 6363 | | | 4953 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 3102 | 152 | 562 | 491 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 3246 | 0 | 0 | 1053 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | Perm | | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 38.0 | | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3022 | | | 2105 | | | | |
| v/s Ratio Prot | | | | | c0.51 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.21 | | | | |
| v/c Ratio | | | | | 1.07 | | | 0.50 | | | | |
| Uniform Delay, d1 | | | | | 21.0 | | | 16.8 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.08 | | | | |
| Incremental Delay, d2 | | | | | 40.4 | | | 0.5 | | | | |
| Delay (s) | | | | | 61.4 | | | 18.7 | | | | |
| Level of Service | | | | | E | | | B | | | | |
| Approach Delay (s) | 0.0 | | | | 61.4 | | | 18.7 | | | 0.0 | |
| Approach LOS | A | | | | E | | | B | | | A | |

| Intersection Summary | | | | | | | | | | | |
|-----------------------------------|--------|--|--|--|--|--|--|--|--|--|--|
| HCM Average Control Delay | 51.0 | | | | | | | | | | |
| HCM Volume to Capacity ratio | 0.80 | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | | | | | | | | |
| Intersection Capacity Utilization | 115.5% | | | | | | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis 50: MacArthur Blvd (WB) & Harrison Street

Cumulative AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1406 | 2049 | 0 | 0 | 0 | 0 | 0 | 1431 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt Protected | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4755 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4755 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1435 | 2091 | 0 | 0 | 0 | 0 | 0 | 1460 | 44 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 860 | 2664 | 0 | 0 | 0 | 0 | 0 | 1501 | 0 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | | | | | | | | | | | 2 |
| Permitted Phases | | | | | | | | | | | | 8 |
| Actuated Green, G (s) | | | | | | | | | | | | 26.0 |
| Effective Green, g (s) | | | | | | | | | | | | 26.0 |
| Actuated g/C Ratio | | | | | | | | | | | | 0.32 |
| Clearance Time (s) | | | | | | | | | | | | 4.0 |
| Lane Grp Cap (vph) | | | | | | | | | | | | 1145 |
| v/s Ratio Prot | | | | | | | | | | | | c0.43 |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | | | | | | | | | | | | 1.31 |
| Uniform Delay, d1 | | | | | | | | | | | | 27.0 |
| Progression Factor | | | | | | | | | | | | 1.00 |
| Incremental Delay, d2 | | | | | | | | | | | | 146.4 |
| Delay (s) | | | | | | | | | | | | 173.4 |
| Level of Service | | | | | | | | | | | | F |
| Approach Delay (s) | 0.0 | | | | | | | | | | | 173.4 |
| Approach LOS | A | | | | | | | | | | | F |

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 107 | 273 | 9 | 13 | 565 | 19 | 13 | 9 | 12 | 26 | 20 | 19 |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Hourly flow rate (vph) | 109 | 279 | 9 | 13 | 577 | 19 | 13 | 9 | 12 | 27 | 20 | 19 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 109 | 288 | 609 | 35 | 66 | | | | | | | |
| Volume Left (vph) | 109 | 0 | 13 | 13 | 27 | | | | | | | |
| Volume Right (vph) | 0 | 9 | 19 | 12 | 19 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.9 | 5.4 | 4.8 | 6.3 | 6.2 | | | | | | | |
| Degree Utilization, x | 0.18 | 0.43 | 0.82 | 0.06 | 0.11 | | | | | | | |
| Capacity (veh/h) | 594 | 651 | 738 | 520 | 525 | | | | | | | |
| Control Delay (s) | 9.0 | 11.2 | 25.5 | 9.7 | 10.0 | | | | | | | |
| Approach Delay (s) | 10.6 | | 25.5 | 9.7 | 10.0 | | | | | | | |
| Approach LOS | B | | D | A | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 18.7 | | | | | | | | | | |
| HCM Level of Service | | C | | | | | | | | | | |
| Intersection Capacity Utilization | | 61.3% | | ICU Level of Service | | | | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Cumulative AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|-------|----------------------|------|-------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 418 | 250 | 629 | 307 | 124 | 1229 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Frst | 0.95 | 0.95 | 1.00 | 1.00 | | |
| Flt Protected | 0.97 | 1.00 | 0.95 | 1.00 | | |
| Satd. Flow (prot) | 1715 | 3365 | 1770 | 3539 | | |
| Flt Permitted | 0.97 | 1.00 | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1715 | 3365 | 1770 | 3539 | | |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 427 | 255 | 642 | 313 | 127 | 1254 |
| RTOR Reduction (vph) | 37 | 0 | 98 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 645 | 0 | 857 | 0 | 127 | 1254 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 24.8 | | 14.4 | | 8.8 | 27.2 |
| Effective Green, g (s) | 24.8 | | 14.4 | | 8.8 | 27.2 |
| Actuated g/C Ratio | 0.41 | | 0.24 | | 0.15 | 0.45 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 709 | | 808 | | 260 | 1604 |
| v/s Ratio Prot | c0.38 | | c0.25 | | 0.07 | c0.35 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.91 | | 1.06 | | 0.49 | 0.78 |
| Uniform Delay, d1 | 16.5 | | 22.8 | | 23.5 | 13.9 |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 15.6 | | 49.0 | | 6.4 | 3.9 |
| Delay (s) | 32.1 | | 71.8 | | 30.0 | 17.8 |
| Level of Service | C | | E | | C | B |
| Approach Delay (s) | 32.1 | | 71.8 | | | 18.9 |
| Approach LOS | C | | E | | | B |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 38.6 | | HCM Level of Service | | D |
| HCM Volume to Capacity ratio | | 0.96 | | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 82.5% | | ICU Level of Service | | E |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Cumulative AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 427 | 303 | 466 | 220 | 201 | 214 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frst | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3369 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3369 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 436 | 309 | 476 | 224 | 205 | 218 |
| RTOR Reduction (vph) | 0 | 0 | 94 | 0 | 0 | 171 |
| Lane Group Flow (vph) | 436 | 309 | 606 | 0 | 205 | 47 |
| Turn Type | | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 15.7 | 33.5 | 13.8 | | 11.3 | 11.3 |
| Effective Green, g (s) | 15.7 | 33.5 | 13.8 | | 11.3 | 11.3 |
| Actuated g/C Ratio | 0.30 | 0.63 | 0.26 | | 0.21 | 0.21 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 526 | 2245 | 881 | | 379 | 339 |
| v/s Ratio Prot | c0.25 | 0.09 | c0.18 | | c0.12 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.83 | 0.14 | 0.69 | | 0.54 | 0.14 |
| Uniform Delay, d1 | 17.3 | 3.9 | 17.6 | | 18.4 | 16.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 10.4 | 0.0 | 2.3 | | 1.6 | 0.2 |
| Delay (s) | 27.7 | 3.9 | 19.8 | | 20.0 | 17.0 |
| Level of Service | C | A | B | | C | B |
| Approach Delay (s) | 17.8 | 19.8 | | | 18.5 | |
| Approach LOS | B | B | | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 18.7 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.70 | | | | |
| Actuated Cycle Length (s) | | 52.8 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 64.7% | | ICU Level of Service | | C |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Cumulative Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Cumulative PM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|--------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 340 | 2180 | 153 | 0 | 615 | 642 | 738 | 1118 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.95 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4973 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.95 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4973 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 347 | 2224 | 156 | 0 | 628 | 655 | 753 | 1141 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 20 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 2719 | 0 | 0 | 628 | 635 | 753 | 1141 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1658 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.55 | | | 0.18 | | c0.43 | 0.32 | |
| v/s Ratio Perm | | | | | | | c0.40 | | | | |
| v/c Ratio | | | | 1.64 | | | 0.91 | 2.06 | 1.30 | 0.57 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.5 | 36.2 | 30.3 | 12.5 | |
| Progression Factor | | | | 1.00 | | | 1.27 | 1.23 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 290.7 | | | 2.3 | 478.6 | 146.6 | 0.4 | |
| Delay (s) | | | | 320.7 | | | 47.3 | 523.3 | 176.8 | 12.8 | |
| Level of Service | | | | F | | | D | F | F | B | |
| Approach Delay (s) | 0.0 | | | 320.7 | | | 290.3 | | | 78.0 | |
| Approach LOS | A | | | F | | | F | | | E | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 236.3 | | | | | | | F | |
| HCM Volume to Capacity ratio | | | 1.61 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | | |
| Intersection Capacity Utilization | | | 119.8% | | | | | | | H | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|---|-------|-------|--------|------|--------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 489 | 1581 | 881 | 183 | 372 | 511 | 76 | 354 | 26 | 262 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.98 | 0.85 | | 0.91 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3137 | 1441 | | 3214 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3137 | 1441 | | 3214 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 499 | 1613 | 899 | 187 | 380 | 521 | 78 | 361 | 27 | 267 |
| RTOR Reduction (vph) | 0 | 0 | 12 | 0 | 7 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 449 | 1915 | 822 | 0 | 972 | 0 | 0 | 0 | 388 | 267 |
| Turn Type | Split | | | Prot | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | | 4 | | | | 2 | 1 | 6 |
| Permitted Phases | | | | | 2 | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 976 | 448 | | 1321 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.28 | c0.61 | 0.57 | | c0.30 | | | | c0.22 | 0.08 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.90 | 1.96 | 1.84 | | 0.90dr | | | | 1.64 | 0.13 |
| Uniform Delay, d1 | 29.6 | 31.0 | 31.0 | | 22.4 | | | | 39.0 | 8.2 |
| Progression Factor | 0.60 | 0.61 | 0.59 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.6 | 433.3 | 376.8 | | 3.7 | | | | 308.1 | 0.1 |
| Delay (s) | 20.3 | 452.1 | 395.2 | | 26.1 | | | | 347.1 | 8.4 |
| Level of Service | C | F | F | | C | | | | F | A |
| Approach Delay (s) | | 376.7 | | | 26.1 | | | | | 209.0 |
| Approach LOS | | F | | | C | | | | | F |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | 282.9 | | | | | | | F |
| HCM Volume to Capacity ratio | | | 1.32 | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | |
| Intersection Capacity Utilization | | | 107.2% | | | | | | | G |
| Analysis Period (min) | | | 15 | | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Cumulative PM
Kaiser Center Transportation Study




| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2086 | 296 | 416 | 1281 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 0.98 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6288 | | | 5024 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6288 | | | 5024 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2129 | 302 | 424 | 1307 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2427 | 0 | 0 | 1729 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | | | 2 | | 4 | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3144 | | | 1842 | | | | |
| v/s Ratio Prot | | | | | c0.39 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.34 | | | | |
| v/c Ratio | | | | | 0.77 | | | 0.94 | | | | |
| Uniform Delay, d1 | | | | | 12.2 | | | 18.3 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 1.9 | | | 10.8 | | | | |
| Delay (s) | | | | | 14.1 | | | 29.1 | | | | |
| Level of Service | | | | | B | | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 14.1 | | | 29.1 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 20.4 | | | | | C | | | |
| HCM Volume to Capacity ratio | | | | 0.84 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | 8.0 | | | |
| Intersection Capacity Utilization | | | | 75.0% | | | | | D | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 50: Santa Clara Avenue & Harrison Street

Cumulative PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|---|---|------|------|------|------|------|---|-------|
| Lane Configurations | | | |  |  | | | | | |  | |
| Volume (vph) | 0 | 0 | 0 | 817 | 1734 | 0 | 0 | 0 | 0 | 0 | 905 | 83 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4782 | | | | | | 3494 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4782 | | | | | | 3494 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 834 | 1769 | 0 | 0 | 0 | 0 | 0 | 923 | 85 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 21 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 612 | 1948 | 0 | 0 | 0 | 0 | 0 | 1004 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | 2 | | | | | | | | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | | 23.0 |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | | 23.0 |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | | 0.38 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | | 4.0 |
| Lane Grp Cap (vph) | | | | 736 | 2311 | | | | | | | 1339 |
| v/s Ratio Prot | | | | | | | | | | | | c0.29 |
| v/s Ratio Perm | | | | 0.40 | 0.41 | | | | | | | |
| v/c Ratio | | | | 0.83 | 0.84 | | | | | | | 0.75 |
| Uniform Delay, d1 | | | | 13.4 | 13.5 | | | | | | | 16.0 |
| Progression Factor | | | | 1.34 | 1.33 | | | | | | | 1.00 |
| Incremental Delay, d2 | | | | 6.6 | 2.4 | | | | | | | 3.9 |
| Delay (s) | | | | 24.6 | 20.4 | | | | | | | 19.9 |
| Level of Service | | | | C | C | | | | | | | B |
| Approach Delay (s) | | 0.0 | | | 21.4 | | | | | | 0.0 | 19.9 |
| Approach LOS | | A | | | C | | | | | | A | B |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.0 | HCM Level of Service | | | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.80 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | Sum of lost time (s) | | | | | | 8.0 | | |
| Intersection Capacity Utilization | | | 75.0% | ICU Level of Service | | | | | | D | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 291 | 623 | 14 | 22 | 306 | 26 | 21 | 31 | 38 | 86 | 64 | 57 |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Hourly flow rate (vph) | 297 | 636 | 14 | 22 | 312 | 27 | 21 | 32 | 39 | 88 | 65 | 58 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 297 | 650 | 361 | 92 | 211 | | | | | | | |
| Volume Left (vph) | 297 | 0 | 22 | 21 | 88 | | | | | | | |
| Volume Right (vph) | 0 | 14 | 27 | 39 | 58 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.17 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.7 | 6.2 | 6.1 | 7.1 | 6.8 | | | | | | | |
| Degree Utilization, x | 0.55 | 1.12 | 0.62 | 0.18 | 0.40 | | | | | | | |
| Capacity (veh/h) | 526 | 584 | 565 | 449 | 499 | | | | | | | |
| Control Delay (s) | 16.6 | 96.9 | 18.5 | 11.7 | 14.3 | | | | | | | |
| Approach Delay (s) | 71.7 | | 18.5 | 11.7 | 14.3 | | | | | | | |
| Approach LOS | F | | C | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 48.8 | | | | | | | | | | |
| HCM Level of Service | | E | | | | | | | | | | |
| Intersection Capacity Utilization | | 80.8% | | ICU Level of Service | | | | | D | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Cumulative PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 207 | 182 | 1176 | 808 | 160 | 938 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frst | 0.94 | | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1700 | | 3323 | | 1770 | 3539 |
| Flt Permitted | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1700 | | 3323 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 211 | 186 | 1200 | 824 | 163 | 957 |
| RTOR Reduction (vph) | 44 | 0 | 106 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 353 | 0 | 1918 | 0 | 163 | 957 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 24.1 | | 40.4 | | 13.5 | 57.9 |
| Effective Green, g (s) | 24.1 | | 40.4 | | 13.5 | 57.9 |
| Actuated g/C Ratio | 0.27 | | 0.45 | | 0.15 | 0.64 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 455 | | 1492 | | 266 | 2277 |
| v/s Ratio Prot | c0.21 | | c0.58 | | c0.09 | 0.27 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.78 | | 1.29 | | 0.61 | 0.42 |
| Uniform Delay, d1 | 30.5 | | 24.8 | | 35.8 | 7.8 |
| Progression Factor | 1.00 | | 1.00 | | 0.97 | 0.39 |
| Incremental Delay, d2 | 8.1 | | 133.8 | | 3.0 | 0.4 |
| Delay (s) | 38.5 | | 158.6 | | 37.7 | 3.5 |
| Level of Service | D | | F | | D | A |
| Approach Delay (s) | 38.5 | | 158.6 | | | 8.4 |
| Approach LOS | D | | F | | | A |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 97.6 | | HCM Level of Service | | F |
| HCM Volume to Capacity ratio | | 1.01 | | | | |
| Actuated Cycle Length (s) | | 90.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 99.9% | | ICU Level of Service | | F |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Cumulative PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 273 | 321 | 265 | 118 | 415 | 478 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frst | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 279 | 328 | 270 | 120 | 423 | 488 |
| RTOR Reduction (vph) | 0 | 0 | 93 | 0 | 0 | 336 |
| Lane Group Flow (vph) | 279 | 328 | 297 | 0 | 423 | 152 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 12.4 | 26.1 | 9.7 | | 15.4 | 15.4 |
| Effective Green, g (s) | 12.4 | 26.1 | 9.7 | | 15.4 | 15.4 |
| Actuated g/C Ratio | 0.25 | 0.53 | 0.20 | | 0.31 | 0.31 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 443 | 1866 | 662 | | 551 | 492 |
| v/s Ratio Prot | c0.16 | 0.09 | c0.09 | | c0.24 | |
| v/s Ratio Perm | | | | | | 0.10 |
| v/c Ratio | 0.63 | 0.18 | 0.45 | | 0.77 | 0.31 |
| Uniform Delay, d1 | 16.5 | 6.1 | 17.5 | | 15.4 | 13.0 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.8 | 0.0 | 0.5 | | 6.4 | 0.4 |
| Delay (s) | 19.3 | 6.1 | 18.0 | | 21.8 | 13.4 |
| Level of Service | B | A | B | | C | B |
| Approach Delay (s) | 12.2 | 18.0 | | | 17.3 | |
| Approach LOS | B | B | | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 15.8 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.64 | | | | |
| Actuated Cycle Length (s) | | 49.5 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 59.2% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Existing plus Project (Phase I and Phase II) Conditions AM Peak Hour

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (EB) & Grand Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|------|------|-------|------|----------------------|-------|
| Lane Configurations | | | ↔↔ | ↔ | ↔ | ↔↔ |
| Volume (vph) | 0 | 0 | 461 | 294 | 155 | 1316 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | | 0.95 | 1.00 | 1.00 | 0.95 |
| Flt Protected | | | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Permitted | | | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | | | 3539 | 1583 | 1770 | 3539 |
| Flt Permitted | | | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | | | 3539 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 501 | 320 | 168 | 1430 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 180 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 501 | 140 | 168 | 1430 |
| Turn Type | | | Perm | Prot | | |
| Protected Phases | | | 2 | 1 | 2 | |
| Permitted Phases | | | | 2 | 2 | |
| Actuated Green, G (s) | | | 35.1 | 35.1 | 11.9 | 60.1 |
| Effective Green, g (s) | | | 35.1 | 35.1 | 11.9 | 60.1 |
| Actuated g/C Ratio | | | 0.44 | 0.44 | 0.15 | 0.75 |
| Clearance Time (s) | | | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 1553 | 695 | 263 | 2659 |
| v/s Ratio Prot | | | 0.14 | | c0.09 | c0.40 |
| v/s Ratio Perm | | | | 0.09 | | |
| v/c Ratio | | | 0.32 | 0.20 | 0.64 | 0.54 |
| Uniform Delay, d1 | | | 14.7 | 13.8 | 32.0 | 4.2 |
| Progression Factor | | | 1.00 | 1.00 | 1.27 | 0.06 |
| Incremental Delay, d2 | | | 0.6 | 0.7 | 3.8 | 0.2 |
| Delay (s) | | | 15.2 | 14.5 | 44.5 | 0.4 |
| Level of Service | | | B | B | D | A |
| Approach Delay (s) | 0.0 | | 14.9 | | | 5.0 |
| Approach LOS | A | | B | | | A |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 8.4 | | HCM Level of Service | A |
| HCM Volume to Capacity ratio | | | 0.55 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | | | 75.3% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
46: El Embarcadero (EB) & Lakeshore Drive

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔↔ | ↔↔ | ↔ |
| Volume (veh/h) | 182 | 261 | 0 | 1937 | 572 | 0 |
| Sign Control | | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 198 | 284 | 0 | 2105 | 622 | 0 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1674 | 311 | 622 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1674 | 311 | 622 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 59 | 100 | | | |
| cM capacity (veh/h) | 86 | 685 | 955 | | | |
| Direction, Lane # | | | | | | |
| Volume Total | 198 | 284 | 1053 | 1053 | 311 | 311 |
| Volume Left | 198 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 284 | 0 | 0 | 0 | 0 |
| cSH | 86 | 685 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 2.29 | 0.41 | 0.62 | 0.62 | 0.18 | 0.18 |
| Queue Length 95th (ft) | 451 | 51 | 0 | 0 | 0 | 0 |
| Control Delay (s) | 694.4 | 13.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | F | B | | | | |
| Approach Delay (s) | 293.5 | | 0.0 | | 0.0 | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 44.0 | | | |
| Intersection Capacity Utilization | | | 70.3% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|-------|------|----------------------|-------|------|
| Lane Configurations | | | ↔↔ | ↔↔ | ↔ | ↔ | ↔↔ | ↔ | ↔ | ↔↔ | ↔ |
| Volume (vph) | 0 | 0 | 395 | 626 | 270 | 0 | 571 | 184 | 277 | 1208 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4895 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4895 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 429 | 680 | 293 | 0 | 621 | 200 | 301 | 1313 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 167 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1368 | 0 | 0 | 621 | 33 | 301 | 1313 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 35.0 | | | 17.5 | 17.5 | 40.5 | 62.0 | |
| Effective Green, g (s) | | | | 35.0 | | | 17.5 | 17.5 | 40.5 | 62.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.17 | 0.17 | 0.38 | 0.58 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1616 | | | 584 | 261 | 676 | 2070 | |
| v/s Ratio Prot | | | | c0.28 | | | c0.18 | | 0.17 | c0.37 | |
| v/s Ratio Perm | | | | | | | 0.02 | | | | |
| v/c Ratio | | | | 0.85 | | | 1.06 | 0.13 | 0.45 | 0.63 | |
| Uniform Delay, d1 | | | | 33.0 | | | 44.3 | 37.7 | 24.4 | 14.5 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.3 | | | 55.2 | 1.0 | 2.1 | 1.5 | |
| Delay (s) | | | | 37.3 | | | 99.5 | 38.7 | 26.5 | 16.0 | |
| Level of Service | | | | D | | | F | D | C | B | |
| Approach Delay (s) | 0.0 | | | 37.3 | | | 84.7 | | | 18.0 | |
| Approach LOS | A | | | D | | | F | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 39.3 | | | | | HCM Level of Service | D | |
| HCM Volume to Capacity ratio | | | | 0.80 | | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | | | | Sum of lost time (s) | 13.0 | |
| Intersection Capacity Utilization | | | | 67.0% | | | | | ICU Level of Service | C | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|-----------------------------------|-------|-------|------|-------|------|----------------------|------|------|-------|------|
| Lane Configurations | ↔ | ↔↔ | ↔ | ↔ | ↔↔ | ↔ | ↔ | ↔ | ↔ | ↔↔ |
| Volume (vph) | 260 | 445 | 196 | 184 | 340 | 259 | 32 | 229 | 31 | 654 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | | 3.5 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | 1.00 | | | | 1.00 |
| Flt Protected | 1.00 | 0.99 | 0.85 | 0.85 | 1.00 | 0.85 | | | | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 |
| Satd. Flow (prot) | 1610 | 3177 | 1441 | 1583 | 3539 | 1583 | | | | 1770 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 0.95 |
| Satd. Flow (perm) | 1610 | 3177 | 1441 | 1583 | 3539 | 1583 | | | | 1770 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 283 | 484 | 213 | 200 | 370 | 282 | 35 | 249 | 34 | 711 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 76 | 0 | 4 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 255 | 533 | 192 | 124 | 370 | 313 | 0 | 0 | 283 | 711 |
| Turn Type | Split | | | | Prot | Perm | | | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | Perm | | | 1 | |
| Permitted Phases | | | | | 4 | 2 | | | 6 | |
| Actuated Green, G (s) | 28.1 | 28.1 | 28.1 | 28.1 | 43.2 | 43.2 | | | 22.2 | 68.9 |
| Effective Green, g (s) | 28.1 | 28.1 | 28.1 | 28.1 | 43.2 | 43.2 | | | 22.2 | 68.9 |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.27 | 0.27 | 0.41 | 0.41 | | | 0.21 | 0.65 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 427 | 842 | 382 | 420 | 1442 | 645 | | | 371 | 2300 |
| v/s Ratio Prot | 0.16 | c0.17 | 0.13 | | 0.10 | | | | c0.16 | 0.20 |
| v/s Ratio Perm | | | | 0.08 | | c0.20 | | | | |
| v/c Ratio | 0.60 | 0.63 | 0.50 | 0.30 | 0.26 | 0.49 | | | 0.76 | 0.31 |
| Uniform Delay, d1 | 34.0 | 34.4 | 33.0 | 31.1 | 20.8 | 23.2 | | | 39.4 | 8.1 |
| Progression Factor | 0.74 | 0.74 | 0.74 | 0.58 | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.7 | 1.2 | 0.8 | 0.3 | 0.4 | 2.6 | | | 9.0 | 0.3 |
| Delay (s) | 26.9 | 26.7 | 25.2 | 18.3 | 21.2 | 25.8 | | | 48.4 | 8.5 |
| Level of Service | C | C | C | B | C | C | | | D | A |
| Approach Delay (s) | 25.1 | | | | 23.3 | | | | 19.8 | |
| Approach LOS | C | | | | C | | | | B | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | | 22.8 | | HCM Level of Service | | | C | |
| HCM Volume to Capacity ratio | | | | 0.60 | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | Sum of lost time (s) | | | 12.5 | |
| Intersection Capacity Utilization | | | | 57.9% | | ICU Level of Service | | | B | |
| Analysis Period (min) | | | | 15 | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|-------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2273 | 103 | 381 | 340 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Fr't | | | | | 0.99 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 6366 | | | 4954 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 6366 | | | 4954 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2471 | 112 | 414 | 370 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2575 | 0 | 0 | 783 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 38.0 | | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3024 | | | 2105 | | | | |
| v/s Ratio Prot | | | | | c0.40 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.16 | | | | |
| v/c Ratio | | | | | 0.85 | | | 0.37 | | | | |
| Uniform Delay, d1 | | | | | 18.5 | | | 15.7 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.16 | | | | |
| Incremental Delay, d2 | | | | | 3.3 | | | 0.4 | | | | |
| Delay (s) | | | | | 21.8 | | | 18.6 | | | | |
| Level of Service | | | | | C | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 21.8 | | | 18.6 | | | 0.0 | |
| Approach LOS | | A | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.0 | | | | | | C | | | |
| HCM Volume to Capacity ratio | | | 0.63 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | | | | 8.0 | | | |
| Intersection Capacity Utilization | | 74.5% | | | | | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|-------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1142 | 1418 | 0 | 0 | 0 | 0 | 0 | 1032 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Fr't | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 1743 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 1743 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1241 | 1541 | 0 | 0 | 0 | 0 | 0 | 1122 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 679 | 2095 | 0 | 0 | 0 | 0 | 0 | 1152 | 0 |
| Turn Type | | | | | Perm | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2727 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.33 | |
| v/s Ratio Perm | | | | c0.45 | 0.44 | | | | | | | |
| v/c Ratio | | | | 0.78 | 0.77 | | | | | | 1.01 | |
| Uniform Delay, d1 | | | | 13.0 | 12.9 | | | | | | 27.0 | |
| Progression Factor | | | | 1.41 | 1.42 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 4.1 | 1.3 | | | | | | 28.2 | |
| Delay (s) | | | | 22.5 | 19.7 | | | | | | 55.2 | |
| Level of Service | | | | C | B | | | | | | E | |
| Approach Delay (s) | | 0.0 | | 20.4 | | | | 0.0 | | | 55.2 | |
| Approach LOS | | A | | C | | | | A | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 30.6 | | | | | | C | | | |
| HCM Volume to Capacity ratio | | | 0.86 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | | | | 8.0 | | | |
| Intersection Capacity Utilization | | 74.5% | | | | | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 74 | 196 | 6 | 9 | 433 | 13 | 9 | 6 | 8 | 18 | 14 | 13 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 80 | 213 | 7 | 10 | 471 | 14 | 10 | 7 | 9 | 20 | 15 | 14 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 80 | 220 | 495 | 25 | 49 | | | | | | | |
| Volume Left (vph) | 80 | 0 | 10 | 10 | 20 | | | | | | | |
| Volume Right (vph) | 0 | 7 | 14 | 9 | 14 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.6 | 5.1 | 4.6 | 5.7 | 5.7 | | | | | | | |
| Degree Utilization, x | 0.13 | 0.31 | 0.63 | 0.04 | 0.08 | | | | | | | |
| Capacity (veh/h) | 622 | 683 | 771 | 538 | 552 | | | | | | | |
| Control Delay (s) | 8.3 | 9.2 | 15.0 | 8.9 | 9.1 | | | | | | | |
| Approach Delay (s) | 9.0 | | 15.0 | 8.9 | 9.1 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 12.4 | | | | | | | | | | |
| HCM Level of Service | | B | | | | | | | | | | |
| Intersection Capacity Utilization | | 48.1% | | | | | | | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Existing plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|--------|------|------|------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 443 | 302 | 461 | 0 | 0 | 1028 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Lane Util. Factor | 0.97 | 1.00 | 0.95 | | | 0.95 |
| Fr't | 1.00 | 0.85 | 1.00 | | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 3433 | 1583 | 3539 | | | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 3433 | 1583 | 3539 | | | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 482 | 328 | 501 | 0 | 0 | 1117 |
| RTOR Reduction (vph) | 0 | 171 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 482 | 157 | 501 | 0 | 0 | 1117 |
| Turn Type | | custom | | | | |
| Protected Phases | 4 | | 2 | | | 2 |
| Permitted Phases | | 2 | | | | |
| Actuated Green, G (s) | 21.0 | 35.1 | 35.1 | | | 35.1 |
| Effective Green, g (s) | 21.0 | 35.1 | 35.1 | | | 35.1 |
| Actuated g/C Ratio | 0.26 | 0.44 | 0.44 | | | 0.44 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 901 | 695 | 1553 | | | 1553 |
| v/s Ratio Prot | c0.14 | | 0.14 | | | c0.32 |
| v/s Ratio Perm | | 0.10 | | | | |
| v/c Ratio | 0.53 | 0.23 | 0.32 | | | 0.72 |
| Uniform Delay, d1 | 25.3 | 14.0 | 14.7 | | | 18.4 |
| Progression Factor | 1.00 | 1.00 | 0.13 | | | 1.00 |
| Incremental Delay, d2 | 0.6 | 0.8 | 0.5 | | | 2.9 |
| Delay (s) | 25.9 | 14.7 | 2.5 | | | 21.3 |
| Level of Service | C | B | A | | | C |
| Approach Delay (s) | 21.4 | | 2.5 | | | 21.3 |
| Approach LOS | C | | A | | | C |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 17.5 | | | | B |
| HCM Volume to Capacity ratio | | 0.65 | | | | |
| Actuated Cycle Length (s) | | 80.0 | | | | 23.9 |
| Intersection Capacity Utilization | | 75.3% | | | | D |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|------|--------------|---------------|----------------------|------|------|
| Lane Configurations | | <div>↰</div> | <div>↑↑</div> | <div>↱</div> | | |
| Sign Control | | Stop | Stop | | Stop | |
| Volume (vph) | 471 | 0 | 572 | 262 | 0 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 512 | 0 | 622 | 285 | 0 | 0 |
| Direction, Lane # | EB 1 | WB 1 | WB 2 | WB 3 | | |
| Volume Total (vph) | 512 | 311 | 311 | 285 | | |
| Volume Left (vph) | 512 | 0 | 0 | 0 | | |
| Volume Right (vph) | 0 | 0 | 0 | 285 | | |
| Hadj (s) | 0.23 | 0.03 | 0.03 | -0.67 | | |
| Departure Headway (s) | 4.8 | 4.9 | 4.9 | 3.2 | | |
| Degree Utilization, x | 0.68 | 0.42 | 0.42 | 0.25 | | |
| Capacity (veh/h) | 751 | 726 | 727 | 1112 | | |
| Control Delay (s) | 17.1 | 10.2 | 10.2 | 6.1 | | |
| Approach Delay (s) | 17.1 | 8.9 | | | | |
| Approach LOS | C | A | | | | |
| Intersection Summary | | | | | | |
| Delay | | 11.9 | | | | |
| HCM Level of Service | | B | | | | |
| Intersection Capacity Utilization | | 49.0% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

Existing plus Project (Phase I and Phase II) Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis
45: El Embarcadero (EB) & Grand Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|------|------|-------|-------|----------------------|-------|
| Lane Configurations | | | | | | |
| Volume (vph) | 0 | 0 | 1069 | 772 | 235 | 770 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | | | 0.95 | 1.00 | 1.00 | 0.95 |
| Flt Protected | | | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Permitted | | | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | | | 3539 | 1583 | 1770 | 3539 |
| Satd. Flow (perm) | | | 3539 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 1162 | 839 | 255 | 837 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 284 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 1162 | 556 | 255 | 837 |
| Turn Type | | | Perm | Prot | | |
| Protected Phases | | | 2 | 1 | 2 | 4 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 36.8 | 36.8 | 14.8 | 57.2 |
| Effective Green, g (s) | | | 36.8 | 36.8 | 14.8 | 57.2 |
| Actuated g/C Ratio | | | 0.46 | 0.46 | 0.18 | 0.72 |
| Clearance Time (s) | | | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 1628 | 728 | 327 | 2530 |
| v/s Ratio Prot | | | 0.33 | | c0.14 | c0.24 |
| v/s Ratio Perm | | | | c0.35 | | |
| v/c Ratio | | | 0.71 | 0.76 | 0.78 | 0.33 |
| Uniform Delay, d1 | | | 17.4 | 18.0 | 31.0 | 4.3 |
| Progression Factor | | | 1.00 | 1.00 | 1.34 | 0.08 |
| Incremental Delay, d2 | | | 2.7 | 7.4 | 10.2 | 0.1 |
| Delay (s) | | | 20.1 | 25.4 | 51.8 | 0.4 |
| Level of Service | | | C | C | D | A |
| Approach Delay (s) | 0.0 | | 22.3 | | | 12.4 |
| Approach LOS | A | | C | | | B |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 18.8 | | HCM Level of Service | B |
| HCM Volume to Capacity ratio | | | 0.64 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | | | 67.5% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
46: El Embarcadero (EB) & Lakeshore Drive

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|--------|------|--------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 383 | 623 | 0 | 1937 | 466 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 416 | 677 | 0 | 2105 | 507 | 0 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1559 | 253 | 507 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1559 | 253 | 507 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 9 | 100 | | | |
| cM capacity (veh/h) | 103 | 746 | 1054 | | | |
| Direction, Lane # | | | | | | |
| Volume Total | 416 | 677 | 1053 | 1053 | 253 | 253 |
| Volume Left | 416 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 677 | 0 | 0 | 0 | 0 |
| cSH | 103 | 746 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 4.04 | 0.91 | 0.62 | 0.62 | 0.15 | 0.15 |
| Queue Length 95th (ft) | Err | 305 | 0 | 0 | 0 | 0 |
| Control Delay (s) | Err | 38.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | F | E | | | | |
| Approach Delay (s) | 3830.3 | | 0.0 | | 0.0 | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1130.3 | | | |
| Intersection Capacity Utilization | | | 81.4% | | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|-------|-------|----------------------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 298 | 768 | 224 | 0 | 696 | 629 | 350 | 785 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4913 | | | 3539 | 1583 | 1770 | 3539 | |
| Satd. Flow (perm) | | | | 4913 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 324 | 835 | 243 | 0 | 757 | 684 | 380 | 853 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 106 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1364 | 0 | 0 | 757 | 578 | 380 | 853 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | 1 | 2 | | |
| Permitted Phases | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 29.4 | | | 21.0 | 21.0 | 26.6 | 51.6 | |
| Effective Green, g (s) | | | | 29.4 | | | 21.0 | 21.0 | 26.6 | 51.6 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.23 | 0.23 | 0.30 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1605 | | | 826 | 369 | 523 | 2029 | |
| v/s Ratio Prot | | | | c0.28 | | | 0.21 | | c0.21 | 0.24 | |
| v/s Ratio Perm | | | | | | | c0.37 | | | | |
| v/c Ratio | | | | 0.85 | | | 0.92 | 1.57 | 0.73 | 0.42 | |
| Uniform Delay, d1 | | | | 28.2 | | | 33.6 | 34.5 | 28.4 | 10.8 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.4 | | | 16.6 | 268.0 | 5.0 | 0.1 | |
| Delay (s) | | | | 32.7 | | | 50.2 | 302.5 | 33.4 | 10.9 | |
| Level of Service | | | | C | | | D | F | C | B | |
| Approach Delay (s) | 0.0 | | | 32.7 | | | 170.0 | | | 17.9 | |
| Approach LOS | A | | | C | | | F | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 76.7 | | | | | HCM Level of Service | E | |
| HCM Volume to Capacity ratio | | | | 1.00 | | | | | | | |
| Actuated Cycle Length (s) | | | | 90.0 | | | | | Sum of lost time (s) | 13.0 | |
| Intersection Capacity Utilization | | | | 74.4% | | | | | ICU Level of Service | D | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|-----------------------------------|-------|-------|------|-------|------|-------|------|------|----------------------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 329 | 830 | 424 | 163 | 444 | 483 | 144 | 263 | 19 | 456 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | 1.00 | 0.95 | 1.00 | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.99 | 0.85 | 0.85 | 1.00 | 0.85 | | | 1.00 | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3176 | 1441 | 1583 | 3539 | 1583 | | | 1770 | 3539 |
| Satd. Flow (perm) | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3176 | 1441 | 1583 | 3539 | 1583 | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 358 | 902 | 461 | 177 | 483 | 525 | 157 | 286 | 21 | 496 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 34 | 0 | 12 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 322 | 984 | 415 | 143 | 483 | 670 | 0 | 0 | 307 | 496 |
| Turn Type | Split | | | | | | Prot | Prot | | |
| Protected Phases | 4 | 4 | 4 | | | | 2 | 2 | | |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | 37.0 | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | 28.0 | 37.0 | 37.0 | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | 0.31 | 0.41 | 0.41 | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 988 | 448 | 492 | 1455 | 651 | | | 236 | 2084 |
| v/s Ratio Prot | 0.20 | c0.31 | 0.29 | | 0.14 | | | | c0.17 | 0.14 |
| v/s Ratio Perm | | | | 0.09 | | c0.42 | | | | |
| v/c Ratio | 0.64 | 1.00 | 0.93 | 0.29 | 0.33 | 1.03 | | | 1.30 | 0.24 |
| Uniform Delay, d1 | 26.7 | 30.9 | 30.0 | 23.5 | 18.1 | 26.5 | | | 39.0 | 8.8 |
| Progression Factor | 0.77 | 0.80 | 0.79 | 0.67 | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.6 | 7.7 | 4.1 | 0.1 | 0.6 | 43.0 | | | 162.8 | 0.3 |
| Delay (s) | 21.1 | 32.6 | 27.8 | 15.9 | 18.7 | 69.5 | | | 201.8 | 9.1 |
| Level of Service | C | C | C | B | B | E | | | F | A |
| Approach Delay (s) | | 28.0 | | | 48.5 | | | | | 82.8 |
| Approach LOS | | C | | | D | | | | | F |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | | 45.6 | | | | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | | | 1.06 | | | | | | |
| Actuated Cycle Length (s) | | | | 90.0 | | | | | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | | | | 90.0% | | | | | ICU Level of Service | E |
| Analysis Period (min) | | | | 15 | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1240 | 172 | 242 | 820 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Frnt | | | | | 0.98 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6291 | | | 5028 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6291 | | | 5028 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1348 | 187 | 263 | 891 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 18 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1515 | 0 | 0 | 1136 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | Perm | | | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3146 | | | 1844 | | | | |
| v/s Ratio Prot | | | | | c0.24 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.23 | | | | |
| v/c Ratio | | | | | 0.48 | | | 0.62 | | | | |
| Uniform Delay, d1 | | | | | 9.9 | | | 15.5 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.5 | | | 1.6 | | | | |
| Delay (s) | | | | | 10.4 | | | 17.1 | | | | |
| Level of Service | | | | | B | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 10.4 | | | 17.1 | | | 0.0 | |
| Approach LOS | | A | | | B | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 13.3 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.54 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | 8.0 | | | | |
| Intersection Capacity Utilization | | | 52.4% | | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
50: Santa Clara Avenue & Harrison Street

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 502 | 1008 | 0 | 0 | 0 | 0 | 0 | 533 | 48 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Frnt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4778 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4778 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 546 | 1096 | 0 | 0 | 0 | 0 | 0 | 579 | 52 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 78 | 26 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 322 | 1217 | 0 | 0 | 0 | 0 | 0 | 620 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | | 8 |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2309 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.18 | |
| v/s Ratio Perm | | | | 0.21 | 0.25 | | | | | | | |
| v/c Ratio | | | | 0.44 | 0.53 | | | | | | 0.46 | |
| Uniform Delay, d1 | | | | 10.2 | 10.7 | | | | | | 13.9 | |
| Progression Factor | | | | 1.88 | 1.47 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 1.7 | 0.8 | | | | | | 1.2 | |
| Delay (s) | | | | 20.7 | 16.5 | | | | | | 15.0 | |
| Level of Service | | | | C | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 17.5 | | | | 0.0 | | | 15.0 |
| Approach LOS | | A | | | B | | | | A | | | B |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 16.8 | | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.50 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | | | 8.0 | |
| Intersection Capacity Utilization | | | 52.4% | | | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
51: Harrison Street & Monte Vista Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|-------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Sign Control | Stop | | | Stop | | | Stop | | | Stop | | |
| Volume (vph) | 169 | 437 | 8 | 13 | 185 | 15 | 12 | 18 | 22 | 50 | 37 | 33 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 184 | 475 | 9 | 14 | 201 | 16 | 13 | 20 | 24 | 54 | 40 | 36 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 184 | 484 | 232 | 57 | 130 | | | | | | | |
| Volume Left (vph) | 184 | 0 | 14 | 13 | 54 | | | | | | | |
| Volume Right (vph) | 0 | 9 | 16 | 24 | 36 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.17 | -0.05 | | | | | | | |
| Departure Headway (s) | 5.9 | 5.4 | 5.4 | 6.1 | 6.0 | | | | | | | |
| Degree Utilization, x | 0.30 | 0.72 | 0.35 | 0.10 | 0.22 | | | | | | | |
| Capacity (veh/h) | 593 | 653 | 640 | 528 | 543 | | | | | | | |
| Control Delay (s) | 10.2 | 19.9 | 11.2 | 9.7 | 10.7 | | | | | | | |
| Approach Delay (s) | 17.2 | | 11.2 | 9.7 | 10.7 | | | | | | | |
| Approach LOS | C | | B | A | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 14.8 | | | | | | | | | |
| HCM Level of Service | | | B | | | | | | | | | |
| Intersection Capacity Utilization | | | 56.7% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Existing plus Project (I+II) PM
Kaiser Center Transportation Study


















| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|--------|-------|------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 245 | 255 | 1069 | 0 | 0 | 760 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Lane Util. Factor | 0.97 | 1.00 | 0.95 | | | 0.95 |
| Frnt | 1.00 | 0.85 | 1.00 | | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (prot) | 3433 | 1583 | 3539 | | | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | 1.00 |
| Satd. Flow (perm) | 3433 | 1583 | 3539 | | | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 266 | 277 | 1162 | 0 | 0 | 826 |
| RTOR Reduction (vph) | 0 | 150 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 266 | 127 | 1162 | 0 | 0 | 826 |
| Turn Type | | custom | | | | |
| Protected Phases | 4 | | 2 | | | 2 |
| Permitted Phases | | 2 | | | | |
| Actuated Green, G (s) | 16.4 | 36.8 | 36.8 | | | 36.8 |
| Effective Green, g (s) | 16.4 | 36.8 | 36.8 | | | 36.8 |
| Actuated g/C Ratio | 0.20 | 0.46 | 0.46 | | | 0.46 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Lane Grp Cap (vph) | 704 | 728 | 1628 | | | 1628 |
| v/s Ratio Prot | c0.08 | | c0.33 | | | 0.23 |
| v/s Ratio Perm | | 0.08 | | | | |
| v/c Ratio | 0.38 | 0.18 | 0.71 | | | 0.51 |
| Uniform Delay, d1 | 27.4 | 12.7 | 17.4 | | | 15.2 |
| Progression Factor | 1.00 | 1.00 | 0.22 | | | 1.00 |
| Incremental Delay, d2 | 0.3 | 0.5 | 1.9 | | | 1.1 |
| Delay (s) | 27.7 | 13.2 | 5.6 | | | 16.3 |
| Level of Service | C | B | A | | | B |
| Approach Delay (s) | 20.3 | | 5.6 | | | 16.3 |
| Approach LOS | C | | A | | | B |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 12.3 | | | |
| HCM Volume to Capacity ratio | | | 0.61 | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | 26.8 |
| Intersection Capacity Utilization | | | 67.5% | | | |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |


















AECOM

Synchro 7 - Report

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | ↰ | ↱↰ | ↱ | | |
| Sign Control | | Stop | Stop | | Stop | |
| Volume (vph) | 350 | 0 | 466 | 148 | 0 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 380 | 0 | 507 | 161 | 0 | 0 |
| Direction, Lane # | EB 1 | WB 1 | WB 2 | WB 3 | | |
| Volume Total (vph) | 380 | 253 | 253 | 161 | | |
| Volume Left (vph) | 380 | 0 | 0 | 0 | | |
| Volume Right (vph) | 0 | 0 | 0 | 161 | | |
| Hadj (s) | 0.23 | 0.03 | 0.03 | -0.67 | | |
| Departure Headway (s) | 4.7 | 4.8 | 4.8 | 3.2 | | |
| Degree Utilization, x | 0.49 | 0.34 | 0.34 | 0.14 | | |
| Capacity (veh/h) | 761 | 739 | 740 | 1121 | | |
| Control Delay (s) | 12.2 | 9.0 | 9.0 | 5.5 | | |
| Approach Delay (s) | 12.2 | 8.2 | | | | |
| Approach LOS | B | A | | | | |
| Intersection Summary | | | | | | |
| Delay | | 9.6 | | | | |
| HCM Level of Service | | A | | | | |
| Intersection Capacity Utilization | | 38.9% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

Existing plus Project (Phase I and Phase II) Conditions Mitigated

| |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|---|---|--|---|---|---|---|--|
| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | |  |  | |  |  |  |  | |
| Volume (vph) | 0 | 0 | 395 | 626 | 270 | 0 | 571 | 184 | 277 | 1208 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 0.88 | 1.00 | 0.95 | |
| Frt | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4895 | | | 3539 | 2787 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4895 | | | 3539 | 2787 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 429 | 680 | 293 | 0 | 621 | 200 | 301 | 1313 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 167 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1368 | 0 | 0 | 621 | 33 | 301 | 1313 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 35.0 | | | 17.5 | 17.5 | 40.5 | 62.0 | |
| Effective Green, g (s) | | | | 35.0 | | | 17.5 | 17.5 | 40.5 | 62.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.17 | 0.17 | 0.38 | 0.58 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1616 | | | 584 | 460 | 676 | 2070 | |
| v/s Ratio Prot | | | | c0.28 | | | c0.18 | | 0.17 | c0.37 | |
| v/s Ratio Perm | | | | | | | 0.01 | | | | |
| v/c Ratio | | | | 0.85 | | | 1.06 | 0.07 | 0.45 | 0.63 | |
| Uniform Delay, d1 | | | | 33.0 | | | 44.3 | 37.4 | 24.4 | 14.5 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.3 | | | 55.2 | 0.3 | 2.1 | 1.5 | |
| Delay (s) | | | | 37.3 | | | 99.5 | 37.7 | 26.5 | 16.0 | |
| Level of Service | | | | D | | | F | D | C | B | |
| Approach Delay (s) | 0.0 | | | 37.3 | | | 84.4 | | | 18.0 | |
| Approach LOS | A | | | D | | | F | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 39.3 | | | | HCM Level of Service | | | D | |
| HCM Volume to Capacity ratio | | | 0.80 | | | | | | | | |
| Actuated Cycle Length (s) | | | 106.0 | | | | Sum of lost time (s) | | | 13.0 | |
| Intersection Capacity Utilization | | | 67.0% | | | | ICU Level of Service | | | C | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

| |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|--|--|--|---|---|--|---|---|---|---|--|
| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | |  |  | |  |  |  |  | |
| Volume (vph) | 0 | 0 | 298 | 768 | 224 | 0 | 696 | 629 | 350 | 785 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 0.88 | 1.00 | 0.95 | |
| Frt | | | | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4913 | | | 3539 | 2787 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4913 | | | 3539 | 2787 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 324 | 835 | 243 | 0 | 757 | 684 | 380 | 853 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 186 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1364 | 0 | 0 | 757 | 498 | 380 | 853 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 29.4 | | | 21.0 | 21.0 | 26.6 | 51.6 | |
| Effective Green, g (s) | | | | 29.4 | | | 21.0 | 21.0 | 26.6 | 51.6 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.23 | 0.23 | 0.30 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1605 | | | 826 | 650 | 523 | 2029 | |
| v/s Ratio Prot | | | | c0.28 | | | c0.21 | | c0.21 | 0.24 | |
| v/s Ratio Perm | | | | | | | 0.18 | | | | |
| v/c Ratio | | | | 0.85 | | | 0.92 | 0.77 | 0.73 | 0.42 | |
| Uniform Delay, d1 | | | | 28.2 | | | 33.6 | 32.2 | 28.4 | 10.8 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 4.4 | | | 16.6 | 8.4 | 5.0 | 0.1 | |
| Delay (s) | | | | 32.7 | | | 50.2 | 40.6 | 33.4 | 10.9 | |
| Level of Service | | | | C | | | D | D | C | B | |
| Approach Delay (s) | 0.0 | | | 32.7 | | | 45.7 | | | 17.9 | |
| Approach LOS | A | | | C | | | D | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 32.8 | | | | HCM Level of Service | | | C | |
| HCM Volume to Capacity ratio | | | 0.83 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | Sum of lost time (s) | | | 13.0 | |
| Intersection Capacity Utilization | | | 74.4% | | | | ICU Level of Service | | | D | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

Near-Term (2015) plus Project (Phase I) Conditions AM Peak Hour

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term + I AM
Kaiser Center Transportation Study

















| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|---|------|------|-------|--------|------|------|----------------------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 671 | 706 | 221 | 0 | 424 | 213 | 282 | 1299 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.95 | 0.95 | 0.92 | 0.95 | 0.95 | 0.95 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 706 | 743 | 233 | 0 | 446 | 224 | 297 | 1367 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 187 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1660 | 0 | 0 | 446 | 37 | 297 | 1367 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1698 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.34 | | | 0.13 | | 0.17 | c0.39 | |
| v/s Ratio Perm | | | | | | | | 0.02 | | | |
| v/c Ratio | | | | 1.12dl | | | 0.76 | 0.14 | 0.46 | 0.68 | |
| Uniform Delay, d1 | | | | 34.4 | | | 42.3 | 37.8 | 25.4 | 15.9 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 16.7 | | | 9.2 | 1.1 | 2.3 | 1.8 | |
| Delay (s) | | | | 51.0 | | | 51.4 | 39.0 | 27.7 | 17.8 | |
| Level of Service | | | | D | | | D | D | C | B | |
| Approach Delay (s) | 0.0 | | | 51.0 | | | 47.3 | | | 19.5 | |
| Approach LOS | A | | | D | | | D | | | B | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 37.3 | | | HCM Level of Service | | | D | |
| HCM Volume to Capacity ratio | | | | 0.79 | | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | | Sum of lost time (s) | | | 8.5 | |
| Intersection Capacity Utilization | | | | 80.2% | | | ICU Level of Service | | | D | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term + I AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|--|---|--|--|--|---|---|
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
| Lane Configurations |  |  |  | |  | | | |  |  |
| Volume (vph) | 261 | 490 | 217 | 198 | 341 | 178 | 21 | 345 | 47 | 460 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Frt | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3101 | 1441 | | 3343 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3101 | 1441 | | 3343 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.97 | 0.97 | 0.97 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 275 | 516 | 228 | 208 | 352 | 184 | 22 | 363 | 49 | 484 |
| RTOR Reduction (vph) | 0 | 0 | 81 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 247 | 681 | 218 | 0 | 555 | 0 | 0 | 0 | 412 | 484 |
| Turn Type | Split | | | Prot | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 30.3 | 30.3 | 30.3 | | 34.9 | | | | 28.3 | 66.7 |
| Effective Green, q (s) | 30.3 | 30.3 | 30.3 | | 34.9 | | | | 28.3 | 66.7 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.33 | | | | 0.27 | 0.63 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 460 | 886 | 412 | | 1101 | | | | 473 | 2227 |
| v/s Ratio Prot | 0.15 | c0.22 | 0.15 | | c0.17 | | | | c0.23 | 0.14 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.54 | 0.77 | 0.53 | | 0.50 | | | | 0.87 | 0.22 |
| Uniform Delay, d1 | 31.9 | 34.6 | 31.9 | | 28.6 | | | | 37.1 | 8.4 |
| Progression Factor | 0.70 | 0.71 | 0.56 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.7 | 2.5 | 0.8 | | 1.7 | | | | 16.0 | 0.2 |
| Delay (s) | 23.2 | 27.1 | 18.6 | | 30.2 | | | | 53.1 | 8.7 |
| Level of Service | C | C | B | | C | | | | D | A |
| Approach Delay (s) | | 24.2 | | | 30.2 | | | | | 29.1 |
| Approach LOS | | C | | | C | | | | | C |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | 27.1 | | HCM Level of Service | | | | C | |
| HCM Volume to Capacity ratio | | | 0.70 | | | | | | | |
| Actuated Cycle Length (s) | | | 106.0 | | Sum of lost time (s) | | | 12.5 | | |
| Intersection Capacity Utilization | | | 67.3% | | ICU Level of Service | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Near-Term + I AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|------|------|-------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2615 | 126 | 466 | 409 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 0.99 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 6362 | | | 4952 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 6362 | | | 4952 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.95 | 0.95 | 0.97 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2668 | 133 | 491 | 422 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2792 | 0 | 0 | 913 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | | | 2 | | 4 | | | |
| Permitted Phases | | | | | | | | 4 | | | | |
| Actuated Green, G (s) | | | | | 38.0 | | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3022 | | | 2105 | | | | |
| v/s Ratio Prot | | | | | c0.44 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.18 | | | | |
| v/c Ratio | | | | | 0.92 | | | 0.43 | | | | |
| Uniform Delay, d1 | | | | | 19.6 | | | 16.2 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.13 | | | | |
| Incremental Delay, d2 | | | | | 6.1 | | | 0.5 | | | | |
| Delay (s) | | | | | 25.8 | | | 18.8 | | | | |
| Level of Service | | | | | C | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 25.8 | | | 18.8 | | | 0.0 | |
| Approach LOS | | A | | | C | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 24.1 | | | HCM Level of Service | | | C | |
| HCM Volume to Capacity ratio | | | | | 0.69 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | |
| Intersection Capacity Utilization | | | | | 85.7% | | | ICU Level of Service | | | E | |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Near-Term + I AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1232 | 1734 | 0 | 0 | 0 | 0 | 0 | 1228 | 37 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4755 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4755 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.99 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1244 | 1825 | 0 | 0 | 0 | 0 | 0 | 1293 | 39 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 744 | 2321 | 0 | 0 | 0 | 0 | 0 | 1329 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Effective Green, g (s) | | | | 46.0 | 46.0 | | | | | | 26.0 | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | 0.32 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 875 | 2734 | | | | | | 1145 | |
| v/s Ratio Prot | | | | | | | | | | | c0.38 | |
| v/s Ratio Perm | | | | c0.49 | 0.49 | | | | | | | |
| v/c Ratio | | | | 0.85 | 0.85 | | | | | | 1.16 | |
| Uniform Delay, d1 | | | | 14.1 | 14.1 | | | | | | 27.0 | |
| Progression Factor | | | | 1.39 | 1.39 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 5.4 | 1.8 | | | | | | 82.4 | |
| Delay (s) | | | | 25.2 | 21.5 | | | | | | 109.4 | |
| Level of Service | | | | C | C | | | | | | F | |
| Approach Delay (s) | | 0.0 | | | 22.4 | | | 0.0 | | | 109.4 | |
| Approach LOS | | A | | | C | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 48.7 | | | HCM Level of Service | | | | | D | |
| HCM Volume to Capacity ratio | | | 0.96 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | | | Sum of lost time (s) | | | | | 8.0 | |
| Intersection Capacity Utilization | | | 85.7% | | | ICU Level of Service | | | | | E | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term + I AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 90 | 233 | 7 | 11 | 496 | 16 | 11 | 7 | 10 | 22 | 17 | 16 |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 92 | 238 | 7 | 12 | 522 | 17 | 12 | 7 | 11 | 23 | 18 | 17 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 92 | 245 | 551 | 29 | 58 | | | | | | | |
| Volume Left (vph) | 92 | 0 | 12 | 12 | 23 | | | | | | | |
| Volume Right (vph) | 0 | 7 | 17 | 11 | 17 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.8 | 5.2 | 4.7 | 6.0 | 5.9 | | | | | | | |
| Degree Utilization, x | 0.15 | 0.36 | 0.72 | 0.05 | 0.10 | | | | | | | |
| Capacity (veh/h) | 609 | 667 | 756 | 534 | 537 | | | | | | | |
| Control Delay (s) | 8.6 | 9.9 | 18.6 | 9.3 | 9.5 | | | | | | | |
| Approach Delay (s) | 9.6 | | 18.6 | 9.3 | 9.5 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 14.7 | | | | | | | | | | |
| HCM Level of Service | | B | | | | | | | | | | |
| Intersection Capacity Utilization | | 54.4% | | ICU Level of Service | | | | | A | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term + I AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|-------|----------------------|------|-------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 361 | 213 | 521 | 286 | 115 | 1223 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Frt | 0.95 | 0.95 | 1.00 | 1.00 | | |
| Flt Protected | 0.97 | 1.00 | 0.95 | 0.95 | 0.95 | 0.95 |
| Satd. Flow (prot) | 1716 | 3351 | 1770 | 3539 | | |
| Flt Permitted | 0.97 | 1.00 | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1716 | 3351 | 1770 | 3539 | | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 380 | 224 | 548 | 301 | 121 | 1287 |
| RTOR Reduction (vph) | 38 | 0 | 122 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 566 | 0 | 727 | 0 | 121 | 1287 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 23.1 | | 14.6 | | 10.3 | 28.9 |
| Effective Green, g (s) | 23.1 | | 14.6 | | 10.3 | 28.9 |
| Actuated g/C Ratio | 0.38 | | 0.24 | | 0.17 | 0.48 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 661 | | 815 | | 304 | 1705 |
| v/s Ratio Prot | c0.33 | | c0.22 | | 0.07 | c0.36 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.86 | | 0.89 | | 0.40 | 0.75 |
| Uniform Delay, d1 | 16.9 | | 21.9 | | 22.1 | 12.7 |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 10.6 | | 14.2 | | 3.9 | 3.2 |
| Delay (s) | 27.5 | | 36.1 | | 26.0 | 15.8 |
| Level of Service | C | | D | | C | B |
| Approach Delay (s) | 27.5 | | 36.1 | | 16.7 | |
| Approach LOS | C | | D | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 24.7 | | HCM Level of Service | | C |
| HCM Volume to Capacity ratio | | 0.87 | | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 73.5% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term + I AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 350 | 233 | 416 | 206 | 187 | 199 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.95 | 0.95 | 0.97 | 0.97 |
| Adj. Flow (vph) | 357 | 238 | 438 | 217 | 193 | 205 |
| RTOR Reduction (vph) | 0 | 0 | 102 | 0 | 0 | 160 |
| Lane Group Flow (vph) | 357 | 238 | 553 | 0 | 193 | 45 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 7 | | 4 | 8 | | 6 |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.0 | 31.2 | 13.2 | | 10.9 | 10.9 |
| Effective Green, g (s) | 14.0 | 31.2 | 13.2 | | 10.9 | 10.9 |
| Actuated g/C Ratio | 0.28 | 0.62 | 0.26 | | 0.22 | 0.22 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 495 | 2204 | 886 | | 385 | 344 |
| v/s Ratio Prot | c0.20 | 0.07 | c0.16 | | c0.11 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.72 | 0.11 | 0.62 | | 0.50 | 0.13 |
| Uniform Delay, d1 | 16.3 | 3.8 | 16.3 | | 17.2 | 15.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.1 | 0.0 | 1.4 | | 1.0 | 0.2 |
| Delay (s) | 21.4 | 3.8 | 17.6 | | 18.2 | 16.0 |
| Level of Service | C | A | B | | B | B |
| Approach Delay (s) | 14.4 | 17.6 | | | 17.1 | |
| Approach LOS | B | B | | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 16.3 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.62 | | | | |
| Actuated Cycle Length (s) | | 50.1 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 57.8% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Near-Term (2015) plus Project (Phase I) Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term + 1 PM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 628 | 490 | 1062 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4963 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4963 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.95 | 0.95 | 0.92 | 0.97 | 0.97 | 0.95 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 333 | 1434 | 149 | 0 | 589 | 647 | 516 | 1118 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 56 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1905 | 0 | 0 | 589 | 591 | 516 | 1118 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1654 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.38 | | | 0.17 | | c0.29 | 0.32 | |
| v/s Ratio Perm | | | | | | | c0.37 | | | | |
| v/c Ratio | | | | 1.15 | | | 0.86 | 1.92 | 0.89 | 0.56 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.0 | 36.2 | 28.7 | 12.4 | |
| Progression Factor | | | | 1.00 | | | 1.24 | 1.23 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 75.7 | | | 1.4 | 415.2 | 15.4 | 0.3 | |
| Delay (s) | | | | 105.7 | | | 45.0 | 459.8 | 44.1 | 12.7 | |
| Level of Service | | | | F | | | D | F | D | B | |
| Approach Delay (s) | 0.0 | | | 105.7 | | | 262.1 | | | 22.6 | |
| Approach LOS | A | | | F | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 117.7 | | | | | | | F | |
| HCM Volume to Capacity ratio | | | 1.23 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | | |
| Intersection Capacity Utilization | | | 88.6% | | | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term + 1 PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|---|------|-------|-------|------|--------|------|------|------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 414 | 1123 | 609 | 169 | 346 | 475 | 102 | 329 | 24 | 243 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.98 | 0.85 | | 0.91 | | | | 1.00 | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3132 | 1441 | | 3207 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3132 | 1441 | | 3207 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 436 | 1182 | 641 | 178 | 364 | 500 | 107 | 346 | 25 | 256 |
| RTOR Reduction (vph) | 0 | 0 | 16 | 0 | 11 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 392 | 1425 | 604 | 0 | 960 | 0 | 0 | 0 | 371 | 256 |
| Turn Type | | Split | | Prot | | | | Prot | | |
| Protected Phases | | 4 | 4 | 4 | | | | 1 | | 6 |
| Permitted Phases | | | | | 2 | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 974 | 448 | | 1318 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.24 | c0.45 | 0.42 | | c0.30 | | | | c0.21 | 0.07 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.78 | 1.46 | 1.35 | | 0.90dr | | | | 1.57 | 0.12 |
| Uniform Delay, d1 | 28.2 | 31.0 | 31.0 | | 22.3 | | | | 39.0 | 8.2 |
| Progression Factor | 0.64 | 0.66 | 0.64 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.1 | 208.9 | 158.2 | | 3.6 | | | | 276.9 | 0.1 |
| Delay (s) | 19.2 | 229.3 | 178.0 | | 25.8 | | | | 315.9 | 8.3 |
| Level of Service | B | F | F | | C | | | | F | A |
| Approach Delay (s) | | 182.4 | | | 25.8 | | | | | 190.3 |
| Approach LOS | | F | | | C | | | | | F |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | 146.0 | | | | | | F | |
| HCM Volume to Capacity ratio | | | 1.13 | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | |
| Intersection Capacity Utilization | | | 92.8% | | | | | | F | |
| Analysis Period (min) | | | 15 | | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Near-Term + 1 PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1658 | 234 | 329 | 1045 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 0.98 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6286 | | | 5025 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6286 | | | 5025 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.95 | 0.95 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1692 | 246 | 346 | 1100 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1929 | 0 | 0 | 1440 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | | | 2 | | 4 | | | |
| Permitted Phases | | | | | | | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3143 | | | 1843 | | | | |
| v/s Ratio Prot | | | | | c0.31 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.29 | | | | |
| v/c Ratio | | | | | 0.61 | | | 0.78 | | | | |
| Uniform Delay, d1 | | | | | 10.8 | | | 16.9 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.9 | | | 3.4 | | | | |
| Delay (s) | | | | | 11.7 | | | 20.2 | | | | |
| Level of Service | | | | | B | | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 11.7 | | | 20.2 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 15.4 | | | | | B | | | |
| HCM Volume to Capacity ratio | | | | 0.68 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | | | 8.0 | | | |
| Intersection Capacity Utilization | | | | 61.5% | | | | | B | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis
50: Santa Clara Avenue & Harrison Street

Near-Term + 1 PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 654 | 1371 | 0 | 0 | 0 | 0 | 0 | 718 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt Protected | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4778 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4778 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.95 | 0.99 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 688 | 1385 | 0 | 0 | 0 | 0 | 0 | 756 | 68 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 41 | 26 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 461 | 1545 | 0 | 0 | 0 | 0 | 0 | 813 | 0 |
| Turn Type | | | | | Perm | | | 2 | | | | |
| Protected Phases | | | | | | | | 2 | | | | 8 |
| Permitted Phases | | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term + 1 PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 230 | 524 | 11 | 18 | 245 | 20 | 16 | 24 | 30 | 68 | 50 | 45 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 242 | 552 | 12 | 19 | 258 | 21 | 17 | 25 | 32 | 72 | 53 | 47 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 242 | 563 | 298 | 74 | 172 | | | | | | | |
| Volume Left (vph) | 242 | 0 | 19 | 17 | 72 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 21 | 32 | 47 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.18 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.3 | 5.8 | 5.8 | 6.7 | 6.5 | | | | | | | |
| Degree Utilization, x | 0.42 | 0.90 | 0.48 | 0.14 | 0.31 | | | | | | | |
| Capacity (veh/h) | 559 | 618 | 582 | 494 | 522 | | | | | | | |
| Control Delay (s) | 12.6 | 38.9 | 14.1 | 10.8 | 12.4 | | | | | | | |
| Approach Delay (s) | 31.0 | | 14.1 | 10.8 | 12.4 | | | | | | | |
| Approach LOS | D | | B | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 23.8 | | | | | | | | | | |
| HCM Level of Service | | C | | | | | | | | | | |
| Intersection Capacity Utilization | | 69.2% | | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term + 1 PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 192 | 170 | 1124 | 787 | 149 | 847 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 |
| Frt | 0.94 | | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1700 | | 3321 | | 1770 | 3539 |
| Flt Permitted | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1700 | | 3321 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 202 | 179 | 1183 | 828 | 157 | 892 |
| RTOR Reduction (vph) | 44 | 0 | 106 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 337 | 0 | 1905 | 0 | 157 | 892 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 23.3 | | 41.5 | | 13.2 | 58.7 |
| Effective Green, g (s) | 23.3 | | 41.5 | | 13.2 | 58.7 |
| Actuated g/C Ratio | 0.26 | | 0.46 | | 0.15 | 0.65 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 440 | | 1531 | | 260 | 2308 |
| v/s Ratio Prot | c0.20 | | c0.57 | | c0.09 | 0.25 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.76 | | 1.24 | | 0.60 | 0.39 |
| Uniform Delay, d1 | 30.8 | | 24.2 | | 36.0 | 7.3 |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | 0.36 |
| Incremental Delay, d2 | 7.7 | | 115.6 | | 3.1 | 0.4 |
| Delay (s) | 38.6 | | 139.8 | | 39.1 | 3.0 |
| Level of Service | D | | F | | D | A |
| Approach Delay (s) | 38.6 | | 139.8 | | | 8.4 |
| Approach LOS | D | | F | | | A |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 88.5 | | HCM Level of Service | | F |
| HCM Volume to Capacity ratio | | 0.99 | | | | |
| Actuated Cycle Length (s) | | 90.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 95.6% | | ICU Level of Service | | F |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term + 1 PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 254 | 299 | 247 | 109 | 416 | 447 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 267 | 315 | 260 | 115 | 438 | 471 |
| RTOR Reduction (vph) | 0 | 0 | 93 | 0 | 0 | 321 |
| Lane Group Flow (vph) | 267 | 315 | 282 | 0 | 438 | 150 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 12.2 | 25.5 | 9.3 | | 15.6 | 15.6 |
| Effective Green, g (s) | 12.2 | 25.5 | 9.3 | | 15.6 | 15.6 |
| Actuated g/C Ratio | 0.25 | 0.52 | 0.19 | | 0.32 | 0.32 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 440 | 1838 | 639 | | 562 | 503 |
| v/s Ratio Prot | c0.15 | 0.09 | c0.08 | | c0.25 | |
| v/s Ratio Perm | | | | | | 0.09 |
| v/c Ratio | 0.61 | 0.17 | 0.44 | | 0.78 | 0.30 |
| Uniform Delay, d1 | 16.3 | 6.2 | 17.6 | | 15.2 | 12.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.4 | 0.0 | 0.5 | | 6.8 | 0.3 |
| Delay (s) | 18.7 | 6.3 | 18.1 | | 21.9 | 13.0 |
| Level of Service | B | A | B | | C | B |
| Approach Delay (s) | | 12.0 | 18.1 | | 17.3 | |
| Approach LOS | | B | B | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 15.8 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.64 | | | | |
| Actuated Cycle Length (s) | | 49.1 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 57.4% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Near-Term (2015) plus Project (Phase I and Phase II) Conditions AM Peak Hour

Near-Term plus Project (I+II) AM
Kaiser Center Transportation StudyAECOM Synchro 7 - ReportNear-Term plus Project (I+II) AM
Kaiser Center Transportation StudyAECOM Synchro 7 - ReportNear-Term plus Project (I+II) AM
Kaiser Center Transportation StudyAECOM Synchro 7 - ReportNear-Term plus Project (I+II) AM
Kaiser Center Transportation StudyAECOM Synchro 7 - Report

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 90 | 238 | 7 | 11 | 520 | 16 | 11 | 7 | 10 | 22 | 17 | 16 |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 92 | 243 | 7 | 12 | 547 | 17 | 12 | 7 | 11 | 23 | 18 | 17 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 92 | 250 | 576 | 29 | 58 | | | | | | | |
| Volume Left (vph) | 92 | 0 | 12 | 12 | 23 | | | | | | | |
| Volume Right (vph) | 0 | 7 | 17 | 11 | 17 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 5.8 | 5.3 | 4.7 | 6.0 | 6.0 | | | | | | | |
| Degree Utilization, x | 0.15 | 0.37 | 0.75 | 0.05 | 0.10 | | | | | | | |
| Capacity (veh/h) | 606 | 663 | 755 | 533 | 535 | | | | | | | |
| Control Delay (s) | 8.6 | 10.1 | 20.5 | 9.3 | 9.6 | | | | | | | |
| Approach Delay (s) | 9.7 | | 20.5 | 9.3 | 9.6 | | | | | | | |
| Approach LOS | A | | C | A | A | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 15.9 | | | | | | | | | | |
| HCM Level of Service | | C | | | | | | | | | | |
| Intersection Capacity Utilization | | 55.9% | | ICU Level of Service | | | | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|------|----------------------|------|-------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 361 | 213 | 523 | 288 | 115 | 1322 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 |
| Frt | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 |
| Flt Protected | 0.97 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1716 | 3351 | 1770 | 3539 | | |
| Flt Permitted | 0.97 | 1.00 | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1716 | 3351 | 1770 | 3539 | | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 380 | 224 | 551 | 303 | 121 | 1392 |
| RTOR Reduction (vph) | 38 | 0 | 123 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 566 | 0 | 731 | 0 | 121 | 1392 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 23.1 | | 14.6 | | 10.3 | 28.9 |
| Effective Green, g (s) | 23.1 | | 14.6 | | 10.3 | 28.9 |
| Actuated g/C Ratio | 0.38 | | 0.24 | | 0.17 | 0.48 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 661 | | 815 | | 304 | 1705 |
| v/s Ratio Prot | c0.33 | | 0.22 | | 0.07 | c0.39 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.86 | | 0.90 | | 0.40 | 0.82 |
| Uniform Delay, d1 | 16.9 | | 22.0 | | 22.1 | 13.3 |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 10.6 | | 14.7 | | 3.9 | 4.5 |
| Delay (s) | 27.5 | | 36.6 | | 26.0 | 17.7 |
| Level of Service | C | | D | | C | B |
| Approach Delay (s) | 27.5 | | 36.6 | | 18.4 | |
| Approach LOS | C | | D | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 25.5 | | HCM Level of Service | | C |
| HCM Volume to Capacity ratio | | 0.83 | | | | |
| Actuated Cycle Length (s) | | 60.0 | | Sum of lost time (s) | | 8.0 |
| Intersection Capacity Utilization | | 76.2% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↱ | ↱ |
| Volume (vph) | 350 | 233 | 416 | 206 | 189 | 199 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3363 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.95 | 0.95 | 0.97 | 0.97 |
| Adj. Flow (vph) | 357 | 238 | 438 | 217 | 195 | 205 |
| RTOR Reduction (vph) | 0 | 0 | 102 | 0 | 0 | 160 |
| Lane Group Flow (vph) | 357 | 238 | 553 | 0 | 195 | 45 |
| Turn Type | | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 14.0 | 31.2 | 13.2 | | 11.0 | 11.0 |
| Effective Green, g (s) | 14.0 | 31.2 | 13.2 | | 11.0 | 11.0 |
| Actuated g/C Ratio | 0.28 | 0.62 | 0.26 | | 0.22 | 0.22 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 494 | 2200 | 884 | | 388 | 347 |
| v/s Ratio Prot | c0.20 | 0.07 | c0.16 | | c0.11 | |
| v/s Ratio Perm | | | | | | 0.03 |
| v/c Ratio | 0.72 | 0.11 | 0.63 | | 0.50 | 0.13 |
| Uniform Delay, d1 | 16.3 | 3.9 | 16.3 | | 17.2 | 15.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.2 | 0.0 | 1.4 | | 1.0 | 0.2 |
| Delay (s) | 21.5 | 3.9 | 17.7 | | 18.2 | 15.9 |
| Level of Service | C | A | B | | B | B |
| Approach Delay (s) | 14.5 | 17.7 | | | 17.0 | |
| Approach LOS | B | B | | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 16.4 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.63 | | | | |
| Actuated Cycle Length (s) | | 50.2 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 58.0% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Near-Term (2015) plus Project (Phase I and Phase II) Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study






















| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|----------------------|-------|-------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 666 | 490 | 1085 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4963 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4963 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.95 | 0.95 | 0.92 | 0.97 | 0.97 | 0.95 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 333 | 1434 | 149 | 0 | 589 | 687 | 516 | 1142 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 56 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1905 | 0 | 0 | 589 | 631 | 516 | 1142 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1654 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.38 | | | 0.17 | | c0.29 | 0.32 | |
| v/s Ratio Perm | | | | | | | c0.40 | | | | |
| v/c Ratio | | | | 1.15 | | | 0.86 | 2.05 | 0.89 | 0.57 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.0 | 36.2 | 28.7 | 12.5 | |
| Progression Factor | | | | 1.00 | | | 1.25 | 1.25 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 75.7 | | | 1.4 | 473.5 | 15.4 | 0.4 | |
| Delay (s) | | | | 105.7 | | | 45.2 | 518.7 | 44.1 | 12.9 | |
| Level of Service | | | | F | | | D | F | D | B | |
| Approach Delay (s) | 0.0 | | | 105.7 | | | 300.1 | | | 22.6 | |
| Approach LOS | A | | | F | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 128.4 | | | | HCM Level of Service | | | F | |
| HCM Volume to Capacity ratio | | | 1.26 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | Sum of lost time (s) | | 13.0 | | |
| Intersection Capacity Utilization | | | 88.6% | | | | ICU Level of Service | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|--|---|--|--|--|---|---|--|
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT | |
| Lane Configurations |  |   |  | |   | | | |   |   | |
| Volume (vph) | 414 | 1161 | 609 | 169 | 346 | 475 | 143 | 329 | 24 | 243 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 | |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 | |
| Frt | 1.00 | 0.98 | 0.85 | | 0.90 | | | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1610 | 3138 | 1441 | | 3199 | | | | 1770 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1610 | 3138 | 1441 | | 3199 | | | | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | |
| Adj. Flow (vph) | 436 | 1222 | 641 | 178 | 364 | 500 | 151 | 346 | 25 | 256 | |
| RTOR Reduction (vph) | 0 | 0 | 16 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | |
| Lane Group Flow (vph) | 392 | 1452 | 617 | 0 | 999 | 0 | 0 | 0 | 371 | 256 | |
| Turn Type | Split | | | Prot | | | | Prot | Prot | | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 | |
| Effective Green, q (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 | |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 501 | 976 | 448 | | 1315 | | | | 236 | 2084 | |
| v/s Ratio Prot | 0.24 | c0.46 | 0.43 | | c0.31 | | | | c0.21 | 0.07 | |
| v/s Ratio Perm | | | | | | | | | | | |
| v/c Ratio | 0.78 | 1.49 | 1.38 | | 0.96dr | | | | 1.57 | 0.12 | |
| Uniform Delay, d1 | 28.2 | 31.0 | 31.0 | | 22.7 | | | | 39.0 | 8.2 | |
| Progression Factor | 0.65 | 0.66 | 0.64 | | 1.00 | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.1 | 220.0 | 171.2 | | 4.2 | | | | 276.9 | 0.1 | |
| Delay (s) | 19.4 | 240.5 | 191.1 | | 26.9 | | | | 315.9 | 8.3 | |
| Level of Service | B | F | F | | C | | | | F | A | |
| Approach Delay (s) | | 192.9 | | | 26.9 | | | | | 190.3 | |
| Approach LOS | | F | | | C | | | | | F | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 151.6 | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 1.15 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | Sum of lost time (s) | | | | 13.0 | | |
| Intersection Capacity Utilization | | | 94.8% | | ICU Level of Service | | | | F | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|------|-------|-------|------|----------------------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 1677 | 234 | 329 | 1088 | | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 0.98 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6287 | | | 5027 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6287 | | | 5027 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.95 | 0.95 | 0.95 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 1711 | 246 | 346 | 1145 | | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 6 | | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1950 | 0 | 0 | 1485 | | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | | | 2 | | | 4 | | |
| Permitted Phases | | | | | | | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3144 | | | 1843 | | | | |
| v/s Ratio Prot | | | | | c0.31 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.30 | | | | |
| v/c Ratio | | | | | 0.62 | | | 0.81 | | | | |
| Uniform Delay, d1 | | | | | 10.9 | | | 17.1 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 0.9 | | | 3.9 | | | | |
| Delay (s) | | | | | 11.8 | | | 21.0 | | | | |
| Level of Service | | | | | B | | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 11.8 | | | 21.0 | | | 0.0 | |
| Approach LOS | | A | | | B | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | 15.8 | | | HCM Level of Service | | B | | | |
| HCM Volume to Capacity ratio | | | | 0.70 | | | | | | | | |
| Actuated Cycle Length (s) | | | | 60.0 | | | Sum of lost time (s) | | 8.0 | | | |
| Intersection Capacity Utilization | | | | 62.6% | | | ICU Level of Service | | B | | | |
| Analysis Period (min) | | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 50: Santa Clara Avenue & Harrison Street

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 673 | 1371 | 0 | 0 | 0 | 0 | 0 | 722 | 65 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4776 | | | | | | 3496 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4776 | | | | | | 3496 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.95 | 0.99 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.95 | 0.95 |
| Adj. Flow (vph) | 0 | 0 | 0 | 708 | 1385 | 0 | 0 | 0 | 0 | 0 | 760 | 68 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 40 | 28 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 470 | 1555 | 0 | 0 | 0 | 0 | 0 | 817 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | 2 | | | | | | | | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2308 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.23 | |
| v/s Ratio Perm | | | | 0.31 | 0.33 | | | | | | | |
| v/c Ratio | | | | 0.64 | 0.67 | | | | | | 0.61 | |
| Uniform Delay, d1 | | | | 11.6 | 11.9 | | | | | | 14.9 | |
| Progression Factor | | | | 1.48 | 1.42 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 3.2 | 1.2 | | | | | | 2.1 | |
| Delay (s) | | | | 20.3 | 18.1 | | | | | | 17.0 | |
| Level of Service | | | | C | B | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 18.6 | | | 0.0 | | | 17.0 | |
| Approach LOS | | A | | | B | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 18.1 | | | HCM Level of Service | | | | | B | |
| HCM Volume to Capacity ratio | | | 0.65 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | | 8.0 | |
| Intersection Capacity Utilization | | | 62.6% | | | ICU Level of Service | | | | | B | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Sign Control | Stop | Stop | | Stop | Stop | | Stop | Stop | | Stop | Stop | |
| Volume (vph) | 230 | 567 | 11 | 18 | 249 | 20 | 16 | 24 | 30 | 68 | 50 | 45 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 242 | 597 | 12 | 19 | 262 | 21 | 17 | 25 | 32 | 72 | 53 | 47 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 242 | 608 | 302 | 74 | 172 | | | | | | | |
| Volume Left (vph) | 242 | 0 | 19 | 17 | 72 | | | | | | | |
| Volume Right (vph) | 0 | 12 | 21 | 32 | 47 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.18 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.3 | 5.8 | 5.9 | 6.8 | 6.6 | | | | | | | |
| Degree Utilization, x | 0.42 | 0.98 | 0.49 | 0.14 | 0.32 | | | | | | | |
| Capacity (veh/h) | 558 | 608 | 601 | 492 | 521 | | | | | | | |
| Control Delay (s) | 12.7 | 53.9 | 14.5 | 10.9 | 12.6 | | | | | | | |
| Approach Delay (s) | 42.1 | | 14.5 | 10.9 | 12.6 | | | | | | | |
| Approach LOS | E | | B | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 30.9 | | | | | | | | | | |
| HCM Level of Service | | D | | | | | | | | | | |
| Intersection Capacity Utilization | | 71.6% | | ICU Level of Service | | | | | | C | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|-------|------|----------------------|------|------|
| Lane Configurations | ↰ | ↱ | ↕ | ↕ | ↰ | ↱ |
| Volume (vph) | 192 | 170 | 1162 | 828 | 149 | 870 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 |
| Flt | 0.94 | 0.94 | 1.00 | 1.00 | | |
| Flt Protected | 0.97 | 1.00 | 0.95 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1700 | 3318 | 1770 | 3539 | | |
| Flt Permitted | 0.97 | 1.00 | 0.95 | 1.00 | | |
| Satd. Flow (perm) | 1700 | 3318 | 1770 | 3539 | | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 202 | 179 | 1223 | 872 | 157 | 916 |
| RTOR Reduction (vph) | 44 | 0 | 108 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 337 | 0 | 1987 | 0 | 157 | 916 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 23.3 | | 41.5 | | 13.2 | 58.7 |
| Effective Green, g (s) | 23.3 | | 41.5 | | 13.2 | 58.7 |
| Actuated g/C Ratio | 0.26 | | 0.46 | | 0.15 | 0.65 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 440 | 1530 | | 260 | 2308 | |
| v/s Ratio Prot | c0.20 | c0.60 | | c0.09 | 0.26 | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.76 | 1.30 | | 0.60 | 0.40 | |
| Uniform Delay, d1 | 30.8 | 24.2 | | 36.0 | 7.3 | |
| Progression Factor | 1.00 | 1.00 | | 1.02 | 0.35 | |
| Incremental Delay, d2 | 7.7 | 139.3 | | 3.0 | 0.4 | |
| Delay (s) | 38.6 | 163.5 | | 39.7 | 3.0 | |
| Level of Service | D | F | | D | A | |
| Approach Delay (s) | 38.6 | 163.5 | | | 8.3 | |
| Approach LOS | D | F | | | A | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 103.2 | | HCM Level of Service | | F |
| HCM Volume to Capacity ratio | | 1.02 | | | | |
| Actuated Cycle Length (s) | | 90.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 98.0% | | ICU Level of Service | | F |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↱ | ↱ | ↱ | ↰ | ↱ |
| Volume (vph) | 254 | 299 | 247 | 109 | 457 | 447 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Flt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 267 | 315 | 260 | 115 | 481 | 471 |
| RTOR Reduction (vph) | 0 | 0 | 93 | 0 | 0 | 317 |
| Lane Group Flow (vph) | 267 | 315 | 282 | 0 | 481 | 154 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | 6 | |
| Actuated Green, G (s) | 12.2 | 25.5 | 9.3 | | 16.2 | 16.2 |
| Effective Green, g (s) | 12.2 | 25.5 | 9.3 | | 16.2 | 16.2 |
| Actuated g/C Ratio | 0.25 | 0.51 | 0.19 | | 0.33 | 0.33 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 434 | 1816 | 632 | | 577 | 516 |
| v/s Ratio Prot | c0.15 | 0.09 | c0.08 | | c0.27 | |
| v/s Ratio Perm | | | | | 0.10 | |
| v/c Ratio | 0.62 | 0.17 | 0.45 | | 0.83 | 0.30 |
| Uniform Delay, d1 | 16.7 | 6.5 | 17.9 | | 15.5 | 12.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.6 | 0.0 | 0.5 | | 10.0 | 0.3 |
| Delay (s) | 19.3 | 6.5 | 18.4 | | 25.5 | 12.8 |
| Level of Service | B | A | B | | C | B |
| Approach Delay (s) | 12.4 | 18.4 | | | 19.2 | |
| Approach LOS | B | B | | | B | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 17.0 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.67 | | | | |
| Actuated Cycle Length (s) | | 49.7 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 59.7% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Near-Term (2015) plus Project (Phase I and Phase II) Conditions Mitigated

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study


















| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|---|------|------|-------|--------|------|------|----------------------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 671 | 706 | 221 | 0 | 424 | 215 | 282 | 1398 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.95 | 0.95 | 0.92 | 0.95 | 0.95 | 0.95 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 706 | 743 | 233 | 0 | 446 | 226 | 297 | 1472 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 189 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1660 | 0 | 0 | 446 | 37 | 297 | 1472 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1698 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.34 | | | 0.13 | | 0.17 | c0.42 | |
| v/s Ratio Perm | | | | | | | | 0.02 | | | |
| v/c Ratio | | | | 1.12dl | | | 0.76 | 0.14 | 0.46 | 0.73 | |
| Uniform Delay, d1 | | | | 34.4 | | | 42.3 | 37.8 | 25.4 | 16.7 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 16.7 | | | 9.2 | 1.1 | 2.3 | 2.3 | |
| Delay (s) | | | | 51.0 | | | 51.4 | 39.0 | 27.7 | 19.1 | |
| Level of Service | | | | D | | | D | D | C | B | |
| Approach Delay (s) | 0.0 | | | 51.0 | | | 47.3 | | | 20.5 | |
| Approach LOS | A | | | D | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 37.3 | | | HCM Level of Service | | | D | |
| HCM Volume to Capacity ratio | | | | 0.82 | | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | | Sum of lost time (s) | | | 8.5 | |
| Intersection Capacity Utilization | | | | 82.9% | | | ICU Level of Service | | | E | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|--|---|--|--|--|---|---|--|
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT | |
| Lane Configurations |  |  |  | |  | | | |  |  | |
| Volume (vph) | 261 | 492 | 217 | 198 | 341 | 178 | 23 | 345 | 47 | 460 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 | |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 | |
| Flt | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1610 | 3101 | 1441 | | 3342 | | | | 1770 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1610 | 3101 | 1441 | | 3342 | | | | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.97 | 0.97 | 0.97 | 0.95 | 0.95 | 0.95 | |
| Adj. Flow (vph) | 275 | 518 | 228 | 208 | 352 | 184 | 24 | 363 | 49 | 484 | |
| RTOR Reduction (vph) | 0 | 0 | 81 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | |
| Lane Group Flow (vph) | 247 | 683 | 218 | 0 | 557 | 0 | 0 | 0 | 412 | 484 | |
| Turn Type | Split | | | Prot | | | | Prot | Prot | | |
| Protected Phases | 4 | 4 | 4 | | 2 | | | 1 | 1 | 6 | |
| Permitted Phases | | | | | | | | | | | |
| Actuated Green, G (s) | 30.3 | 30.3 | 30.3 | | 34.9 | | | | 28.3 | 66.7 | |
| Effective Green, q (s) | 30.3 | 30.3 | 30.3 | | 34.9 | | | | 28.3 | 66.7 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.33 | | | | 0.27 | 0.63 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 460 | 886 | 412 | | 1100 | | | | 473 | 2227 | |
| v/s Ratio Prot | 0.15 | c0.22 | 0.15 | | c0.17 | | | | c0.23 | 0.14 | |
| v/s Ratio Perm | | | | | | | | | | | |
| v/c Ratio | 0.54 | 0.77 | 0.53 | | 0.51 | | | | 0.87 | 0.22 | |
| Uniform Delay, d1 | 31.9 | 34.7 | 31.9 | | 28.6 | | | | 37.1 | 8.4 | |
| Progression Factor | 0.70 | 0.71 | 0.56 | | 1.00 | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 2.6 | 0.8 | | 1.7 | | | | 16.0 | 0.2 | |
| Delay (s) | 23.2 | 27.2 | 18.6 | | 30.3 | | | | 53.1 | 8.7 | |
| Level of Service | C | C | B | | C | | | | D | A | |
| Approach Delay (s) | | 24.3 | | | 30.3 | | | | | 29.1 | |
| Approach LOS | | C | | | C | | | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 27.2 | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.70 | | | | | | | | |
| Actuated Cycle Length (s) | | | 106.0 | | Sum of lost time (s) | | | 12.5 | | | |
| Intersection Capacity Utilization | | | 67.4% | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) PM MIT
Kaiser Center Transportation Study



















| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|-------|------|------|----------------------|-------|-------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 316 | 1362 | 142 | 0 | 571 | 666 | 490 | 1085 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 0.88 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4963 | | | 3539 | 2787 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4963 | | | 3539 | 2787 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.95 | 0.95 | 0.95 | 0.92 | 0.97 | 0.97 | 0.95 | 0.95 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 333 | 1434 | 149 | 0 | 589 | 687 | 516 | 1142 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 98 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1905 | 0 | 0 | 589 | 589 | 516 | 1142 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1654 | | | 688 | 542 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.38 | | | 0.17 | | c0.29 | 0.32 | |
| v/s Ratio Perm | | | | | | | | c0.21 | | | |
| v/c Ratio | | | | 1.15 | | | 0.86 | 1.09 | 0.89 | 0.57 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.0 | 36.2 | 28.7 | 12.5 | |
| Progression Factor | | | | 1.00 | | | 1.21 | 1.22 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 75.7 | | | 6.9 | 53.6 | 15.4 | 0.4 | |
| Delay (s) | | | | 105.7 | | | 49.3 | 97.9 | 44.1 | 12.9 | |
| Level of Service | | | | F | | | D | F | D | B | |
| Approach Delay (s) | 0.0 | | | 105.7 | | | 75.5 | | | 22.6 | |
| Approach LOS | A | | | F | | | E | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 69.3 | | | HCM Level of Service | | | E | |
| HCM Volume to Capacity ratio | | | | 1.04 | | | | | | | |
| Actuated Cycle Length (s) | | | | 90.0 | | | Sum of lost time (s) | | | 13.0 | |
| Intersection Capacity Utilization | | | | 88.6% | | | ICU Level of Service | | | E | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) PM MIT
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
| Lane Configurations |  |   |  | |  | | | |   |  |
| Volume (vph) | 414 | 1161 | 609 | 169 | 346 | 475 | 143 | 329 | 24 | 243 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt | 1.00 | 0.98 | 0.85 | | 0.90 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3138 | 1441 | | 3199 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3138 | 1441 | | 3199 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 436 | 1222 | 641 | 178 | 364 | 500 | 151 | 346 | 25 | 256 |
| RTOR Reduction (vph) | 0 | 0 | 16 | 0 | 16 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 392 | 1452 | 617 | 0 | 999 | 0 | 0 | 0 | 371 | 256 |
| Turn Type | Split | Prot | | | | | | | Prot | Prot |
| Protected Phases | 4 | 4 | 4 | 2 | | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 37.0 | 37.0 | 37.0 | 24.0 | | | | 16.0 | 44.0 | |
| Effective Green, g (s) | 37.0 | 37.0 | 37.0 | 24.0 | | | | 16.0 | 44.0 | |
| Actuated g/C Ratio | 0.41 | 0.41 | 0.41 | 0.27 | | | | 0.18 | 0.49 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 4.0 | | | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 662 | 1290 | 592 | 853 | | | | 315 | 1730 | |
| v/s Ratio Prot | 0.24 | c0.46 | 0.43 | c0.31 | | | | c0.21 | 0.07 | |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.59 | 1.13 | 1.04 | 1.46dr | | | | 1.18 | 0.15 | |
| Uniform Delay, d1 | 20.6 | 26.5 | 26.5 | 33.0 | | | | 37.0 | 12.7 | |
| Progression Factor | 0.71 | 0.77 | 0.75 | 1.00 | | | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.4 | 57.6 | 24.4 | 89.4 | | | | 108.0 | 0.2 | |
| Delay (s) | 15.0 | 78.1 | 44.3 | 122.4 | | | | 145.0 | 12.9 | |
| Level of Service | B | E | D | F | | | | F | B | |
| Approach Delay (s) | 59.5 | | | 122.4 | | | | 91.1 | | |
| Approach LOS | E | | | F | | | | F | | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | 79.8 | | | HCM Level of Service | | | | E | | |
| HCM Volume to Capacity ratio | 1.15 | | | | | | | | | |
| Actuated Cycle Length (s) | 90.0 | | | Sum of lost time (s) | | | | 13.0 | | |
| Intersection Capacity Utilization | 94.8% | | | ICU Level of Service | | | | F | | |
| Analysis Period (min) | 15 | | | | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

Cumulative (2030) plus Project (Phase I and Phase II) Conditions AM Peak Hour

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|---|------|------|-------|--------|------|------|----------------------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 722 | 760 | 238 | 0 | 490 | 276 | 345 | 1595 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4931 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 737 | 776 | 243 | 0 | 500 | 282 | 352 | 1628 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 158 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1741 | 0 | 0 | 500 | 124 | 352 | 1628 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Effective Green, g (s) | | | | 36.5 | | | 17.5 | 17.5 | 39.0 | 60.5 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1698 | | | 584 | 261 | 651 | 2020 | |
| v/s Ratio Prot | | | | c0.35 | | | 0.14 | | 0.20 | c0.46 | |
| v/s Ratio Perm | | | | | | | | 0.08 | | | |
| v/c Ratio | | | | 1.18dl | | | 0.86 | 0.48 | 0.54 | 0.81 | |
| Uniform Delay, d1 | | | | 34.8 | | | 43.0 | 40.1 | 26.4 | 18.1 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 28.5 | | | 14.9 | 6.1 | 3.2 | 3.6 | |
| Delay (s) | | | | 63.3 | | | 57.9 | 46.2 | 29.6 | 21.6 | |
| Level of Service | | | | E | | | E | D | C | C | |
| Approach Delay (s) | 0.0 | | | 63.3 | | | 53.7 | | | 23.1 | |
| Approach LOS | A | | | E | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 44.0 | | | HCM Level of Service | | | D | |
| HCM Volume to Capacity ratio | | | | 0.88 | | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | | Sum of lost time (s) | | | 8.5 | |
| Intersection Capacity Utilization | | | | 91.2% | | | ICU Level of Service | | | F | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|--|---|--|--|--|---|---|
| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
| Lane Configurations |  |  |  | |  | | | |  |  |
| Volume (vph) | 291 | 541 | 239 | 228 | 398 | 208 | 26 | 372 | 50 | 496 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3097 | 1441 | | 3343 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3097 | 1441 | | 3343 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 297 | 552 | 244 | 233 | 406 | 212 | 27 | 380 | 51 | 506 |
| RTOR Reduction (vph) | 0 | 0 | 91 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 267 | 736 | 232 | 0 | 642 | 0 | 0 | 0 | 431 | 506 |
| Turn Type | Split | | | Prot | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | | 4 | 2 | | | 1 | 1 | 6 |
| Permitted Phases | | | | | | | | | | |
| Actuated Green, G (s) | 31.0 | 31.0 | 31.0 | | 33.5 | | | | 29.0 | 66.0 |
| Effective Green, q (s) | 31.0 | 31.0 | 31.0 | | 33.5 | | | | 29.0 | 66.0 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.32 | | | | 0.27 | 0.62 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 471 | 906 | 421 | | 1057 | | | | 484 | 2204 |
| v/s Ratio Prot | 0.17 | c0.24 | 0.16 | | c0.19 | | | | c0.24 | 0.14 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.57 | 0.81 | 0.55 | | 0.61 | | | | 0.89 | 0.23 |
| Uniform Delay, d1 | 31.8 | 34.8 | 31.6 | | 30.7 | | | | 37.0 | 8.8 |
| Progression Factor | 0.74 | 0.75 | 0.62 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.8 | 3.0 | 0.8 | | 2.6 | | | | 18.2 | 0.2 |
| Delay (s) | 24.5 | 29.2 | 20.4 | | 33.3 | | | | 55.2 | 9.0 |
| Level of Service | C | C | C | | C | | | | E | A |
| Approach Delay (s) | | 26.1 | | | 33.3 | | | | | 30.3 |
| Approach LOS | | C | | | C | | | | | C |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | 29.0 | | | HCM Level of Service | | | | | C | |
| HCM Volume to Capacity ratio | 0.76 | | | | | | | | | |
| Actuated Cycle Length (s) | 106.0 | | | Sum of lost time (s) | | | | | 12.5 | |
| Intersection Capacity Utilization | 74.2% | | | ICU Level of Service | | | | | D | |
| Analysis Period (min) | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|------|------|--------|------|------|----------------------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 3209 | 149 | 551 | 488 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 1.00 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 6365 | | | 4954 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 6365 | | | 4954 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 3274 | 152 | 562 | 498 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 3418 | 0 | 0 | 1060 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | 2 | | | 4 | | | | |
| Permitted Phases | | | | | | | 4 | | | | | |
| Actuated Green, G (s) | | | | | 38.0 | | | 34.0 | | | | |
| Effective Green, g (s) | | | | | 38.0 | | | 34.0 | | | | |
| Actuated g/C Ratio | | | | | 0.48 | | | 0.42 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3023 | | | 2105 | | | | |
| v/s Ratio Prot | | | | | c0.54 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.21 | | | | |
| v/c Ratio | | | | | 1.13 | | | 0.50 | | | | |
| Uniform Delay, d1 | | | | | 21.0 | | | 16.8 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.08 | | | | |
| Incremental Delay, d2 | | | | | 63.6 | | | 0.5 | | | | |
| Delay (s) | | | | | 84.6 | | | 18.7 | | | | |
| Level of Service | | | | | F | | | B | | | | |
| Approach Delay (s) | | 0.0 | | | 84.6 | | | 18.7 | | | 0.0 | |
| Approach LOS | | A | | | F | | | B | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 69.0 | | | HCM Level of Service | | | E | |
| HCM Volume to Capacity ratio | | | | | 0.83 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 80.0 | | | Sum of lost time (s) | | | 8.0 | |
| Intersection Capacity Utilization | | | | | 119.1% | | | ICU Level of Service | | | H | |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 50: MacArthur Blvd (WB) & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|--------|------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1575 | 2049 | 0 | 0 | 0 | 0 | 0 | 1473 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4746 | | | | | | 3524 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4746 | | | | | | 3524 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1607 | 2091 | 0 | 0 | 0 | 0 | 0 | 1503 | 44 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 899 | 2797 | 0 | 0 | 0 | 0 | 0 | 1544 | 0 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | 2 | | | | | | | | | | | |
| Permitted Phases | 8 | | | | | | | | | | | |
| Actuated Green, G (s) | 26.0 | | | | | | | | | | | |
| Effective Green, g (s) | 26.0 | | | | | | | | | | | |
| Actuated g/C Ratio | 0.32 | | | | | | | | | | | |
| Clearance Time (s) | 4.0 | | | | | | | | | | | |
| Lane Grp Cap (vph) | 1145 | | | | | | | | | | | |
| v/s Ratio Prot | c0.44 | | | | | | | | | | | |
| v/s Ratio Perm | 1.03 | | | | | | | | | | | |
| v/c Ratio | 1.35 | | | | | | | | | | | |
| Uniform Delay, d1 | 27.0 | | | | | | | | | | | |
| Progression Factor | 1.00 | | | | | | | | | | | |
| Incremental Delay, d2 | 162.8 | | | | | | | | | | | |
| Delay (s) | 189.8 | | | | | | | | | | | |
| Level of Service | F | | | | | | | | | | | |
| Approach Delay (s) | 189.8 | | | | | | | | | | | |
| Approach LOS | F | | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 82.5 | | | HCM Level of Service | | | | | | F | | |
| HCM Volume to Capacity ratio | 1.14 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 80.0 | | | Sum of lost time (s) | | | | | | 8.0 | | |
| Intersection Capacity Utilization | 129.4% | | | ICU Level of Service | | | | | | H | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |











HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|-------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 107 | 280 | 9 | 13 | 607 | 19 | 13 | 9 | 12 | 26 | 20 | 19 |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Hourly flow rate (vph) | 109 | 286 | 9 | 13 | 619 | 19 | 13 | 9 | 12 | 27 | 20 | 19 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 109 | 295 | 652 | 35 | 66 | | | | | | | |
| Volume Left (vph) | 109 | 0 | 13 | 13 | 27 | | | | | | | |
| Volume Right (vph) | 0 | 9 | 19 | 12 | 19 | | | | | | | |
| Hadj (s) | 0.53 | 0.01 | 0.02 | -0.10 | -0.06 | | | | | | | |
| Departure Headway (s) | 6.0 | 5.4 | 4.8 | 6.4 | 6.3 | | | | | | | |
| Degree Utilization, x | 0.18 | 0.45 | 0.88 | 0.06 | 0.12 | | | | | | | |
| Capacity (veh/h) | 580 | 645 | 737 | 518 | 524 | | | | | | | |
| Control Delay (s) | 9.1 | 11.5 | 32.0 | 9.8 | 10.2 | | | | | | | |
| Approach Delay (s) | 10.9 | | 32.0 | 9.8 | 10.2 | | | | | | | |
| Approach LOS | B | | D | A | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | 22.7 | | | | | | | | | | | |
| HCM Level of Service | C | | | | | | | | | | | |
| Intersection Capacity Utilization | 63.9% | | | | | | | | | | | |
| ICU Level of Service | B | | | | | | | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |












HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  |
|-----------------------------------|---|--|---|--|---|---|
| Movement | NWL | NWR | NET | NER | SWL | SWT |
| Lane Configurations |  | |  | |  |  |
| Volume (vph) | 418 | 250 | 631 | 309 | 124 | 1457 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | | 0.95 | | 1.00 | 0.95 |
| Frt | 0.95 | | 0.95 | | 1.00 | 1.00 |
| Flt Protected | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1715 | | 3365 | | 1770 | 3539 |
| Flt Permitted | 0.97 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1715 | | 3365 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 427 | 255 | 644 | 315 | 127 | 1487 |
| RTOR Reduction (vph) | 37 | 0 | 99 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 645 | 0 | 860 | 0 | 127 | 1487 |
| Turn Type | | | | | Prot | |
| Protected Phases | 4 | 6 | | 5 2 | | |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 24.8 | 14.4 | | 8.8 27.2 | | |
| Effective Green, q (s) | 24.8 | 14.4 | | 8.8 27.2 | | |
| Actuated g/C Ratio | 0.41 | 0.24 | | 0.15 0.45 | | |
| Clearance Time (s) | 4.0 | 4.0 | | 4.0 4.0 | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 3.0 | | |
| Lane Grp Cap (vph) | 709 | 808 | | 260 1604 | | |
| v/s Ratio Prot | c0.38 | 0.26 | | 0.07 c0.42 | | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.91 | 1.06 | | 0.49 0.93 | | |
| Uniform Delay, d1 | 16.5 | 22.8 | | 23.5 15.5 | | |
| Progression Factor | 1.00 | 1.00 | | 1.00 1.00 | | |
| Incremental Delay, d2 | 15.6 | 50.3 | | 6.4 10.7 | | |
| Delay (s) | 32.1 | 73.1 | | 30.0 26.2 | | |
| Level of Service | C | E | | C C | | |
| Approach Delay (s) | 32.1 | 73.1 | | 26.5 | | |
| Approach LOS | C | E | | C | | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | 41.4 | | HCM Level of Service | | | D |
| HCM Volume to Capacity ratio | 0.92 | | | | | |
| Actuated Cycle Length (s) | 60.0 | | Sum of lost time (s) | | | 8.0 |
| Intersection Capacity Utilization | 85.4% | | ICU Level of Service | | | E |
| Analysis Period (min) | 15 | | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|--|
| Movement | EBL | EBT | WBT | WBR | SEL | SER | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (vph) | 427 | 303 | 466 | 220 | 203 | 214 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 3369 | | 1770 | 1583 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 3539 | 3369 | | 1770 | 1583 | |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | |
| Adj. Flow (vph) | 436 | 309 | 476 | 224 | 207 | 218 | |
| RTOR Reduction (vph) | 0 | 0 | 94 | 0 | 0 | 171 | |
| Lane Group Flow (vph) | 436 | 309 | 606 | 0 | 207 | 47 | |
| Turn Type | Prot | | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | | |
| Permitted Phases | | | | | | 6 | |
| Actuated Green, G (s) | 15.7 | 33.5 | 13.8 | | 11.3 | 11.3 | |
| Effective Green, g (s) | 15.7 | 33.5 | 13.8 | | 11.3 | 11.3 | |
| Actuated g/C Ratio | 0.30 | 0.63 | 0.26 | | 0.21 | 0.21 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 526 | 2245 | 881 | | 379 | 339 | |
| v/s Ratio Prot | c0.25 | 0.09 | c0.18 | | c0.12 | | |
| v/s Ratio Perm | | | | | | 0.03 | |
| v/c Ratio | 0.83 | 0.14 | 0.69 | | 0.55 | 0.14 | |
| Uniform Delay, d1 | 17.3 | 3.9 | 17.6 | | 18.5 | 16.8 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 10.4 | 0.0 | 2.3 | | 1.6 | 0.2 | |
| Delay (s) | 27.7 | 3.9 | 19.8 | | 20.1 | 17.0 | |
| Level of Service | C | A | B | | C | B | |
| Approach Delay (s) | | 17.8 | 19.8 | | 18.5 | | |
| Approach LOS | | B | B | | B | | |
| Intersection Summary | | | | | | | |
| HCM Average Control Delay | 18.7 | | HCM Level of Service | | | B | |
| HCM Volume to Capacity ratio | 0.70 | | | | | | |
| Actuated Cycle Length (s) | 52.8 | | Sum of lost time (s) | | | 12.0 | |
| Intersection Capacity Utilization | 64.8% | | ICU Level of Service | | | C | |
| Analysis Period (min) | 15 | | | | | | |
| c Critical Lane Group | | | | | | | |

Cumulative (2030) plus Project (Phase I and Phase II) Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis 47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|--------|-------|------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 340 | 2180 | 153 | 0 | 615 | 711 | 738 | 1165 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.94 | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.95 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 4973 | | | 3539 | 1583 | 1770 | 3539 | |
| Flt Permitted | | | | 0.95 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 4973 | | | 3539 | 1583 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 347 | 2224 | 156 | 0 | 628 | 726 | 753 | 1189 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 20 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 2719 | 0 | 0 | 628 | 706 | 753 | 1189 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 1658 | | | 688 | 308 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.55 | | | 0.18 | | c0.43 | 0.34 | |
| v/s Ratio Perm | | | | | | | c0.45 | | | | |
| v/c Ratio | | | | 1.64 | | | 0.91 | 2.29 | 1.30 | 0.59 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.5 | 36.2 | 30.3 | 12.7 | |
| Progression Factor | | | | 1.00 | | | 1.28 | 1.25 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 290.7 | | | 2.3 | 582.2 | 146.6 | 0.5 | |
| Delay (s) | | | | 320.7 | | | 47.6 | 627.6 | 176.8 | 13.2 | |
| Level of Service | | | | F | | | D | F | F | B | |
| Approach Delay (s) | 0.0 | | | 320.7 | | | 358.6 | | | 76.7 | |
| Approach LOS | A | | | F | | | F | | | E | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 250.5 | | | | | | | F | |
| HCM Volume to Capacity ratio | | | 1.66 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | | |
| Intersection Capacity Utilization | | | 119.8% | | | | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|---|-------|-------|--------|------|--------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 489 | 1650 | 881 | 183 | 372 | 511 | 148 | 354 | 26 | 262 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.98 | 0.85 | | 0.90 | | | | 1.00 | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3143 | 1441 | | 3200 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3143 | 1441 | | 3200 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 499 | 1684 | 899 | 187 | 380 | 521 | 151 | 361 | 27 | 267 |
| RTOR Reduction (vph) | 0 | 0 | 11 | 0 | 15 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 449 | 1968 | 841 | 0 | 1037 | 0 | 0 | 0 | 388 | 267 |
| Turn Type | Split | | | Prot | | | | Prot | | |
| Protected Phases | 4 | 4 | | 4 | | | | 1 | | 6 |
| Permitted Phases | | | | | 2 | | | | | |
| Actuated Green, G (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Effective Green, g (s) | 28.0 | 28.0 | 28.0 | | 37.0 | | | | 12.0 | 53.0 |
| Actuated g/C Ratio | 0.31 | 0.31 | 0.31 | | 0.41 | | | | 0.13 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 501 | 978 | 448 | | 1316 | | | | 236 | 2084 |
| v/s Ratio Prot | 0.28 | c0.63 | 0.58 | | c0.32 | | | | c0.22 | 0.08 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.90 | 2.01 | 1.88 | | 0.99dr | | | | 1.64 | 0.13 |
| Uniform Delay, d1 | 29.6 | 31.0 | 31.0 | | 23.1 | | | | 39.0 | 8.2 |
| Progression Factor | 0.60 | 0.61 | 0.60 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.6 | 455.9 | 395.5 | | 4.8 | | | | 308.1 | 0.1 |
| Delay (s) | 20.5 | 474.9 | 414.1 | | 27.9 | | | | 347.1 | 8.4 |
| Level of Service | C | F | F | | C | | | | F | A |
| Approach Delay (s) | 396.7 | | | | 27.9 | | | | 209.0 | |
| Approach LOS | F | | | | C | | | | F | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | 294.0 | | | | | | F | |
| HCM Volume to Capacity ratio | | | 1.37 | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | 13.0 | |
| Intersection Capacity Utilization | | | 110.8% | | | | | | H | |
| Analysis Period (min) | | | 15 | | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2113 | 296 | 416 | 1356 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 0.98 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6290 | | | 5026 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6290 | | | 5026 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2156 | 302 | 424 | 1384 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2455 | 0 | 0 | 1806 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | | | 2 | | 4 | | | |
| Permitted Phases | | | | | | | | 4 | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | 22.0 | | | | |
| Effective Green, g (s) | | | | | 30.0 | | | 22.0 | | | | |
| Actuated g/C Ratio | | | | | 0.50 | | | 0.37 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3145 | | | 1843 | | | | |
| v/s Ratio Prot | | | | | c0.39 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.36 | | | | |
| v/c Ratio | | | | | 0.78 | | | 0.98 | | | | |
| Uniform Delay, d1 | | | | | 12.3 | | | 18.8 | | | | |
| Progression Factor | | | | | 1.00 | | | 1.00 | | | | |
| Incremental Delay, d2 | | | | | 2.0 | | | 16.7 | | | | |
| Delay (s) | | | | | 14.3 | | | 35.5 | | | | |
| Level of Service | | | | | B | | | D | | | | |
| Approach Delay (s) | 0.0 | | | | 14.3 | | | 35.5 | | | 0.0 | |
| Approach LOS | A | | | | B | | | D | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 23.3 | | | | | | C | | | |
| HCM Volume to Capacity ratio | | | 0.86 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | | | | 8.0 | | | |
| Intersection Capacity Utilization | | | 76.9% | | | | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis 50: Santa Clara Avenue & Harrison Street

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|------|----------------------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 844 | 1734 | 0 | 0 | 0 | 0 | 0 | 912 | 83 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.95 | |
| Flt | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4779 | | | | | | 3495 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4779 | | | | | | 3495 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 861 | 1769 | 0 | 0 | 0 | 0 | 0 | 931 | 85 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 22 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 615 | 1971 | 0 | 0 | 0 | 0 | 0 | 1012 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | 2 | | | | | | | | |
| Permitted Phases | | | | 8 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2310 | | | | | | 1340 | |
| v/s Ratio Prot | | | | | | | | | | | c0.29 | |
| v/s Ratio Perm | | | | 0.40 | 0.41 | | | | | | | |
| v/c Ratio | | | | 0.84 | 0.85 | | | | | | 0.75 | |
| Uniform Delay, d1 | | | | 13.4 | 13.6 | | | | | | 16.1 | |
| Progression Factor | | | | 1.35 | 1.34 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 6.6 | 2.5 | | | | | | 4.0 | |
| Delay (s) | | | | 24.7 | 20.8 | | | | | | 20.0 | |
| Level of Service | | | | C | C | | | | | | C | |
| Approach Delay (s) | | 0.0 | | | 21.7 | | | 0.0 | | | 20.0 | |
| Approach LOS | | A | | | C | | | A | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.3 | | | HCM Level of Service | | | | | C | |
| HCM Volume to Capacity ratio | | | 0.81 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | | Sum of lost time (s) | | | | | 8.0 | |
| Intersection Capacity Utilization | | | 76.9% | | | ICU Level of Service | | | | | D | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Volume (vph) | 291 | 698 | 14 | 22 | 313 | 26 | 21 | 31 | 38 | 86 | 64 | 57 |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Hourly flow rate (vph) | 297 | 712 | 14 | 22 | 319 | 27 | 21 | 32 | 39 | 88 | 65 | 58 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | NB 1 | SB 1 | | | | | | | |
| Volume Total (vph) | 297 | 727 | 368 | 92 | 211 | | | | | | | |
| Volume Left (vph) | 297 | 0 | 22 | 21 | 88 | | | | | | | |
| Volume Right (vph) | 0 | 14 | 27 | 39 | 58 | | | | | | | |
| Hadj (s) | 0.53 | 0.02 | 0.00 | -0.17 | -0.05 | | | | | | | |
| Departure Headway (s) | 6.7 | 6.2 | 6.1 | 7.2 | 6.8 | | | | | | | |
| Degree Utilization, x | 0.56 | 1.25 | 0.63 | 0.18 | 0.40 | | | | | | | |
| Capacity (veh/h) | 525 | 588 | 565 | 447 | 497 | | | | | | | |
| Control Delay (s) | 16.6 | 147.7 | 19.0 | 11.8 | 14.3 | | | | | | | |
| Approach Delay (s) | 109.7 | | 19.0 | 11.8 | 14.3 | | | | | | | |
| Approach LOS | F | | C | B | B | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | 72.8 | | | | | | | | | | |
| HCM Level of Service | | F | | | | | | | | | | |
| Intersection Capacity Utilization | | 85.1% | | ICU Level of Service | | | | | E | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | NWL | NWR | NET | NER | SWL | SWT |
|-----------------------------------|-------|--------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 207 | 182 | 1245 | 880 | 160 | 985 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frst | 0.94 | | 0.94 | | 1.00 | 1.00 |
| Flt Protected | 0.97 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1700 | | 3319 | | 1770 | 3539 |
| Flt Permitted | 0.97 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1700 | | 3319 | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 211 | 186 | 1270 | 898 | 163 | 1005 |
| RTOR Reduction (vph) | 44 | 0 | 110 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 353 | 0 | 2058 | 0 | 163 | 1005 |
| Turn Type | | | Prot | | | |
| Protected Phases | 4 | | 6 | | 5 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 24.1 | | 40.4 | | 13.5 | 57.9 |
| Effective Green, g (s) | 24.1 | | 40.4 | | 13.5 | 57.9 |
| Actuated g/C Ratio | 0.27 | | 0.45 | | 0.15 | 0.64 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 455 | | 1490 | | 266 | 2277 |
| v/s Ratio Prot | c0.21 | | c0.62 | | c0.09 | 0.28 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.78 | | 1.38 | | 0.61 | 0.44 |
| Uniform Delay, d1 | 30.5 | | 24.8 | | 35.8 | 8.0 |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | 0.37 |
| Incremental Delay, d2 | 8.1 | | 175.9 | | 2.9 | 0.4 |
| Delay (s) | 38.5 | | 200.7 | | 38.7 | 3.4 |
| Level of Service | D | | F | | D | A |
| Approach Delay (s) | 38.5 | | 200.7 | | | 8.3 |
| Approach LOS | D | | F | | | A |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 123.3 | | HCM Level of Service | | F |
| HCM Volume to Capacity ratio | | 1.06 | | | | |
| Actuated Cycle Length (s) | | 90.0 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 104.1% | | ICU Level of Service | | G |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Movement | EBL | EBT | WBT | WBR | SEL | SER |
|-----------------------------------|-------|-------|-------|----------------------|-------|------|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (vph) | 273 | 321 | 265 | 118 | 487 | 478 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frst | 1.00 | 1.00 | 0.95 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 3539 | 3376 | | 1770 | 1583 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 279 | 328 | 270 | 120 | 497 | 488 |
| RTOR Reduction (vph) | 0 | 0 | 94 | 0 | 0 | 331 |
| Lane Group Flow (vph) | 279 | 328 | 296 | 0 | 497 | 157 |
| Turn Type | Prot | | | | Perm | |
| Protected Phases | 7 | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Actuated Green, G (s) | 12.5 | 26.1 | 9.6 | | 16.2 | 16.2 |
| Effective Green, g (s) | 12.5 | 26.1 | 9.6 | | 16.2 | 16.2 |
| Actuated g/C Ratio | 0.25 | 0.52 | 0.19 | | 0.32 | 0.32 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 440 | 1836 | 644 | | 570 | 510 |
| v/s Ratio Prot | c0.16 | 0.09 | c0.09 | | c0.28 | |
| v/s Ratio Perm | | | | | | 0.10 |
| v/c Ratio | 0.63 | 0.18 | 0.46 | | 0.87 | 0.31 |
| Uniform Delay, d1 | 16.9 | 6.4 | 18.1 | | 16.1 | 12.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.0 | 0.0 | 0.5 | | 13.7 | 0.3 |
| Delay (s) | 19.8 | 6.5 | 18.6 | | 29.8 | 13.2 |
| Level of Service | B | A | B | | C | B |
| Approach Delay (s) | 12.6 | 18.6 | | | 21.6 | |
| Approach LOS | B | B | | | C | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 18.2 | | HCM Level of Service | | B |
| HCM Volume to Capacity ratio | | 0.69 | | | | |
| Actuated Cycle Length (s) | | 50.3 | | Sum of lost time (s) | | 12.0 |
| Intersection Capacity Utilization | | 63.2% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

Cumulative (2030) plus Project (Phase I and Phase II) Conditions Mitigated

HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) AM MIT
47: MacArthur Blvd (EB) & Grand Avenue Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|---|------|------|-------|--------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 722 | 760 | 238 | 0 | 490 | 276 | 345 | 1595 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.91 | | | 0.95 | 0.88 | 1.00 | 0.95 | |
| Flt Protected | | | | 0.98 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 6365 | | | 3539 | 2787 | 1770 | 3539 | |
| Flt Permitted | | | | 0.96 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 6365 | | | 3539 | 2787 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 737 | 776 | 243 | 0 | 500 | 282 | 352 | 1628 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 235 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 1741 | 0 | 0 | 500 | 47 | 352 | 1628 | 0 |
| Turn Type | | | Split | | | | Perm | | Prot | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | 2 | | | | |
| Actuated Green, G (s) | | | | 35.9 | | | 17.5 | 17.5 | 39.6 | 61.1 | |
| Effective Green, g (s) | | | | 35.9 | | | 17.5 | 17.5 | 39.6 | 61.1 | |
| Actuated g/C Ratio | | | | 0.34 | | | 0.17 | 0.17 | 0.37 | 0.58 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 2156 | | | 584 | 460 | 661 | 2040 | |
| v/s Ratio Prot | | | | c0.27 | | | 0.14 | | 0.20 | c0.46 | |
| v/s Ratio Perm | | | | | | | 0.02 | | | | |
| v/c Ratio | | | | 1.20dl | | | 0.86 | 0.10 | 0.53 | 0.80 | |
| Uniform Delay, d1 | | | | 31.9 | | | 43.0 | 37.6 | 26.0 | 17.6 | |
| Progression Factor | | | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 2.3 | | | 14.9 | 0.4 | 3.1 | 3.4 | |
| Delay (s) | | | | 34.2 | | | 57.9 | 38.0 | 29.0 | 21.0 | |
| Level of Service | | | | C | | | E | D | C | C | |
| Approach Delay (s) | 0.0 | | | 34.2 | | | 50.8 | | | 22.4 | |
| Approach LOS | A | | | C | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | | 31.9 | | | | | | | |
| HCM Volume to Capacity ratio | | | | 0.80 | | | | | | | |
| Actuated Cycle Length (s) | | | | 106.0 | | | | | | | |
| Intersection Capacity Utilization | | | | 91.2% | | | | | | | |
| Analysis Period (min) | | | | 15 | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) AM MIT
48: MacArthur Blvd (EB) & Lakeshore Drive Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|-----------------------------------|-------|-------|------|------|-------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 291 | 541 | 239 | 228 | 398 | 208 | 26 | 372 | 50 | 496 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 0.95 | | | | 1.00 | 0.95 |
| Flt Protected | 1.00 | 0.97 | 0.85 | | 0.94 | | | | 1.00 | 1.00 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3097 | 1441 | | 3343 | | | | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3097 | 1441 | | 3343 | | | | 1770 | 3539 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 297 | 552 | 244 | 233 | 406 | 212 | 27 | 380 | 51 | 506 |
| RTOR Reduction (vph) | 0 | 0 | 91 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 267 | 736 | 232 | 0 | 642 | 0 | 0 | 0 | 431 | 506 |
| Turn Type | Split | | | Prot | | | | Prot | Prot | |
| Protected Phases | 4 | 4 | | 4 | | | | 1 | 1 | 6 |
| Permitted Phases | | | | | 2 | | | | | |
| Actuated Green, G (s) | 31.0 | 31.0 | 31.0 | | 33.5 | | | | 29.0 | 66.0 |
| Effective Green, g (s) | 31.0 | 31.0 | 31.0 | | 33.5 | | | | 29.0 | 66.0 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | 0.32 | | | | 0.27 | 0.62 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | | | | 3.5 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 471 | 906 | 421 | | 1057 | | | | 484 | 2204 |
| v/s Ratio Prot | 0.17 | c0.24 | 0.16 | | c0.19 | | | | c0.24 | 0.14 |
| v/s Ratio Perm | | | | | | | | | | |
| v/c Ratio | 0.57 | 0.81 | 0.55 | | 0.61 | | | | 0.89 | 0.23 |
| Uniform Delay, d1 | 31.8 | 34.8 | 31.6 | | 30.7 | | | | 37.0 | 8.8 |
| Progression Factor | 0.76 | 0.78 | 0.64 | | 1.00 | | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.2 | 4.3 | 1.2 | | 2.6 | | | | 18.2 | 0.2 |
| Delay (s) | 25.4 | 31.6 | 21.4 | | 33.3 | | | | 55.2 | 9.0 |
| Level of Service | C | C | C | | C | | | | E | A |
| Approach Delay (s) | | 27.9 | | | 33.3 | | | | | 30.3 |
| Approach LOS | | C | | | C | | | | | C |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | | | | 29.8 | | | | | |
| HCM Volume to Capacity ratio | | | | | 0.76 | | | | | |
| Actuated Cycle Length (s) | | | | | 106.0 | | | | | |
| Intersection Capacity Utilization | | | | | 74.2% | | | | | |
| Analysis Period (min) | | | | | 15 | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) AM MIT
49: Santa Clara Avenue & Oakland Avenue Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|------|------|------|------|--------|------|------|--------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 3209 | 149 | 551 | 488 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Flt Protected | | | | | 0.99 | | | 1.00 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (prot) | | | | | 6365 | | | 4954 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.97 | | | | |
| Satd. Flow (perm) | | | | | 6365 | | | 4954 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 3274 | 152 | 562 | 498 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 3418 | 0 | 0 | 1060 | 0 | 0 | 0 | 0 |
| Turn Type | | | | | | | Perm | | | | | |
| Protected Phases | | | | | | | 2 | | 4 | | | |
| Permitted Phases | | | | | | | | 4 | | | | |
| Actuated Green, G (s) | | | | | 44.0 | | | 28.0 | | | | |
| Effective Green, g (s) | | | | | 44.0 | | | 28.0 | | | | |
| Actuated g/C Ratio | | | | | 0.55 | | | 0.35 | | | | |
| Clearance Time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Grp Cap (vph) | | | | | 3501 | | | 1734 | | | | |
| v/s Ratio Prot | | | | | c0.54 | | | | | | | |
| v/s Ratio Perm | | | | | | | | 0.21 | | | | |
| v/c Ratio | | | | | 0.98 | | | 0.91dl | | | | |
| Uniform Delay, d1 | | | | | 17.5 | | | 21.5 | | | | |
| Progression Factor | | | | | 1.00 | | | 0.89 | | | | |
| Incremental Delay, d2 | | | | | 10.6 | | | 1.0 | | | | |
| Delay (s) | | | | | 28.1 | | | 20.1 | | | | |
| Level of Service | | | | | C | | | C | | | | |
| Approach Delay (s) | | 0.0 | | | 28.1 | | | 20.1 | | | 0.0 | |
| Approach LOS | | A | | | C | | | C | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | | | 26.2 | | | | | | | |
| HCM Volume to Capacity ratio | | | | | 0.83 | | | | | | | |
| Actuated Cycle Length (s) | | | | | 80.0 | | | | | | | |
| Intersection Capacity Utilization | | | | | 106.4% | | | | | | | |
| Analysis Period (min) | | | | | 15 | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) AM MIT
50: MacArthur Blvd (WB) & Harrison Street Kaiser Center Transportation Study

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|--------|------|-------|----------------------|------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 1575 | 2049 | 0 | 0 | 0 | 0 | 0 | 1473 | 43 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.91 | |
| Flt Protected | | | | 1.00 | 1.00 | | | | | | 1.00 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (prot) | | | | 1522 | 4746 | | | | | | 5064 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Satd. Flow (perm) | | | | 1522 | 4746 | | | | | | 5064 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1607 | 2091 | 0 | 0 | 0 | 0 | 0 | 1503 | 44 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 899 | 2797 | 0 | 0 | 0 | 0 | 0 | 1543 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | 2 | | | | | | | | |
| Permitted Phases | | | | 8 | | | | | | | | |
| Actuated Green, G (s) | | | | 46.0 | 46.0 | | | | | | | |
| Effective Green, q (s) | | | | 46.0 | 46.0 | | | | | | | |
| Actuated g/C Ratio | | | | 0.57 | 0.57 | | | | | | | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | | |
| Lane Grp Cap (vph) | | | | 875 | 2729 | | | | | | | |
| v/s Ratio Prot | | | | | | | | | | | c0.30 | |
| v/s Ratio Perm | | | c0.59 | 0.59 | | | | | | | | |
| v/c Ratio | | | 1.03 | 1.02 | | | | | | | | |
| Uniform Delay, d1 | | | 17.0 | 17.0 | | | | | | | | |
| Progression Factor | | | 1.11 | 1.09 | | | | | | | | |
| Incremental Delay, d2 | | | 26.0 | 17.7 | | | | | | | | |
| Delay (s) | | | 44.9 | 36.2 | | | | | | | | |
| Level of Service | | | D | D | | | | | | | | |
| Approach Delay (s) | 0.0 | | | 38.3 | | | | | | | 0.0 | 37.8 |
| Approach LOS | A | | | D | | | | | | | A | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 38.2 | HCM Level of Service | | | | | | | D | |
| HCM Volume to Capacity ratio | | | 0.99 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 80.0 | Sum of lost time (s) | | | | | | | 8.0 | |
| Intersection Capacity Utilization | 116.7% | | | ICU Level of Service | | | | | | | H | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) AM MIT 51: Oakland Avenue & Monte Vista Avenue Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|-------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 107 | 280 | 9 | 13 | 607 | 19 | 13 | 9 | 12 | 26 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 4.0 | | | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 |
| Frst | 1.00 | 1.00 | | | 1.00 | | | 0.95 | | | 0.96 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | | | 0.98 | | | 0.98 |
| Satd. Flow (prot) | 1770 | 1854 | | | 1854 | | | 1741 | | | 1754 |
| Flt Permitted | 0.31 | 1.00 | | | 0.99 | | | 0.93 | | | 0.91 |
| Satd. Flow (perm) | 582 | 1854 | | | 1840 | | | 1644 | | | 1636 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 109 | 286 | 9 | 13 | 619 | 19 | 13 | 9 | 12 | 27 | 20 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 7 | 0 | 0 | 11 |
| Lane Group Flow (vph) | 109 | 292 | 0 | 0 | 648 | 0 | 0 | 27 | 0 | 0 | 55 |
| Turn Type | Perm | | Perm | | Perm | | Perm | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 |
| Permitted Phases | 4 | | | | | | | | | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | | | 16.0 | | | 16.0 |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | | | 16.0 | | | 16.0 |
| Actuated g/C Ratio | 0.40 | 0.40 | | | 0.40 | | | 0.40 | | | 0.40 |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 4.0 | | | 4.0 |
| Lane Grp Cap (vph) | 233 | 742 | | | 736 | | | 658 | | | 654 |
| v/s Ratio Prot | | 0.16 | | | | | | | | | |
| v/s Ratio Perm | 0.19 | | | | c0.35 | | | 0.02 | | | c0.03 |
| v/c Ratio | 0.47 | 0.39 | | | 0.88 | | | 0.04 | | | 0.08 |
| Uniform Delay, d1 | 8.9 | 8.5 | | | 11.1 | | | 7.3 | | | 7.4 |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 |
| Incremental Delay, d2 | 6.6 | 1.6 | | | 14.2 | | | 0.1 | | | 0.3 |
| Delay (s) | 15.5 | 10.1 | | | 25.4 | | | 7.4 | | | 7.7 |
| Level of Service | B | B | | | C | | | A | | | A |
| Approach Delay (s) | 11.6 | | | | 25.4 | | | 7.4 | | | 7.7 |
| Approach LOS | B | | | | C | | | A | | | A |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | 19.0 | | | HCM Level of Service | | | B | | | |
| HCM Volume to Capacity ratio | | 0.48 | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | |
| Intersection Capacity Utilization | | 63.9% | | | ICU Level of Service | | | B | | | |
| Analysis Period (min) | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) PM MIT 47: MacArthur Blvd (EB) & Grand Avenue Kaiser Center Transportation Study

| Movement | WBL | WBR | SEL2 | SEL | SER | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|--------|-------|----------------------|------|-------|-------|-------|------|------|
| Lane Configurations | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 340 | 2180 | 153 | 0 | 615 | 711 | 738 | 1165 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | 4.0 | |
| Lane Util. Factor | | | | 0.91 | | | 0.95 | 0.88 | 1.00 | 0.95 | |
| Frst | | | | 0.99 | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.95 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 6420 | | | 3539 | 2787 | 1770 | 3539 | |
| Flt Permitted | | | | 0.95 | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | | | 6420 | | | 3539 | 2787 | 1770 | 3539 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 347 | 2224 | 156 | 0 | 628 | 726 | 753 | 1189 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 35 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 2716 | 0 | 0 | 628 | 691 | 753 | 1189 | 0 |
| Turn Type | | | Split | | | | Perm | Prot | | | |
| Protected Phases | | | 4 | 4 | | | 2 | | 1 | 2 | |
| Permitted Phases | | | | | | | | | | | |
| Actuated Green, G (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Effective Green, g (s) | | | | 30.0 | | | 17.5 | 17.5 | 29.5 | 51.0 | |
| Actuated g/C Ratio | | | | 0.33 | | | 0.19 | 0.19 | 0.33 | 0.57 | |
| Clearance Time (s) | | | | 4.5 | | | 4.5 | 4.5 | 4.0 | | |
| Vehicle Extension (s) | | | | 3.0 | | | 3.0 | 3.0 | 3.0 | | |
| Lane Grp Cap (vph) | | | | 2140 | | | 688 | 542 | 580 | 2005 | |
| v/s Ratio Prot | | | | c0.42 | | | 0.18 | | c0.43 | 0.34 | |
| v/s Ratio Perm | | | | | | | | c0.25 | | | |
| v/c Ratio | | | | 1.27 | | | 0.91 | 1.27 | 1.30 | 0.59 | |
| Uniform Delay, d1 | | | | 30.0 | | | 35.5 | 36.2 | 30.3 | 12.7 | |
| Progression Factor | | | | 1.00 | | | 1.24 | 1.22 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | | 125.0 | | | 8.9 | 129.2 | 146.6 | 0.5 | |
| Delay (s) | | | | 155.0 | | | 53.0 | 173.4 | 176.8 | 13.2 | |
| Level of Service | | | | F | | | D | F | F | B | |
| Approach Delay (s) | 0.0 | | | 155.0 | | | 117.6 | | | 76.7 | |
| Approach LOS | A | | | F | | | F | | | E | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 121.3 | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.28 | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | Sum of lost time (s) | | | 13.0 | | | |
| Intersection Capacity Utilization | | | 107.1% | | ICU Level of Service | | | G | | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

AECOM

Synchro 7 - Report



















HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) PM MIT 48: MacArthur Blvd (EB) & Lakeshore Drive Kaiser Center Transportation Study

| Movement | EBL | EBT | EBR | EBR2 | NET | NER | NER2 | SWL2 | SWL | SWT |
|---|-------|-------|-------|------|----------------------|------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | |
| Volume (vph) | 489 | 1650 | 881 | 183 | 372 | 511 | 148 | 354 | 26 | 262 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | 0.91 | 0.86 | 0.91 | | 1.00 | 0.88 | | | 0.97 | 1.00 |
| Frst | 1.00 | 0.98 | 0.85 | | 1.00 | 0.85 | | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1610 | 3143 | 1441 | | 1863 | 2787 | | | 3433 | 1863 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | | 0.95 | 1.00 |
| Satd. Flow (perm) | 1610 | 3143 | 1441 | | 1863 | 2787 | | | 3433 | 1863 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 499 | 1684 | 899 | 187 | 380 | 521 | 151 | 361 | 27 | 267 |
| RTOR Reduction (vph) | 0 | 0 | 11 | 0 | 0 | 26 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 449 | 1968 | 841 | 0 | 380 | 646 | 0 | 0 | 388 | 267 |
| Turn Type | Split | | Prot | | Perm | | Prot | Prot | | |
| Protected Phases | 4 | 4 | 4 | | 2 | | 1 | 1 | 6 | |
| Permitted Phases | | | | | | 2 | | | | |
| Actuated Green, G (s) | 39.0 | 39.0 | 39.0 | | 23.5 | 23.5 | | | 14.5 | 42.0 |
| Effective Green, g (s) | 39.0 | 39.0 | 39.0 | | 23.5 | 23.5 | | | 14.5 | 42.0 |
| Actuated g/C Ratio | 0.43 | 0.43 | 0.43 | | 0.26 | 0.26 | | | 0.16 | 0.47 |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 698 | 1362 | 624 | | 486 | 728 | | | 553 | 869 |
| v/s Ratio Prot | 0.28 | c0.63 | 0.58 | | 0.20 | | | | c0.11 | 0.14 |
| v/s Ratio Perm | | | | | c0.23 | | | | | |
| v/c Ratio | 0.64 | 1.44 | 1.35 | | 0.78 | 0.89 | | | 1.27 | 0.31 |
| Uniform Delay, d1 | 20.0 | 25.5 | 25.5 | | 30.9 | 32.0 | | | 35.7 | 14.9 |
| Progression Factor | 0.67 | 0.74 | 0.73 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.4 | 200.6 | 157.3 | | 11.8 | 15.0 | | | 4.0 | 0.9 |
| Delay (s) | 13.8 | 219.5 | 175.9 | | 42.7 | 47.0 | | | 39.7 | 15.9 |
| Level of Service | B | F | F | | D | D | | | D | B |
| Approach Delay (s) | 179.9 | | | | 45.5 | | | | 30.0 | |
| Approach LOS | F | | | | D | | | | C | |
| Intersection Summary | | | | | | | | | | |
| HCM Average Control Delay | | 131.7 | | | HCM Level of Service | | | F | | |
| HCM Volume to Capacity ratio | | 1.13 | | | | | | | | |
| Actuated Cycle Length (s) | | 90.0 | | | Sum of lost time (s) | | | 13.0 | | |
| Intersection Capacity Utilization | | 92.1% | | | ICU Level of Service | | | F | | |
| Analysis Period (min) | | 15 | | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | |

AECOM

Synchro 7 - Report

HCM Signalized Intersection Capacity Analysis Cumulative plus Project (I+II) PM MIT 49: Santa Clara Avenue & Oakland Avenue Kaiser Center Transportation Study

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations | | | | |    | | |    | | | | |
| Volume (vph) | 0 | 0 | 0 | 0 | 2113 | 296 | 416 | 1356 | 0 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | | 4.0 | | | | |
| Lane Util. Factor | | | | | 0.86 | | | 0.91 | | | | |
| Frst | | | | | 0.98 | | | 1.00 | | | | |
| Flt Protected | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (prot) | | | | | 6290 | | | 5026 | | | | |
| Flt Permitted | | | | | 1.00 | | | 0.99 | | | | |
| Satd. Flow (perm) | | | | | 6290 | | | 5026 | | | | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 0 | 0 | 0 | 0 | 2156 | 302 | 424 | 1384 | 0 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2455 | 0 | 0 | 1806 | 0 | 0 | 0 | 0 |
| Turn Type | Perm | | | | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | 4 | | |
| Permitted Phases | | | | | | 4 | | | | | | |
| Actuated Green, G (s) | | | | | 30.0 | | | | | 22.0 | | |
| Effective Green, g (s) | | | | | 30.0 | | | | | 22.0 | | |
| Actuated g/C Ratio | | | | | 0.50 | | | | | 0.37 | | |
| Clearance Time (s) | | | | | 4.0 | | | | | 4.0 | | |
| Lane Grp Cap (vph) | | | | | 3145 | | | | | 1843 | | |
| v/s Ratio Prot | | | | | c0.39 | | | | | | | |
| v/s Ratio Perm | | | | | | | | | | 0.36 | | |
| v/c Ratio | | | | | 0.78 | | | | | 0.98 | | |
| Uniform Delay, d1 | | | | | 12.3 | | | | | 18.8 | | |
| Progression Factor | | | | | 1.00 | | | | | 1.00 | | |
| Incremental Delay, d2 | | | | | 2.0 | | | | | 16.7 | | |
| Delay (s) | | | | | 14.3 | | | | | 35.5 | | |
| Level of Service | | | | | B | | | | | D | | |
| Approach Delay (s) | 0.0 | | | | 14.3 | 35.5 | | | | 0.0 | | |
| Approach LOS | A | | | | B | D | | | | A | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 23.3 | | | | HCM Level of Service | | | | C | | | |
| HCM Volume to Capacity ratio | 0.86 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 60.0 | | | | Sum of lost time (s) | | | | 8.0 | | | |
| Intersection Capacity Utilization | 76.9% | | | | ICU Level of Service | | | | D | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |






| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|-----------------------------------|------|------|-------|------|----------------------|------|------|------|------|------|-------|------|
| Lane Configurations | | | | ↰ | ↱ | | | | | | ↰ | ↱ |
| Volume (vph) | 0 | 0 | 0 | 844 | 1734 | 0 | 0 | 0 | 0 | 0 | 912 | 83 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Util. Factor | | | | 0.86 | 0.86 | | | | | | 0.91 | |
| Fr't | | | | 1.00 | 1.00 | | | | | | 0.99 | |
| Flt Protected | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Sat'd. Flow (prot) | | | | 1522 | 4779 | | | | | | 5021 | |
| Flt Permitted | | | | 0.95 | 0.99 | | | | | | 1.00 | |
| Sat'd. Flow (perm) | | | | 1522 | 4779 | | | | | | 5021 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 |
| Adj. Flow (vph) | 0 | 0 | 0 | 861 | 1769 | 0 | 0 | 0 | 0 | 0 | 931 | 85 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 22 | 22 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 615 | 1971 | 0 | 0 | 0 | 0 | 0 | 1012 | 0 |
| Turn Type | | | | Perm | | | | | | | | |
| Protected Phases | | | | | 2 | | | | | | 8 | |
| Permitted Phases | | | | 2 | | | | | | | | |
| Actuated Green, G (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Effective Green, g (s) | | | | 29.0 | 29.0 | | | | | | 23.0 | |
| Actuated g/C Ratio | | | | 0.48 | 0.48 | | | | | | 0.38 | |
| Clearance Time (s) | | | | 4.0 | 4.0 | | | | | | 4.0 | |
| Lane Grp Cap (vph) | | | | 736 | 2310 | | | | | | 1925 | |
| v/s Ratio Prot | | | | | | | | | | | c0.20 | |
| v/s Ratio Perm | | | | 0.40 | 0.41 | | | | | | | |
| v/c Ratio | | | | 0.84 | 0.85 | | | | | | 0.53 | |
| Uniform Delay, d1 | | | | 13.4 | 13.6 | | | | | | 14.3 | |
| Progression Factor | | | | 1.35 | 1.34 | | | | | | 1.00 | |
| Incremental Delay, d2 | | | | 6.6 | 2.5 | | | | | | 1.0 | |
| Delay (s) | | | | 24.7 | 20.8 | | | | | | 15.3 | |
| Level of Service | | | | C | C | | | | | | B | |
| Approach Delay (s) | | 0.0 | | | 21.7 | | | 0.0 | | | 15.3 | |
| Approach LOS | | A | | | C | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 19.9 | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | | 0.71 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 60.0 | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | | 76.9% | | ICU Level of Service | | | D | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |






| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|-------|------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Volume (vph) | 291 | 698 | 14 | 22 | 313 | 26 | 21 | 31 | 38 | 86 | 64 | 57 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | | 4.0 | | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Fr't | 1.00 | 1.00 | | | 0.99 | | | 0.94 | | | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | | | 0.99 | | | 0.98 | |
| Sat'd. Flow (prot) | 1770 | 1857 | | | 1839 | | | 1736 | | | 1757 | |
| Flt Permitted | 0.56 | 1.00 | | | 0.91 | | | 0.92 | | | 0.84 | |
| Sat'd. Flow (perm) | 1035 | 1857 | | | 1674 | | | 1608 | | | 1514 | |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 297 | 712 | 14 | 22 | 319 | 27 | 21 | 32 | 39 | 88 | 65 | 58 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 7 | 0 | 0 | 26 | 0 | 0 | 34 | 0 |
| Lane Group Flow (vph) | 297 | 724 | 0 | 0 | 361 | 0 | 0 | 66 | 0 | 0 | 177 | 0 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | | | | | | | | | |
| Actuated Green, G (s) | 19.0 | 19.0 | | | 19.0 | | | 13.0 | | | 13.0 | |
| Effective Green, g (s) | 19.0 | 19.0 | | | 19.0 | | | 13.0 | | | 13.0 | |
| Actuated g/C Ratio | 0.48 | 0.48 | | | 0.48 | | | 0.32 | | | 0.32 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | | 4.0 | | | 4.0 | |
| Lane Grp Cap (vph) | 492 | 882 | | | 795 | | | 523 | | | 492 | |
| v/s Ratio Prot | | c0.39 | | | | | | | | | | |
| v/s Ratio Perm | 0.29 | | | | 0.22 | | | 0.04 | | | c0.12 | |
| v/c Ratio | 0.60 | 0.82 | | | 0.45 | | | 0.13 | | | 0.36 | |
| Uniform Delay, d1 | 7.7 | 9.0 | | | 7.0 | | | 9.5 | | | 10.3 | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 5.4 | 8.5 | | | 1.9 | | | 0.5 | | | 2.0 | |
| Delay (s) | 13.1 | 17.5 | | | 8.9 | | | 10.0 | | | 12.3 | |
| Level of Service | B | B | | | A | | | A | | | B | |
| Approach Delay (s) | | 16.3 | | | 8.9 | | | 10.0 | | | 12.3 | |
| Approach LOS | | B | | | A | | | A | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 13.8 | | | HCM Level of Service | | | B | | | | |
| HCM Volume to Capacity ratio | | 0.63 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 40.0 | | | Sum of lost time (s) | | | 8.0 | | | | |
| Intersection Capacity Utilization | | 85.1% | | | ICU Level of Service | | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Appendix D

Queue Calculation Worksheets

Existing Conditions

| |  |  |  |  |  |
|-------------------------|--|--|--|--|--|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1402 | 621 | 198 | 301 | 1065 |
| v/c Ratio | 0.85 | 1.06 | 0.46 | 0.44 | 0.51 |
| Control Delay | 36.8 | 98.2 | 9.5 | 27.5 | 14.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.8 | 98.2 | 9.5 | 27.5 | 14.1 |
| Queue Length 50th (ft) | 290 | ~245 | 0 | 154 | 217 |
| Queue Length 95th (ft) | 348 | #359 | 63 | 234 | 272 |
| Internal Link Dist (ft) | 1105 | 413 | | | 511 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1731 | 584 | 427 | 678 | 2090 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.81 | 1.06 | 0.46 | 0.44 | 0.51 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| | Queue shown is maximum after two cycles. | | | | |

| |  |  |  |  |  |
|-------------------------|--|--|--|--|--|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1402 | 757 | 609 | 380 | 802 |
| v/c Ratio | 0.85 | 0.92 | 1.28 | 0.73 | 0.39 |
| Control Delay | 33.2 | 53.4 | 168.1 | 36.8 | 11.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.2 | 53.4 | 168.1 | 36.8 | 11.1 |
| Queue Length 50th (ft) | 248 | ~260 | ~413 | 183 | 123 |
| Queue Length 95th (ft) | 306 | #374 | #621 | 283 | 162 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1675 | 826 | 475 | 580 | 2049 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.84 | 0.92 | 1.28 | 0.66 | 0.39 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| | Queue shown is maximum after two cycles. | | | | |

Near-Term (2015) Conditions

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term AM
Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|-----------------------------|---|------|------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 1682 | 446 | 224 | 297 | 1232 |
| v/c Ratio | 1.12 | 0.76 | 0.50 | 0.46 | 0.60 |
| Control Delay | 51.3 | 51.9 | 9.5 | 28.3 | 16.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.3 | 51.9 | 9.5 | 28.3 | 16.2 |
| Queue Length 50th (ft) | 390 | 153 | 0 | 151 | 269 |
| Queue Length 95th (ft) | 502 | 210 | 65 | 230 | 334 |
| Internal Link Dist (ft) | 1105 | 413 | | | 511 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1720 | 584 | 448 | 651 | 2037 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.98 | 0.76 | 0.50 | 0.46 | 0.60 |
| Intersection Summary | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |
| dl | Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | |

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term AM
Kaiser Center Transportation Study

| | EBL | EBT | EBR | NET | SWL | SWT |
|-----------------------------|---|------|------|------|------|------|
| Lane Group | | | | | | |
| Lane Group Flow (vph) | 247 | 681 | 299 | 558 | 412 | 484 |
| v/c Ratio | 0.54 | 0.77 | 0.61 | 0.50 | 0.87 | 0.22 |
| Control Delay | 25.2 | 28.5 | 14.4 | 31.8 | 56.7 | 9.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 25.2 | 28.5 | 14.4 | 31.8 | 56.7 | 9.1 |
| Queue Length 50th (ft) | 100 | 176 | 39 | 164 | 261 | 70 |
| Queue Length 95th (ft) | 131 | 212 | 79 | 230 | 401 | 100 |
| Internal Link Dist (ft) | | 774 | | 703 | | 185 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 966 | 526 | 1106 | 526 | 2228 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.49 | 0.70 | 0.57 | 0.50 | 0.78 | 0.22 |
| Intersection Summary | | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |

Queues
145: El Embarcadero (WB) & Grand Avenue







Near-Term AM
Kaiser Center Transportation Study





| | NWL | NET | SWL | SWT |
|-----------------------------|---|------|------|------|
| Lane Group | | | | |
| Lane Group Flow (vph) | 604 | 849 | 121 | 1152 |
| v/c Ratio | 0.86 | 0.91 | 0.40 | 0.68 |
| Control Delay | 29.0 | 34.7 | 28.0 | 15.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.0 | 34.7 | 28.0 | 15.3 |
| Queue Length 50th (ft) | 165 | 130 | 41 | 168 |
| Queue Length 95th (ft) | 326 | 240 | 87 | 244 |
| Internal Link Dist (ft) | 513 | 307 | | 413 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 779 | 934 | 305 | 1702 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 0.91 | 0.40 | 0.68 |
| Intersection Summary | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | |

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term PM
Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|-----------------------------|---|------|-------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 1916 | 589 | 615 | 516 | 1093 |
| v/c Ratio | 1.15 | 0.85 | 1.68 | 0.89 | 0.54 |
| Control Delay | 104.7 | 45.2 | 336.4 | 49.0 | 13.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 104.7 | 45.2 | 336.4 | 49.0 | 13.2 |
| Queue Length 50th (ft) | 459 | 147 | 477 | 275 | 187 |
| Queue Length 95th (ft) | 553 | 167 | 420 | 462 | 242 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1665 | 693 | 365 | 580 | 1998 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.15 | 0.85 | 1.68 | 0.89 | 0.55 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | |

| |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
| Lane Group Flow (vph) | 392 | 1405 | 607 | 939 | 371 | 256 |
| v/c Ratio | 0.78 | 1.45 | 1.31 | 0.86 | 1.57 | 0.12 |
| Control Delay | 20.5 | 223.5 | 161.0 | 25.3 | 306.7 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 20.5 | 223.5 | 161.0 | 25.3 | 306.7 | 8.4 |
| Queue Length 50th (ft) | 162 | -629 | -471 | 224 | -302 | 31 |
| Queue Length 95th (ft) | 126 | m | 487 | m | 354 | 296 |
| Internal Link Dist (ft) | 1206 | | | 1205 | | 1978 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 972 | 465 | 1328 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 1.45 | 1.31 | 0.71 | 1.57 | 0.12 |
| Intersection Summary | | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |
| dr | Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | |

| |  |  |  |  |
|-------------------------|---|---|---|---|
| Lane Group | NWL | NET | SWL | SWT |
| Lane Group Flow (vph) | 381 | 1947 | 157 | 866 |
| v/c Ratio | 0.79 | 1.19 | 0.61 | 0.37 |
| Control Delay | 37.3 | 114.6 | 42.7 | 3.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 37.3 | 114.6 | 42.7 | 3.4 |
| Queue Length 50th (ft) | 171 | -679 | 69 | 0 |
| Queue Length 95th (ft) | 241 | m | 964 | m |
| Internal Link Dist (ft) | 560 | 322 | | 429 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 734 | 1640 | 308 | 2310 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.52 | 1.19 | 0.51 | 0.37 |
| Intersection Summary | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | |
| | Queue shown is maximum after two cycles. | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | |
| | Queue shown is maximum after two cycles. | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | |

Cumulative (2030) Conditions

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative AM
Kaiser Center Transportation Study

| | ↘ | ↗ | ↖ | ↙ | ↘ |
|-------------------------|---|------|------|------|------|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1756 | 500 | 280 | 352 | 1395 |
| v/c Ratio | 1.17 | 0.86 | 0.67 | 0.54 | 0.68 |
| Control Delay | 61.5 | 58.5 | 22.8 | 30.2 | 18.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 61.5 | 58.5 | 22.8 | 30.2 | 18.0 |
| Queue Length 50th (ft) | 445 | 175 | 55 | 186 | 327 |
| Queue Length 95th (ft) | 540 | 261 | 148 | 278 | 406 |
| Internal Link Dist (ft) | 1105 | 413 | | 511 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1720 | 584 | 419 | 651 | 2037 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.02 | 0.86 | 0.67 | 0.54 | 0.68 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| dl | Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | |

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative AM
Kaiser Center Transportation Study

| | ↘ | → | ↖ | ↗ | ↙ | ↘ |
|-------------------------|---|------|------|------|------|------|
| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
| Lane Group Flow (vph) | 267 | 734 | 323 | 642 | 431 | 506 |
| v/c Ratio | 0.57 | 0.81 | 0.63 | 0.61 | 0.89 | 0.23 |
| Control Delay | 26.5 | 30.6 | 15.0 | 34.7 | 58.1 | 9.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.5 | 30.6 | 15.0 | 34.7 | 58.1 | 9.4 |
| Queue Length 50th (ft) | 120 | 211 | 41 | 204 | 271 | 77 |
| Queue Length 95th (ft) | 157 | 249 | 100 | 270 | 431 | 104 |
| Internal Link Dist (ft) | | 774 | | 703 | | 185 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 964 | 537 | 1060 | 526 | 2206 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.76 | 0.60 | 0.61 | 0.82 | 0.23 |
| Intersection Summary | | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |

Queues
49: Santa Clara Avenue & Oakland Avenue

Cumulative AM
Kaiser Center Transportation Study

| | ↖ | ↗ |
|-------------------------|---|------|
| Lane Group | NWT | NET |
| Lane Group Flow (vph) | 3254 | 1053 |
| v/c Ratio | 1.07 | 0.50 |
| Control Delay | 62.5 | 18.9 |
| Queue Delay | 111.8 | 0.3 |
| Total Delay | 174.4 | 19.2 |
| Queue Length 50th (ft) | 534 | 179 |
| Queue Length 95th (ft) | 610 | 204 |
| Internal Link Dist (ft) | 378 | 334 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 3031 | 2105 |
| Starvation Cap Reductn | 0 | 0 |
| Spillback Cap Reductn | 576 | 448 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 1.33 | 0.64 |
| Intersection Summary | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | |
| | Queue shown is maximum after two cycles. | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | |
| | Queue shown is maximum after two cycles. | |
| m | Volume for 95th percentile queue is metered by upstream signal. | |

Queues
50: MacArthur Blvd (WB) & Harrison Street

Cumulative AM
Kaiser Center Transportation Study

| | ↖ | ↗ | ↘ |
|-------------------------|---|-------|-------|
| Lane Group | NWL | NWT | SWT |
| Lane Group Flow (vph) | 861 | 2665 | 1504 |
| v/c Ratio | 0.98 | 0.97 | 1.31 |
| Control Delay | 36.2 | 27.7 | 172.4 |
| Queue Delay | 127.4 | 145.2 | 0.0 |
| Total Delay | 163.6 | 172.9 | 172.4 |
| Queue Length 50th (ft) | 384 | 396 | 521 |
| Queue Length 95th (ft) | 375 | 379 | 655 |
| Internal Link Dist (ft) | | 191 | 1680 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 876 | 2734 | 1148 |
| Starvation Cap Reductn | 216 | 733 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.30 | 1.33 | 1.31 |
| Intersection Summary | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | |
| | Queue shown is maximum after two cycles. | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | |
| | Queue shown is maximum after two cycles. | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | |

Queues
145: El Embarcadero (WB) & Grand Avenue

Cumulative AM
Kaiser Center Transportation Study

| Lane Group | NWL | NET | SWL | SWT |
|-------------------------|------|------|------|------|
| Lane Group Flow (vph) | 682 | 955 | 127 | 1254 |
| v/c Ratio | 0.91 | 1.05 | 0.49 | 0.78 |
| Control Delay | 34.6 | 68.0 | 31.4 | 18.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 34.6 | 68.0 | 31.4 | 18.9 |
| Queue Length 50th (ft) | 196 | ~189 | 44 | 198 |
| Queue Length 95th (ft) | 397 | #299 | #94 | #278 |
| Internal Link Dist (ft) | 513 | 307 | | 413 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 780 | 907 | 260 | 1607 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.87 | 1.05 | 0.49 | 0.78 |

| Intersection Summary | | | | |
|---|--|--|--|--|
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | |
| Queue shown is maximum after two cycles. | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| Queue shown is maximum after two cycles. | | | | |

AECOM

Synchro 7 - Report

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|-------|-------|-------|-------|------|
| Lane Group Flow (vph) | 2727 | 628 | 655 | 753 | 1141 |
| v/c Ratio | 1.64 | 0.91 | 2.00 | 1.30 | 0.56 |
| Control Delay | 315.1 | 47.8 | 475.0 | 175.3 | 13.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 315.1 | 47.8 | 475.0 | 175.3 | 13.5 |
| Queue Length 50th (ft) | 811 | 160 | ~567 | ~553 | 200 |
| Queue Length 95th (ft) | 904 | m173m | #477 | #770 | 257 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1665 | 688 | 328 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.64 | 0.91 | 2.00 | 1.30 | 0.56 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
|-------------------------|------|-------|-------|------|-------|------|
| Lane Group Flow (vph) | 449 | 1915 | 834 | 979 | 388 | 267 |
| v/c Ratio | 0.90 | 1.96 | 1.81 | 0.90 | 1.64 | 0.13 |
| Control Delay | 22.9 | 453.2 | 386.9 | 26.2 | 336.9 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 22.9 | 453.2 | 386.9 | 26.2 | 336.9 | 8.4 |
| Queue Length 50th (ft) | 193 | ~980 | ~775 | 238 | ~323 | 32 |
| Queue Length 95th (ft) | m86m | #478m | #309 | 314 | #497 | 50 |
| Internal Link Dist (ft) | | 1206 | | 1205 | | 1978 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 976 | 460 | 1328 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.90 | 1.96 | 1.81 | 0.74 | 1.64 | 0.13 |

| Intersection Summary | | | | | | |
|---|--|--|--|--|--|--|
| ~ Volume exceeds capacity, queue is theoretically infinite. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | | |

AECOM

Synchro 7 - Report

Queues
49: Santa Clara Avenue & Oakland Avenue

Cumulative PM
Kaiser Center Transportation Study

| Lane Group | NWT | NET |
|-------------------------|------|------|
| Lane Group Flow (vph) | 2431 | 1731 |
| v/c Ratio | 0.77 | 0.94 |
| Control Delay | 14.3 | 30.6 |
| Queue Delay | 0.6 | 32.0 |
| Total Delay | 14.9 | 62.5 |
| Queue Length 50th (ft) | 191 | 214 |
| Queue Length 95th (ft) | 237 | #319 |
| Internal Link Dist (ft) | 566 | 394 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 3147 | 1844 |
| Starvation Cap Reductn | 0 | 0 |
| Spillback Cap Reductn | 323 | 226 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 0.86 | 1.07 |

| Intersection Summary | |
|---|--|
| # 95th percentile volume exceeds capacity, queue may be longer. | |
| Queue shown is maximum after two cycles. | |

AECOM

Synchro 7 - Report

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| Lane Group | NWL | NWT | SWT |
|-------------------------|------|------|------|
| Lane Group Flow (vph) | 634 | 1969 | 1008 |
| v/c Ratio | 0.84 | 0.84 | 0.75 |
| Control Delay | 25.4 | 20.7 | 20.2 |
| Queue Delay | 31.7 | 49.8 | 0.0 |
| Total Delay | 57.1 | 70.5 | 20.2 |
| Queue Length 50th (ft) | 261 | 279 | 159 |
| Queue Length 95th (ft) | 383 | m334 | 225 |
| Internal Link Dist (ft) | | 236 | 402 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 758 | 2332 | 1343 |
| Starvation Cap Reductn | 155 | 553 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.05 | 1.11 | 0.75 |

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

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| Lane Group | NWL | NET | SWL | SWT |
|-------------------------|------|-------|------|------|
| Lane Group Flow (vph) | 397 | 2024 | 163 | 957 |
| v/c Ratio | 0.79 | 1.27 | 0.62 | 0.42 |
| Control Delay | 37.1 | 149.1 | 41.4 | 3.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 37.1 | 149.1 | 41.4 | 3.9 |
| Queue Length 50th (ft) | 179 | ~744 | 69 | 0 |
| Queue Length 95th (ft) | 249 | #1031 | m89 | m0 |
| Internal Link Dist (ft) | 560 | 322 | | 429 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 734 | 1598 | 311 | 2275 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.54 | 1.27 | 0.52 | 0.42 |






Intersection Summary






- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Existing plus Project (Phase I and Phase II) Conditions

| |  |  |  |  |  |
|-------------------------|--|--|--|--|--|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1402 | 621 | 200 | 301 | 1313 |
| v/c Ratio | 0.85 | 1.06 | 0.47 | 0.45 | 0.63 |
| Control Delay | 37.4 | 98.2 | 9.5 | 27.5 | 16.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 37.4 | 98.2 | 9.5 | 27.5 | 16.2 |
| Queue Length 50th (ft) | 295 | ~245 | 0 | 154 | 297 |
| Queue Length 95th (ft) | 353 | #359 | 63 | 234 | 368 |
| Internal Link Dist (ft) | 1105 | 413 | | | 511 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1720 | 584 | 428 | 676 | 2086 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.82 | 1.06 | 0.47 | 0.45 | 0.63 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| | Queue shown is maximum after two cycles. | | | | |

| |  |  |  |  |  |
|-------------------------|--|--|--|--|--|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1402 | 757 | 684 | 380 | 853 |
| v/c Ratio | 0.85 | 0.92 | 1.44 | 0.73 | 0.42 |
| Control Delay | 33.2 | 53.4 | 234.2 | 36.8 | 11.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.2 | 53.4 | 234.2 | 36.8 | 11.4 |
| Queue Length 50th (ft) | 248 | ~260 | ~505 | 183 | 133 |
| Queue Length 95th (ft) | 306 | #374 | #720 | 283 | 175 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1675 | 826 | 475 | 580 | 2049 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.84 | 0.92 | 1.44 | 0.66 | 0.42 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | |
| | Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | |
| | Queue shown is maximum after two cycles. | | | | |

Existing plus Project (Phase I and Phase II) Conditions Mitigated

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| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|------|------|------|------|------|
| Lane Group Flow (vph) | 1402 | 757 | 684 | 380 | 853 |
| v/c Ratio | 0.85 | 0.92 | 0.82 | 0.73 | 0.42 |
| Control Delay | 33.2 | 53.4 | 31.6 | 36.8 | 11.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.2 | 53.4 | 31.6 | 36.8 | 11.4 |
| Queue Length 50th (ft) | 248 | ~260 | 146 | 183 | 133 |
| Queue Length 95th (ft) | 306 | #374 | #265 | 283 | 175 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1675 | 826 | 837 | 580 | 2049 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.84 | 0.92 | 0.82 | 0.66 | 0.42 |

Intersection Summary

-

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

#

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Near-Term (2015) plus Project (Phase I) Conditions

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term + I AM
Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|-----------------------------|---|------|------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 1682 | 446 | 224 | 297 | 1367 |
| v/c Ratio | 1.12 | 0.76 | 0.50 | 0.46 | 0.67 |
| Control Delay | 51.3 | 51.9 | 9.5 | 28.3 | 17.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.3 | 51.9 | 9.5 | 28.3 | 17.6 |
| Queue Length 50th (ft) | 390 | 153 | 0 | 151 | 317 |
| Queue Length 95th (ft) | 502 | 210 | 65 | 230 | 393 |
| Internal Link Dist (ft) | 1105 | 413 | | 511 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1720 | 584 | 448 | 651 | 2037 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.98 | 0.76 | 0.50 | 0.46 | 0.67 |
| Intersection Summary | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |
| dl | Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | |

AECOM

Synchro 7 - Report

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term + I AM
Kaiser Center Transportation Study

| | EBL | EBT | EBR | NET | SWL | SWT |
|-----------------------------|---|------|------|------|------|------|
| Lane Group | | | | | | |
| Lane Group Flow (vph) | 247 | 681 | 299 | 558 | 412 | 484 |
| v/c Ratio | 0.54 | 0.77 | 0.61 | 0.50 | 0.87 | 0.22 |
| Control Delay | 25.2 | 28.5 | 14.4 | 31.8 | 56.7 | 9.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 25.2 | 28.5 | 14.4 | 31.8 | 56.7 | 9.1 |
| Queue Length 50th (ft) | 100 | 176 | 39 | 164 | 261 | 70 |
| Queue Length 95th (ft) | 131 | 212 | 79 | 230 | 401 | 100 |
| Internal Link Dist (ft) | | 774 | | 703 | 185 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 966 | 526 | 1106 | 526 | 2228 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.49 | 0.70 | 0.57 | 0.50 | 0.78 | 0.22 |
| Intersection Summary | | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues
145: El Embarcadero (WB) & Grand Avenue

Near-Term + I AM
Kaiser Center Transportation Study

| | NWL | NET | SWL | SWT |
|-----------------------------|---|------|------|------|
| Lane Group | | | | |
| Lane Group Flow (vph) | 604 | 849 | 121 | 1287 |
| v/c Ratio | 0.86 | 0.91 | 0.40 | 0.76 |
| Control Delay | 29.0 | 34.7 | 28.0 | 17.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.0 | 34.7 | 28.0 | 17.7 |
| Queue Length 50th (ft) | 165 | 130 | 41 | 199 |
| Queue Length 95th (ft) | 326 | 240 | 87 | 301 |
| Internal Link Dist (ft) | 513 | 307 | | 413 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 779 | 934 | 305 | 1702 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 0.91 | 0.40 | 0.76 |
| Intersection Summary | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | |

AECOM

Synchro 7 - Report







Queues
47: MacArthur Blvd (EB) & Grand Avenue





Near-Term + I PM
Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|-----------------------------|---|------|-------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 1916 | 589 | 647 | 516 | 1118 |
| v/c Ratio | 1.15 | 0.86 | 1.78 | 0.89 | 0.55 |
| Control Delay | 104.7 | 45.6 | 379.2 | 48.5 | 13.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 104.7 | 45.6 | 379.2 | 48.5 | 13.3 |
| Queue Length 50th (ft) | 459 | 147 | 515 | 275 | 194 |
| Queue Length 95th (ft) | 553 | 162 | 643 | 462 | 250 |
| Internal Link Dist (ft) | 1276 | 429 | | 958 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1665 | 688 | 363 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.15 | 0.86 | 1.78 | 0.89 | 0.55 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | |

AECOM

Synchro 7 - Report

| |  |  |  |  |  |  |
|-------------------------|--|--|--|--|--|--|
| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
| Lane Group Flow (vph) | 392 | 1425 | 620 | 971 | 371 | 256 |
| v/c Ratio | 0.78 | 1.46 | 1.34 | 0.90 | 1.57 | 0.12 |
| Control Delay | 20.6 | 231.4 | 174.8 | 25.8 | 306.7 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 20.6 | 231.4 | 174.8 | 25.8 | 306.7 | 8.4 |
| Queue Length 50th (ft) | 164 | ~643 | ~490 | 234 | ~302 | 31 |
| Queue Length 95th (ft) | 126 | ~487 | ~363 | 309 | ~473 | 48 |
| Internal Link Dist (ft) | 1206 | | 1205 | | 1978 | |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 974 | 464 | 1329 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 1.46 | 1.34 | 0.73 | 1.57 | 0.12 |
| Intersection Summary | | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |
| dr | Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | |

| |  |  |  |  |
|-------------------------|---|--|--|--|
| Lane Group | NWL | NET | SWL | SWT |
| Lane Group Flow (vph) | 381 | 2011 | 157 | 892 |
| v/c Ratio | 0.79 | 1.23 | 0.61 | 0.39 |
| Control Delay | 37.3 | 131.1 | 43.3 | 3.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 37.3 | 131.1 | 43.3 | 3.4 |
| Queue Length 50th (ft) | 171 | ~720 | 69 | 0 |
| Queue Length 95th (ft) | 241 | #1005 | m88 | m0 |
| Internal Link Dist (ft) | 560 | 322 | 429 | |
| Turn Bay Length (ft) | 100 | | | |
| Base Capacity (vph) | 734 | 1640 | 308 | 2310 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.52 | 1.23 | 0.51 | 0.39 |
| Intersection Summary | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles. | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | |

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|-----------------------------|---|------|------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 1682 | 446 | 226 | 297 | 1472 |
| v/c Ratio | 1.12 | 0.76 | 0.50 | 0.46 | 0.72 |
| Control Delay | 51.3 | 51.9 | 9.5 | 28.3 | 19.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.3 | 51.9 | 9.5 | 28.3 | 19.0 |
| Queue Length 50th (ft) | 390 | 153 | 0 | 151 | 359 |
| Queue Length 95th (ft) | 502 | 210 | 66 | 230 | 443 |
| Internal Link Dist (ft) | 1105 | 413 | | | 511 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1720 | 584 | 450 | 651 | 2037 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.98 | 0.76 | 0.50 | 0.46 | 0.72 |
| Intersection Summary | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |
| dl | Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | |

AECOM

Synchro 7 - Report

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| | EBL | EBT | EBR | NET | SWL | SWT |
|-----------------------------|---|------|------|------|------|------|
| Lane Group | | | | | | |
| Lane Group Flow (vph) | 247 | 683 | 299 | 560 | 412 | 484 |
| v/c Ratio | 0.54 | 0.77 | 0.61 | 0.51 | 0.87 | 0.22 |
| Control Delay | 25.2 | 28.5 | 14.4 | 31.8 | 56.7 | 9.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 25.2 | 28.5 | 14.4 | 31.8 | 56.7 | 9.1 |
| Queue Length 50th (ft) | 98 | 176 | 39 | 165 | 261 | 70 |
| Queue Length 95th (ft) | 131 | 214 | 78 | 231 | 401 | 100 |
| Internal Link Dist (ft) | | 774 | | 703 | | 185 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 966 | 526 | 1103 | 526 | 2226 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.49 | 0.71 | 0.57 | 0.51 | 0.78 | 0.22 |
| Intersection Summary | | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |

AECOM

Synchro 7 - Report

Queues
145: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

| | NWL | NET | SWL | SWT |
|-----------------------------|---|------|------|------|
| Lane Group | | | | |
| Lane Group Flow (vph) | 604 | 854 | 121 | 1392 |
| v/c Ratio | 0.86 | 0.91 | 0.40 | 0.82 |
| Control Delay | 29.0 | 35.4 | 28.0 | 20.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.0 | 35.4 | 28.0 | 20.1 |
| Queue Length 50th (ft) | 165 | 131 | 41 | 226 |
| Queue Length 95th (ft) | 326 | 242 | 87 | 374 |
| Internal Link Dist (ft) | 513 | 307 | | 413 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 779 | 934 | 305 | 1702 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 0.91 | 0.40 | 0.82 |
| Intersection Summary | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | |

AECOM

Synchro 7 - Report







Queues
47: MacArthur Blvd (EB) & Grand Avenue





Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|-----------------------------|---|------|-------|------|------|
| Lane Group | | | | | |
| Lane Group Flow (vph) | 1916 | 589 | 687 | 516 | 1142 |
| v/c Ratio | 1.15 | 0.86 | 1.89 | 0.89 | 0.56 |
| Control Delay | 104.7 | 45.8 | 427.7 | 48.5 | 13.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 104.7 | 45.8 | 427.7 | 48.5 | 13.5 |
| Queue Length 50th (ft) | 459 | 147 | 563 | 275 | 200 |
| Queue Length 95th (ft) | 553 | 157 | 745 | 462 | 258 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1665 | 688 | 363 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.15 | 0.86 | 1.89 | 0.89 | 0.56 |
| Intersection Summary | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles. | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | |

AECOM

Synchro 7 - Report

| |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
| Lane Group Flow (vph) | 392 | 1452 | 633 | 1015 | 371 | 256 |
| v/c Ratio | 0.78 | 1.49 | 1.36 | 0.96 | 1.57 | 0.12 |
| Control Delay | 20.7 | 242.5 | 187.3 | 26.7 | 306.7 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 20.7 | 242.5 | 187.3 | 26.7 | 306.7 | 8.4 |
| Queue Length 50th (ft) | 167 | ~661 | ~507 | 247 | ~302 | 31 |
| Queue Length 95th (ft) | 124 | m#488 | m#364 | 326 | #473 | 48 |
| Internal Link Dist (ft) | | 1206 | | 1205 | | 1978 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 976 | 464 | 1331 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 1.49 | 1.36 | 0.76 | 1.57 | 0.12 |
| Intersection Summary | | | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| | Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |
| dr | Defacto Right Lane. Recode with 1 though lane as a right lane. | | | | | |

| |  |  |  |  |
|-------------------------|---|---|---|---|
| Lane Group | NWL | NET | SWL | SWT |
| Lane Group Flow (vph) | 381 | 2095 | 157 | 916 |
| v/c Ratio | 0.79 | 1.28 | 0.61 | 0.40 |
| Control Delay | 37.3 | 152.4 | 43.8 | 3.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 37.3 | 152.4 | 43.8 | 3.3 |
| Queue Length 50th (ft) | 171 | ~773 | 70 | 0 |
| Queue Length 95th (ft) | 241 | #1057 | m89 | m0 |
| Internal Link Dist (ft) | 560 | 322 | | 429 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 734 | 1642 | 308 | 2310 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.52 | 1.28 | 0.51 | 0.40 |
| Intersection Summary | | | | |
| - | Volume exceeds capacity, queue is theoretically infinite. | | | |
| | Queue shown is maximum after two cycles. | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer. | | | |
| | Queue shown is maximum after two cycles. | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | |

Cumulative (2030) plus Project (Phase I and Phase II) Conditions

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|---|------|------|------|------|------|
| Lane Group Flow (vph) | 1756 | 500 | 282 | 352 | 1628 |
| v/c Ratio | 1.18 | 0.86 | 0.67 | 0.54 | 0.80 |
| Control Delay | 62.8 | 58.5 | 23.1 | 30.2 | 21.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.8 | 58.5 | 23.1 | 30.2 | 21.5 |
| Queue Length 50th (ft) | 448 | 175 | 57 | 186 | 430 |
| Queue Length 95th (ft) | 543 | #261 | 150 | 278 | 530 |
| Internal Link Dist (ft) | 1105 | 413 | | | 511 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1713 | 584 | 419 | 651 | 2037 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.03 | 0.86 | 0.67 | 0.54 | 0.80 |
| Intersection Summary | | | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | |

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
|---|------|------|------|------|------|------|
| Lane Group Flow (vph) | 267 | 736 | 323 | 645 | 431 | 506 |
| v/c Ratio | 0.57 | 0.81 | 0.63 | 0.61 | 0.89 | 0.23 |
| Control Delay | 26.3 | 30.5 | 14.9 | 34.8 | 58.1 | 9.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.3 | 30.5 | 14.9 | 34.8 | 58.1 | 9.4 |
| Queue Length 50th (ft) | 120 | 212 | 34 | 206 | 271 | 77 |
| Queue Length 95th (ft) | 156 | m250 | m98 | 271 | #431 | 104 |
| Internal Link Dist (ft) | | 774 | | 703 | | 185 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 964 | 537 | 1059 | 526 | 2205 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.76 | 0.60 | 0.61 | 0.82 | 0.23 |
| Intersection Summary | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | | |

Queues
49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | NWT | NET |
|---|-------|------|
| Lane Group Flow (vph) | 3426 | 1060 |
| v/c Ratio | 1.13 | 0.50 |
| Control Delay | 86.1 | 18.9 |
| Queue Delay | 144.0 | 0.3 |
| Total Delay | 230.1 | 19.2 |
| Queue Length 50th (ft) | 588 | 180 |
| Queue Length 95th (ft) | 663 | m205 |
| Internal Link Dist (ft) | 378 | 334 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 3030 | 2105 |
| Starvation Cap Reductn | 0 | 0 |
| Spillback Cap Reductn | 671 | 448 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 1.45 | 0.64 |
| Intersection Summary | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | |
| Queue shown is maximum after two cycles. | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | |
| Queue shown is maximum after two cycles. | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | |

Queues
50: MacArthur Blvd (WB) & Harrison Street

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | NWL | NWT | SWT |
|---|-------|-------|-------|
| Lane Group Flow (vph) | 900 | 2798 | 1547 |
| v/c Ratio | 1.03 | 1.02 | 1.35 |
| Control Delay | 42.3 | 37.1 | 188.5 |
| Queue Delay | 143.4 | 163.3 | 0.0 |
| Total Delay | 185.7 | 200.5 | 188.5 |
| Queue Length 50th (ft) | 416 | -430 | -545 |
| Queue Length 95th (ft) | 373 | m379 | #680 |
| Internal Link Dist (ft) | | 191 | 1680 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 876 | 2731 | 1148 |
| Starvation Cap Reductn | 217 | 729 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.37 | 1.40 | 1.35 |
| Intersection Summary | | | |
| - Volume exceeds capacity, queue is theoretically infinite. | | | |
| Queue shown is maximum after two cycles. | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

Queues
145: El Embarcadero (WB) & Grand Avenue

Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

| Lane Group | NWL | NET | SWL | SWT |
|-------------------------|------|------|------|------|
| Lane Group Flow (vph) | 682 | 959 | 127 | 1487 |
| v/c Ratio | 0.91 | 1.06 | 0.49 | 0.93 |
| Control Delay | 34.6 | 69.1 | 31.4 | 28.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 34.6 | 69.1 | 31.4 | 28.6 |
| Queue Length 50th (ft) | 196 | ~191 | 44 | 262 |
| Queue Length 95th (ft) | 397 | #301 | #94 | #415 |
| Internal Link Dist (ft) | 513 | 307 | | 413 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 780 | 908 | 260 | 1607 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.87 | 1.06 | 0.49 | 0.93 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|-------|-------|-------|-------|------|
| Lane Group Flow (vph) | 2727 | 628 | 726 | 753 | 1189 |
| v/c Ratio | 1.64 | 0.91 | 2.21 | 1.30 | 0.59 |
| Control Delay | 315.1 | 48.2 | 570.3 | 175.3 | 13.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 315.1 | 48.2 | 570.3 | 175.3 | 13.9 |
| Queue Length 50th (ft) | 811 | 159 | ~653 | ~553 | 212 |
| Queue Length 95th (ft) | 904 | m163m | #508 | #770 | 273 |
| Internal Link Dist (ft) | 1276 | 429 | | | 958 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 1665 | 688 | 328 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.64 | 0.91 | 2.21 | 1.30 | 0.59 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
|-------------------------|------|-------|-------|------|-------|------|
| Lane Group Flow (vph) | 449 | 1968 | 852 | 1052 | 388 | 267 |
| v/c Ratio | 0.90 | 2.01 | 1.86 | 0.99 | 1.64 | 0.13 |
| Control Delay | 23.0 | 475.6 | 406.2 | 27.9 | 336.9 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 23.0 | 475.6 | 406.2 | 27.9 | 336.9 | 8.4 |
| Queue Length 50th (ft) | 197 | ~1018 | ~801 | 262 | ~323 | 32 |
| Queue Length 95th (ft) | m86m | #484m | #320 | 344 | #497 | 50 |
| Internal Link Dist (ft) | | 1206 | | 1205 | | 1978 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 978 | 459 | 1330 | 236 | 2084 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.90 | 2.01 | 1.86 | 0.79 | 1.64 | 0.13 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Queues
49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) PM
Kaiser Center Transportation Study

| Lane Group | NWT | NET |
|-------------------------|------|------|
| Lane Group Flow (vph) | 2458 | 1808 |
| v/c Ratio | 0.78 | 0.98 |
| Control Delay | 14.5 | 37.5 |
| Queue Delay | 0.9 | 48.1 |
| Total Delay | 15.4 | 85.6 |
| Queue Length 50th (ft) | 194 | 230 |
| Queue Length 95th (ft) | 241 | #342 |
| Internal Link Dist (ft) | 566 | 394 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 3150 | 1844 |
| Starvation Cap Reductn | 0 | 0 |
| Spillback Cap Reductn | 386 | 226 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 0.89 | 1.12 |

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

| Lane Group | NWL | NWT | SWT |
|-------------------------|------|------|------|
| Lane Group Flow (vph) | 637 | 1993 | 1016 |
| v/c Ratio | 0.84 | 0.85 | 0.76 |
| Control Delay | 25.7 | 21.1 | 20.4 |
| Queue Delay | 35.2 | 56.9 | 0.0 |
| Total Delay | 60.9 | 77.9 | 20.4 |
| Queue Length 50th (ft) | 266 | 286 | 161 |
| Queue Length 95th (ft) | 376 | m337 | 227 |
| Internal Link Dist (ft) | | 236 | 402 |
| Turn Bay Length (ft) | | | |
| Base Capacity (vph) | 757 | 2331 | 1343 |
| Starvation Cap Reductn | 157 | 557 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.06 | 1.12 | 0.76 |

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

| Lane Group | NWL | NET | SWL | SWT |
|-------------------------|------|-------|------|------|
| Lane Group Flow (vph) | 397 | 2168 | 163 | 1005 |
| v/c Ratio | 0.79 | 1.36 | 0.62 | 0.44 |
| Control Delay | 37.1 | 187.3 | 42.3 | 3.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 37.1 | 187.3 | 42.3 | 3.9 |
| Queue Length 50th (ft) | 179 | -834 | 70 | 0 |
| Queue Length 95th (ft) | 249 | m1121 | m92 | m0 |
| Internal Link Dist (ft) | 560 | 322 | | 429 |
| Turn Bay Length (ft) | | | 100 | |
| Base Capacity (vph) | 734 | 1600 | 311 | 2275 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.54 | 1.36 | 0.52 | 0.44 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Cumulative (2030) plus Project (Phase I and Phase II) Conditions Mitigated

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) AM MIT
Kaiser Center Transportation Study

| | SEL | NET | NER | SWL | SWT |
|-----------------------------|---|------|------|------|------|
| Lane Group | SEL | NET | NER | SWL | SWT |
| Lane Group Flow (vph) | 1756 | 500 | 282 | 352 | 1628 |
| v/c Ratio | 1.20 | 0.86 | 0.41 | 0.53 | 0.79 |
| Control Delay | 35.0 | 58.5 | 6.6 | 29.8 | 21.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 35.0 | 58.5 | 6.6 | 29.8 | 21.0 |
| Queue Length 50th (ft) | 289 | 175 | 0 | 186 | 430 |
| Queue Length 95th (ft) | 334 | #261 | 39 | 278 | 530 |
| Internal Link Dist (ft) | 1105 | 413 | | | 511 |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 2207 | 584 | 696 | 661 | 2057 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.80 | 0.86 | 0.41 | 0.53 | 0.79 |
| Intersection Summary | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |
| dl | Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | |

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) AM MIT
Kaiser Center Transportation Study

| | EBL | EBT | EBR | NET | SWL | SWT |
|-----------------------------|---|------|------|------|------|------|
| Lane Group | EBL | EBT | EBR | NET | SWL | SWT |
| Lane Group Flow (vph) | 267 | 736 | 323 | 645 | 431 | 506 |
| v/c Ratio | 0.57 | 0.81 | 0.63 | 0.61 | 0.89 | 0.23 |
| Control Delay | 27.9 | 33.4 | 16.6 | 34.8 | 58.1 | 9.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 27.9 | 33.4 | 16.6 | 34.8 | 58.1 | 9.4 |
| Queue Length 50th (ft) | 126 | 245 | 47 | 206 | 271 | 77 |
| Queue Length 95th (ft) | 191 | 323 | 143 | 271 | #431 | 104 |
| Internal Link Dist (ft) | | 774 | | 703 | | 185 |
| Turn Bay Length (ft) | | | | | | |
| Base Capacity (vph) | 501 | 964 | 537 | 1059 | 526 | 2205 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.76 | 0.60 | 0.61 | 0.82 | 0.23 |
| Intersection Summary | | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | | |
| m | Volume for 95th percentile queue is metered by upstream signal. | | | | | |

Queues
49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) AM MIT
Kaiser Center Transportation Study

| | NWT | NET |
|-----------------------------|---|------|
| Lane Group | NWT | NET |
| Lane Group Flow (vph) | 3426 | 1060 |
| v/c Ratio | 0.98 | 0.91 |
| Control Delay | 29.0 | 20.3 |
| Queue Delay | 58.6 | 1.4 |
| Total Delay | 87.6 | 21.8 |
| Queue Length 50th (ft) | 447 | 184 |
| Queue Length 95th (ft) | #586 | m209 |
| Internal Link Dist (ft) | 378 | 334 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 3508 | 1734 |
| Starvation Cap Reductn | 0 | 0 |
| Spillback Cap Reductn | 495 | 448 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 1.14 | 0.82 |
| Intersection Summary | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | |
| m | Volume for 95th percentile queue is metered by upstream signal. | |
| dl | Defacto Left Lane. Recode with 1 though lane as a left lane. | |

Queues
51: Oakland Avenue & Monte Vista Avenue

Cumulative plus Project (I+II) AM MIT
Kaiser Center Transportation Study

| | EBL | EBT | WBT | NBT | SBT |
|-----------------------------|---|------|------|------|------|
| Lane Group | EBL | EBT | WBT | NBT | SBT |
| Lane Group Flow (vph) | 109 | 295 | 651 | 34 | 66 |
| v/c Ratio | 0.47 | 0.40 | 0.88 | 0.05 | 0.10 |
| Control Delay | 17.2 | 10.4 | 29.2 | 6.2 | 6.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 17.2 | 10.4 | 29.2 | 6.2 | 6.4 |
| Queue Length 50th (ft) | 17 | 43 | 125 | 3 | 6 |
| Queue Length 95th (ft) | #58 | 86 | #292 | 13 | 21 |
| Internal Link Dist (ft) | | 613 | 231 | 516 | 579 |
| Turn Bay Length (ft) | 50 | | | | |
| Base Capacity (vph) | 233 | 744 | 739 | 665 | 666 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.40 | 0.88 | 0.05 | 0.10 |
| Intersection Summary | | | | | |
| # | 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles. | | | | |

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Cumulative plus Project (I+II) PM MIT
Kaiser Center Transportation Study

| Lane Group | SEL | NET | NER | SWL | SWT |
|-------------------------|-------|------|-------|-------|------|
| Lane Group Flow (vph) | 2727 | 628 | 726 | 753 | 1189 |
| v/c Ratio | 1.27 | 0.91 | 1.26 | 1.30 | 0.59 |
| Control Delay | 153.1 | 53.6 | 157.6 | 175.3 | 13.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 153.1 | 53.6 | 157.6 | 175.3 | 13.9 |
| Queue Length 50th (ft) | 545 | 155 | 276 | 553 | 212 |
| Queue Length 95th (ft) | 617 | 218 | 330 | 770 | 273 |
| Internal Link Dist (ft) | 1276 | 429 | | 958 | |
| Turn Bay Length (ft) | | | 200 | 150 | |
| Base Capacity (vph) | 2150 | 688 | 577 | 580 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.27 | 0.91 | 1.26 | 1.30 | 0.59 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | |

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Cumulative plus Project (I+II) PM MIT
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | EBR | NET | NER | SWL | SWT |
|-------------------------|------|-------|-------|------|------|------|------|
| Lane Group Flow (vph) | 449 | 1968 | 852 | 380 | 672 | 388 | 267 |
| v/c Ratio | 0.64 | 1.44 | 1.34 | 0.78 | 0.89 | 1.27 | 0.31 |
| Control Delay | 14.3 | 222.4 | 175.3 | 44.4 | 47.0 | 43.0 | 16.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 14.3 | 222.4 | 175.3 | 44.4 | 47.0 | 43.0 | 16.2 |
| Queue Length 50th (ft) | 158 | 915 | 707 | 203 | 201 | 107 | 91 |
| Queue Length 95th (ft) | 102 | 613 | 457 | 355 | 328 | 154 | 145 |
| Internal Link Dist (ft) | 1206 | | 1205 | | | 1978 | |
| Turn Bay Length (ft) | | | | 75 | | | |
| Base Capacity (vph) | 698 | 1362 | 636 | 487 | 755 | 610 | 869 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 1.44 | 1.34 | 0.78 | 0.89 | 0.64 | 0.31 |

| Intersection Summary | | | | | | | |
|---|--|--|--|--|--|--|--|
| - Volume exceeds capacity, queue is theoretically infinite. | | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | | | |
| Queue shown is maximum after two cycles. | | | | | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | | | | | |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | | | | | | | |

Queues
49: Santa Clara Avenue & Oakland Avenue

Cumulative plus Project (I+II) PM MIT
Kaiser Center Transportation Study

| Lane Group | NWT | NET |
|-------------------------|------|------|
| Lane Group Flow (vph) | 2458 | 1808 |
| v/c Ratio | 0.78 | 0.98 |
| Control Delay | 14.5 | 37.5 |
| Queue Delay | 0.9 | 48.1 |
| Total Delay | 15.4 | 85.6 |
| Queue Length 50th (ft) | 194 | 230 |
| Queue Length 95th (ft) | 241 | 342 |
| Internal Link Dist (ft) | 566 | 394 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 3150 | 1844 |
| Starvation Cap Reductn | 0 | 0 |
| Spillback Cap Reductn | 386 | 226 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 0.89 | 1.12 |

| Intersection Summary | | |
|---|--|--|
| # 95th percentile volume exceeds capacity, queue may be longer. | | |
| Queue shown is maximum after two cycles. | | |

Queues
51: Oakland Avenue & Monte Vista Avenue

Cumulative plus Project (I+II) PM MIT
Kaiser Center Transportation Study

| Lane Group | EBL | EBT | WBT | NBT | SBT |
|-------------------------|------|------|------|------|------|
| Lane Group Flow (vph) | 297 | 726 | 368 | 92 | 211 |
| v/c Ratio | 0.60 | 0.82 | 0.46 | 0.17 | 0.40 |
| Control Delay | 14.7 | 20.1 | 9.1 | 7.4 | 10.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 14.7 | 20.1 | 9.1 | 7.4 | 10.8 |
| Queue Length 50th (ft) | 43 | 124 | 47 | 8 | 26 |
| Queue Length 95th (ft) | 112 | 299 | 94 | 29 | 65 |
| Internal Link Dist (ft) | 614 | 268 | 355 | 512 | |
| Turn Bay Length (ft) | 50 | | | | |
| Base Capacity (vph) | 491 | 884 | 803 | 549 | 526 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.60 | 0.82 | 0.46 | 0.17 | 0.40 |

| Intersection Summary | | | | | |
|---|--|--|--|--|--|
| # 95th percentile volume exceeds capacity, queue may be longer. | | | | | |
| Queue shown is maximum after two cycles. | | | | | |

APPENDIX G.12

Harrison Street-Oakland Avenue Study

Harrison-Oakland Avenue Community-Based Transportation Plan (CBTP) Study Comparison

The Harrison-Oakland Avenue Community-Based Transportation Plan (CBTP) Study is a planning effort that proposes a series of multi-modal improvements (bulbouts, sidewalks, improved crossings), bicycle improvements, transit improvements (bus bulbouts, bus stop relocations), as well as possible roadway closures and road diets. . However, the Harrison-Oakland Avenue Study was not included in the DEIR's assumptions of planned transportation network changes. The Harrison-Oakland couplet has not undergone environmental review, has not been approved by the City, is not a funded project, and did not have final designs at the time of preparation of the DEIR. Consistent with City practice, this study was therefore not assumed as part of the planned transportation network changes and was not assumed in the analysis.

However, the City has examined the potential effects of the Kaiser Center Office Project on a street network that would include the Harrison-Oakland couplet scheme. Those results and conclusions are as follows:

The DEIR evaluated seven intersections that were also evaluated in the CBTP Study. These intersections include¹:

1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (*unsignalized*) (CBTP Study #4)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (CBTP Study #5)
3. Harrison Street / 27th Street / 24th Street / Bay Place (CBTP Study #10)
12. Harrison Street / Grand Avenue (within Downtown Oakland) (CBTP Study #11)
49. Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp (CBTP Study #3)
50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (CBTP Study #2)
51. Oakland Avenue / Monte Vista Avenue / Vernon Street (*unsignalized*) (CBTP Study #1)

The findings from this DEIR and the CBTP Study are summarized below and in Table 1.

Reasons for Different Findings

There are several reasons that the two studies would have different results:

- This DEIR analyzes future forecasted conditions based on ACCMA Model year 2030. The CBTP Study analyzed future forecasted conditions based on ACCMA Model year 2035.
- The Harrison-Oakland Avenue Study has assumed fundamental shifts in traffic patterns by converting one-directional traffic flow on Harrison Street and Oakland Avenue to two-way traffic flow north of I-580 and reduced travel lane capacity on these streets south of I-580.

¹ Numbers shown (e.g., 1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp) identify the location of the intersection on Figure IV.L-2 in Chapter IV.L, Transportation and Circulation, in this DEIR. Numbers of the corresponding intersections in the CBTP Study are shown in parentheses. All intersection on located in Downtown Oakland unless otherwise noted.

- The two studies collected existing traffic data at different times. The existing traffic data is used as the basis for developing the 2030 traffic forecasts. So, using different existing traffic assumptions will result in different forecasts.
- The signal timing parameters between the two studies were different in the 2030 and 2035 scenarios. This EIR analysis held existing signal timing unchanged under future scenarios (as is proper), whereas the Harrison-Oakland corridor study optimized the timing for their future scenarios. The technical analyst doing the intersection analyses must make determinations regarding several signal timing parameters such as green time allocation to each traffic movement. These parameters are different between the two studies but both are within standard engineering practice.

However, even with these differences the intersection analysis results are similar, indicating that conclusions drawn from the CBTP Study would also be applicable to this DEIR analysis.

Summary of Findings

#1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (*unsignalized*) (CBTP Intersection #4)

The CBTP Study recommended changes at this intersection to include realigning the off-I-580 Off-Ramp as a “hard” right-turn onto Harrison Street, signalization, and addition of a travel lane along the off-ramp. Southbound Harrison Street would be modified from three travel lanes to two travel lanes and a bike lane, with a new crosswalk across the north leg of the intersection. The Stanley Place approach at the intersection would be closed off, with bollards providing fire truck access in case of emergency.

This DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would not adversely impact this intersection. Although the side-street service level at this unsignalized intersection would operate at LOS F during the AM peak hour, the intersection would not satisfy the California MUTCD peak-hour signal warrant. As a result, no mitigation measures were explored for this intersection.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study assumes major changes which would substantially improve the operations of this intersection, including the following items:

- **Signalization of the intersection.** Signalizing the intersection would provide a dedicated gap in southbound Harrison Street traffic, improving off-ramp serviceability.
- **Additional off-ramp lane.** The additional off-ramp lane would increase vehicle storage capacity and off-ramp serviceability.
- **Stanley Place closure.** The closure of Stanley Place would eliminate conflicts with off-ramp traffic,

As a result, the LOS presented in the CBTP is substantially better than for the DEIR, as shown in **Table 1**.

#2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (CBTP Study Intersection #5)

The CBTP Study recommended changes at this intersection to include reducing the one-directional northbound travel lanes on Oakland Avenue from three lanes to two lanes by converting a current through lane to a right-turn only lane. Other recommended improvements include construction of a new pedestrian staircase connecting Harrison Street to Oakland Avenue and a new pedestrian refuge island on Perry Place. The Study also recommended increasing the signal cycle length at this intersection from 80 seconds to 120 seconds, which would improve the delay time in the PM.

Impact TRANS-7a in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would adversely impact this intersection. Recommended mitigation measures include optimizing the signal timing for the PM peak hour, and coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group. However, improvements considered would have adverse effects on pedestrian and bicyclist safety, remove existing bicycle lanes, or are precluded by physical constraints, and therefore, the DEIR concluded that there are no feasible mitigation measures to completely mitigate the Project's impacts and the Project impacts at this intersection are significant and unavoidable.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study assumes signal optimization and a longer cycle length (100 seconds compared to 90 seconds), which generally improves intersection operations when all other variables such as traffic volumes and lane geometry are held constant.

#3. Harrison Street / 27th Street / 24th Street / Bay Place (CBTP Study Intersection #10)

The CBTP Study recommended removal of the existing channelized right-turn lane at the northeast corner of the intersection and closure of the 24th Street leg (access only provided via right-turns from 27th Street). The additional space freed up by these modifications would be converted to pedestrian plaza and street landscaping.

Impact TRANS-7b in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would adversely impact this intersection. Recommended mitigation measures include optimizing the signal timing for the PM peak hour, coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group, and prohibiting westbound left turns during the AM and PM peak hours.

After implementation of the mitigation measures, this intersection would operate at an acceptable LOS D in the AM peak hour. In the PM peak hour, this intersection would operate at an unacceptable LOS E, but the average delay for the overall intersection and for critical movements would be reduced to a level that would mitigate the Project's impacts at this intersection in 2030.

Although the changes proposed under the CBTP Study would generally improve pedestrian conditions at this intersection, they would generally not improve traffic operations, as removal of the channelized right-turn from southbound Harrison Street to westbound 27th Street and closure of the 24th Street leg would restrict available vehicle movements at the intersection and increase delay. An additional reason for the difference in LOS presented in this DEIR is the proposed mitigation measure of prohibition of westbound left turns

during the AM and PM peak hours—without mitigation, this DEIR indicates the intersection would operate similar to the CBTP Study (LOS F with over 120 seconds of intersection average delay).

#12. Harrison Street / Grand Avenue (CBTP Study Intersection #11)

The CBTP Study recommended only minor changes at this intersection, including addition of a bulbout on the northeast corner of the intersection and relocation of the nearside bus stop on the west side of Harrison Street to a farside location.

Impact TRANS-7d in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would increase the average intersection delay by more than two seconds during AM peak hour, which currently operates at LOS F under cumulative conditions without the Project. During the PM peak hour, the intersection would operate at LOS F under cumulative conditions without the Project, and the addition of Project-generated traffic would increase the v/c ratio by more than three percent.

Recommended mitigation measures include optimizing the signal timing for the PM peak hour, coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group, and prohibiting southbound left turns during the AM peak hours (this movement is already prohibited in the PM peak period) with extinguishable message signs installed on the northbound and southbound approaches to enforce this prohibition.

After implementation of the mitigation measures, the intersection would operate at LOS E during the AM peak hour and LOS F during the PM peak hour. As a result, the impact would still remain significant because these measures alone would not be sufficient to completely mitigate the Project's impacts in 2030.

The difference in LOS and delay between the DEIR and the CBTP Study is primarily due to different volumes as a result of the use of different ACCMA travel demand models. In particular, there are substantial differences in baseline volumes on the northbound left-turn, eastbound right-turn, and westbound left-turn and through movements which stem from the use of different versions of the ACCMA model.

#49. Oakland Avenue/West MacArthur Boulevard/Santa Clara Avenue (CBTP Study Intersection #3)

The CBTP Study recommended changes at this intersection to include converting Oakland Avenue north of the West MacArthur Boulevard - Santa Clara Avenue intersection from one-way northbound to two-way travel. The two-way conversion requires a median on Oakland Avenue north of the intersection to facilitate the 1-way to 2-way conversion, widening of Oakland Avenue under the I-580 overpass to accommodate the 2-way conversion and bicycle lanes, and improved sidewalks. The Study also recommends a split-phase intersection signal to direct the new traffic movements. These modifications would degrade intersection operations to LOS D during both peak hours in 2035.

Impact TRANS-7k in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would adversely impact in the PM peak hour because the maximum increase in v/c ratio would exceed the three percent threshold of significance. Recommended mitigation measures include optimizing the signal timing for the PM peak hour, coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group, and restriping the northeast Oakland Avenue approach from the current configuration of one shared through-left lane and two through lanes to one exclusive left-turn lane, one shared through-left lane, and one through lane.

After implementation of the mitigation measures, in the AM peak hour, this intersection would operate at an unacceptable LOS E, but the average delay for the overall intersection and for critical movements would be reduced to a level that would mitigate the Project's impacts at this intersection in 2030. During the PM peak hour, the intersection would operate at LOS D after implementation of the mitigation measure.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study proposed substantial changes for this intersection, including conversion to two-way traffic along Oakland Avenue and fundamental shifts in traffic patterns to accommodate these changes in the roadway network. In particular, there would only be one northbound through lane along Oakland Avenue, and two new southbound right-turn lanes at this intersection. As a result, although the PM peak hour LOS results in the CBTP Study are similar to those presented in this DEIR, there are differences in AM peak hour LOS results.

#50. Harrison Street/ MacArthur Boulevard (Westbound) /Santa Clara Avenue (CBTP Study Intersection #2)

The CBTP Study recommended changes at this intersection to include converting Harrison Street north of the West MacArthur Boulevard - Santa Clara Avenue intersection from one-way southbound to two-way travel. The two-way conversion allows for a center median island with a pedestrian refuge at the Santa Clara intersection. The Study also recommended increasing the signal cycle length at this intersection to 100 seconds, which would improve the LOS in the AM from LOS E to LOS D. The CBTP Study concluded that in 2035 the intersection could operate at an acceptable LOS C during the PM peak hour,

Impact TRANS-7l in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would increase the average intersection delay by more than two seconds during AM peak hour, which currently operates at LOS F under cumulative conditions without the Project.

After implementation of the mitigation measures, the intersection would continue to operate at LOS F during the AM peak hour. As a result, the impact would still remain significant because these measures alone would not be sufficient to completely mitigate the Project's impacts in 2030.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study proposed substantial changes for this intersection, including conversion to two-way traffic along Oakland Avenue and fundamental shifts in traffic patterns to accommodate these changes in the roadway network. In particular, there would be a new northbound travel lane along Harrison Street north of the intersection. As a result, although the PM peak hour LOS results in the CBTP Study are similar to those presented in this DEIR, there are some differences in AM peak hour LOS results.

#51. Oakland Avenue / Monte Vista Avenue (unsignalized) (CBTP Study Intersection #1)

The CBTP Study recommended changes at this intersection to including conversion of the westbound Oakland Avenue approach from a single all-movement lane to one exclusive left-turn lane, one exclusive through-lane, and one exclusive right-turn lane, which would result in LOS C during the AM peak hour and LOS F during the PM peak hour.

This DEIR identifies that the intersection would operate at LOS D during the AM peak hour and LOS F during the PM peak hour under cumulative conditions in 2030 with the Project. However, because the intersection would already meet peak hour traffic signal warrants under baseline conditions without the Project, the Project would not result in an impact at this intersection.

The difference in LOS between the CBTP Study and this DEIR is primarily a result of changes proposed by the CBTP Study to the westbound Oakland Avenue approach at this intersection. The DEIR assumes that the existing configuration of only one lane would remain in 2030, restricting the serviceability of this approach, but the CBTP Study stripes additional lanes on the approach, improving serviceability and reducing overall intersection average delay.

TABLE 1

**PROPOSED PROJECT YEAR 2030 (WITH MITIGATION) AND HARRISON/OAKLAND CORRIDOR
YEAR 2035 (WITH IMPROVEMENTS) LOS COMPARISON**

| Intersection | Traffic Control | Peak Hour | Kaiser Center Cumulative LOS (2030) | | Harrison/Oakland Cumulative LOS (2035) | |
|--|-----------------|-----------|-------------------------------------|------------------|--|------------------|
| | | | Delay(s) ¹ | LOS ¹ | Delay(s) ¹ | LOS ¹ |
| 1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp | TWSC | AM | >120 | F | 20 | C |
| | | PM | 22 | C | 10 | B |
| 2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps | Signal | AM | 84 | F | 32 | C |
| | | PM | >120 | F | 138 | F |
| 3. Harrison Street / 27th Street / 24th Street / Bay Place | Signal | AM | 54 | D | 137 | F |
| | | PM | 66 | E | 248 | F |
| 12. Harrison Street / Grand Avenue | Signal | AM | 80 | E | 46 | D |
| | | PM | >120 | F | 95 | F |
| 49. Oakland Avenue/ MacArthur Boulevard (WB) /Santa Clara Avenue | Signal | AM | 70 | E | 49 | D |
| | | PM | 36 | D | 37 | D |
| 50. Harrison Street/ MacArthur Boulevard/Santa Clara Avenue | Signal | AM | 99 | F | 44 | D |
| | | PM | 22 | C | 22 | C |
| 51. Oakland Avenue / Monte Vista Avenue | AWSC | AM | 29 | D | 19 | C |
| | | PM | 89 | F | 85 | F |

NOTES:

¹ LOS assuming optimized signal timing.

² The Harrison/Oakland Study assumed that the right turn movement onto Perry Place was a slow speed right turn.

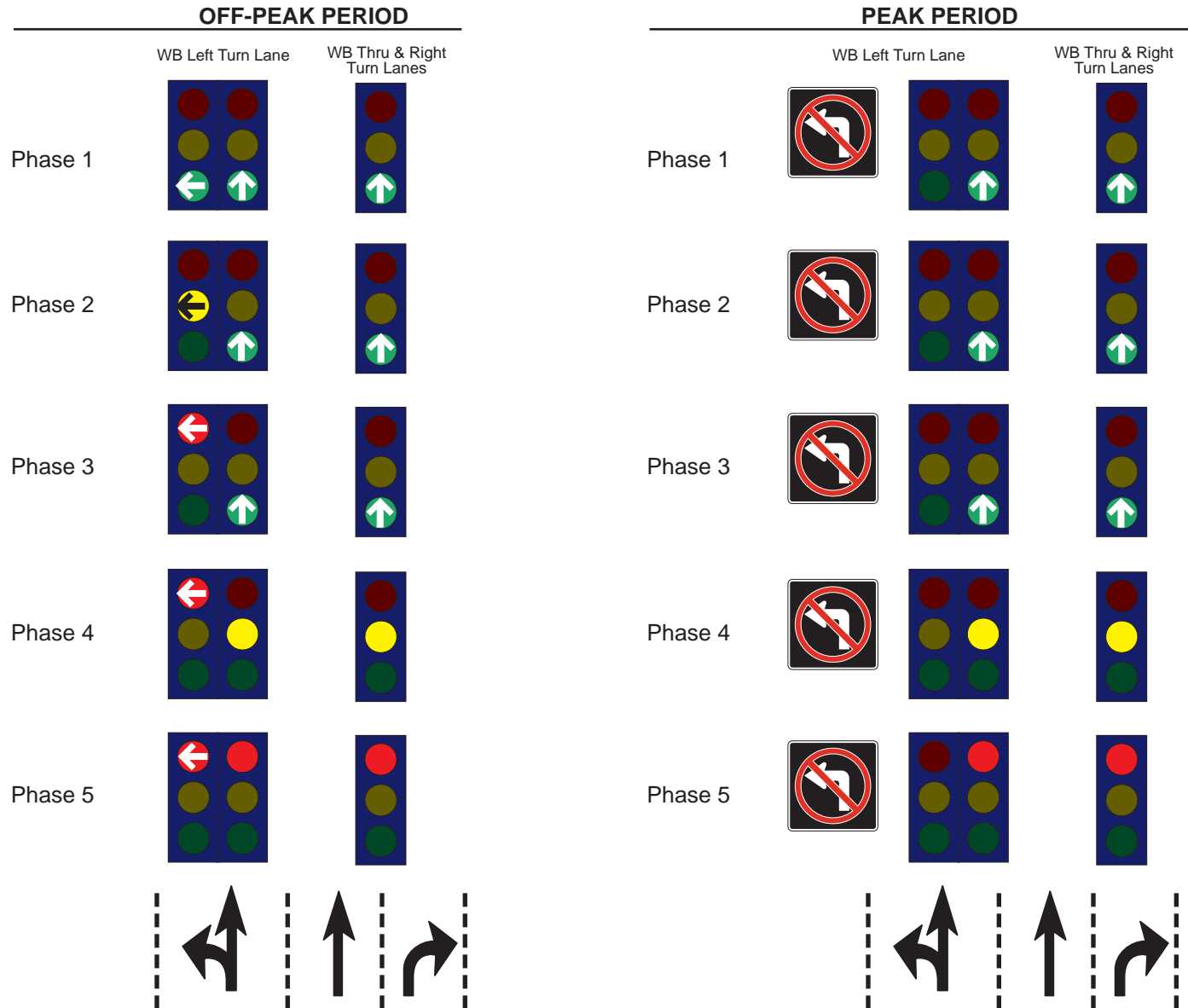
SOURCES: Dowling Associates, Harrison Street/Oakland Avenue Corridor CBTP (P08-090) Concept Plan Analysis Memorandum, September 2009;; Design, Community and Environment, Harrison Street/Oakland Avenue Corridor CTP, February 2010; AECOM, 2010.

Conclusion

In conclusion, while the two studies utilized different model years and have different intersection analysis results, traffic generated by the proposed project would not substantially change the characterization of traffic operations in Year 2030 as presented in this DEIR, or in Year 2035 as presented in the CBTP Study. Furthermore, this project is not responsible for implementing any of the Harrison/Oakland Avenue Study improvements for the reasons stated above.

APPENDIX G.13

Proposed Westbound Signal Phase Sequence for Intersection #3 (Harrison Street / 27th Street / 24th Street)



APPENDIX H

Phase 1 (South Tower Only) Transportation Analysis

Phase 1 (South Tower) Only Analysis

The Phase 1 (South Tower) Only analysis in this appendix has been prepared to analyze the potential environmental transportation impacts that would occur if only Phase 1 of the Proposed Project was developed.

Existing plus South Tower Conditions

Intersection Impacts

Impact TRANS-12: Phase I of the proposed Project, when added to existing traffic levels, would worsen level of service at area intersections. (Significant at intersections described below under Impacts TRANS-12a through TRANS-12d)

Existing plus South Tower Conditions traffic volumes are illustrated in **Figure 1a** through **Figure 1d**. **Table 1** summarizes the peak-hour LOS at the 51 study intersections under Existing plus Phase South Tower Conditions.

Average delay at some intersections would decrease under Existing plus South Tower Conditions due to greater growth on movements that are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in **Table 1**, the following intersections would operate at unacceptable conditions under Existing plus South Tower Conditions:

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)

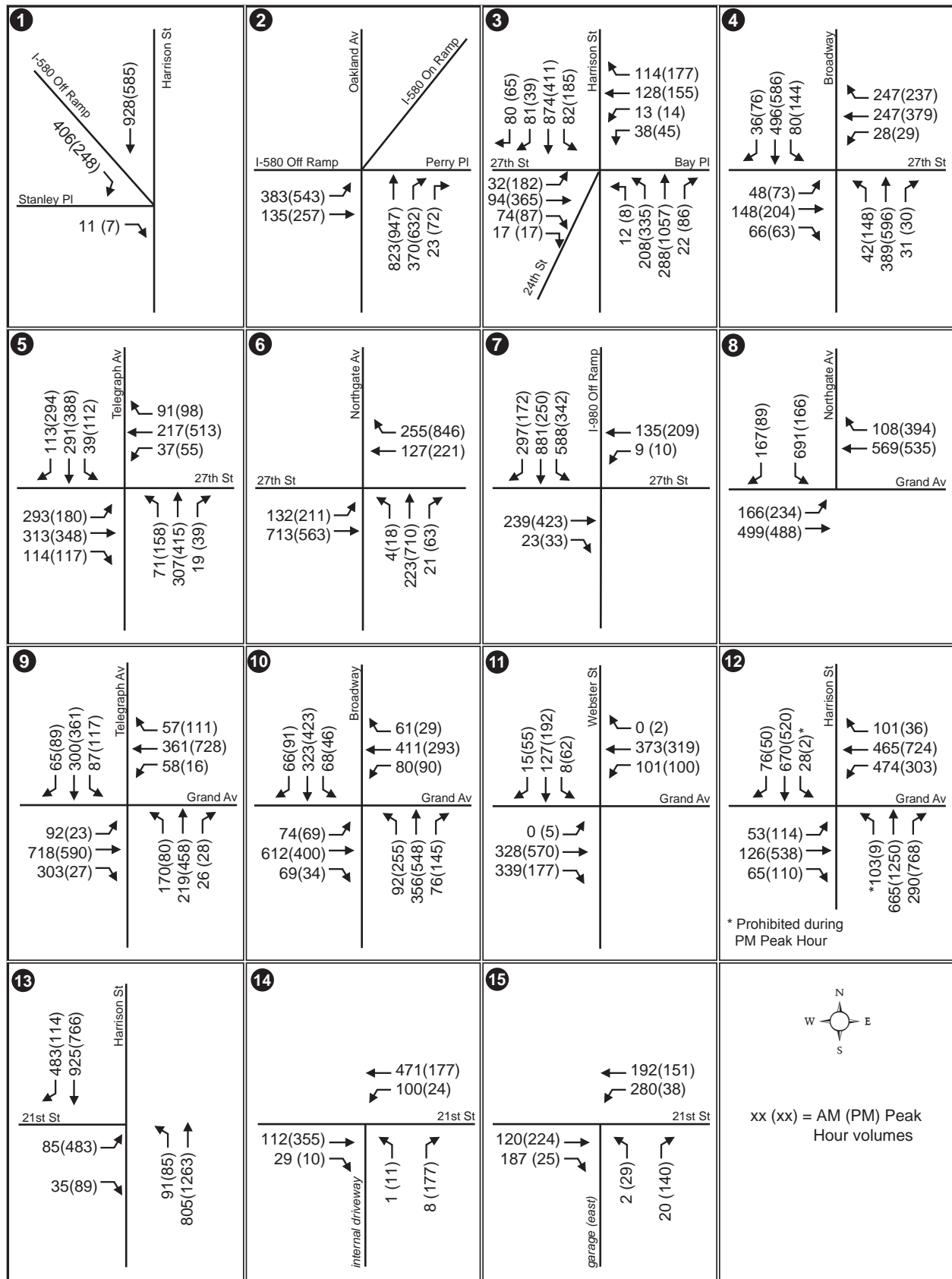
Within Downtown Area

42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in PM peak hour)

The Project would not result in a significant impact at the following intersection:

- #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM). Although the intersection would operate at LOS F during both the AM and PM peak hours under both Existing Conditions and Existing plus South Tower Conditions, the addition of South Tower-generated traffic would cause an increase in v/c ratio not above the three percent threshold.
- #44: Oak Street / 5th Street / I-880 SB On-Ramp (PM). Although the intersection would operate at LOS F during the PM peak hour under both Existing Conditions and Existing plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.

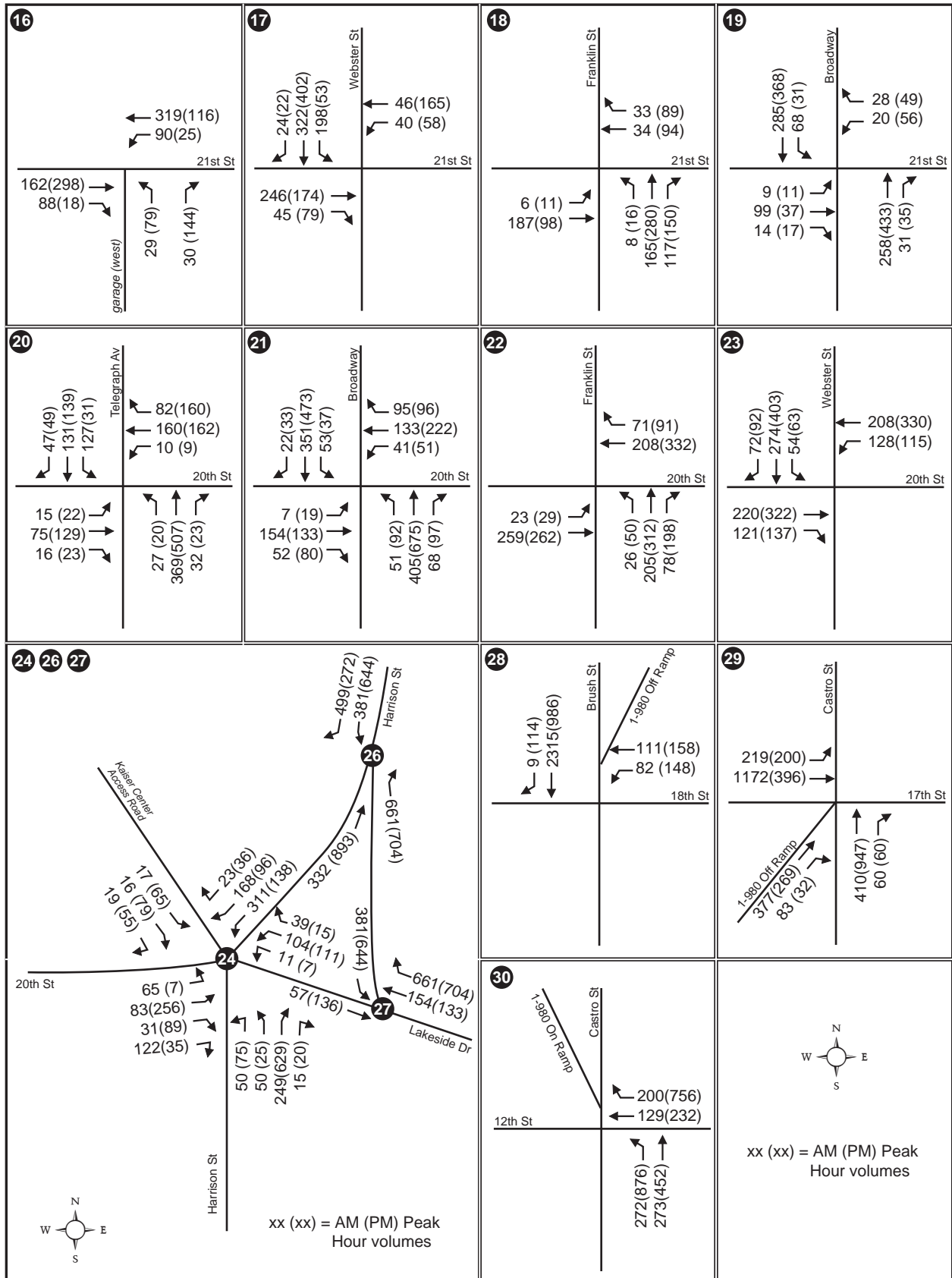
Impacts due to the South Tower at the remaining intersections above are discussed below.



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

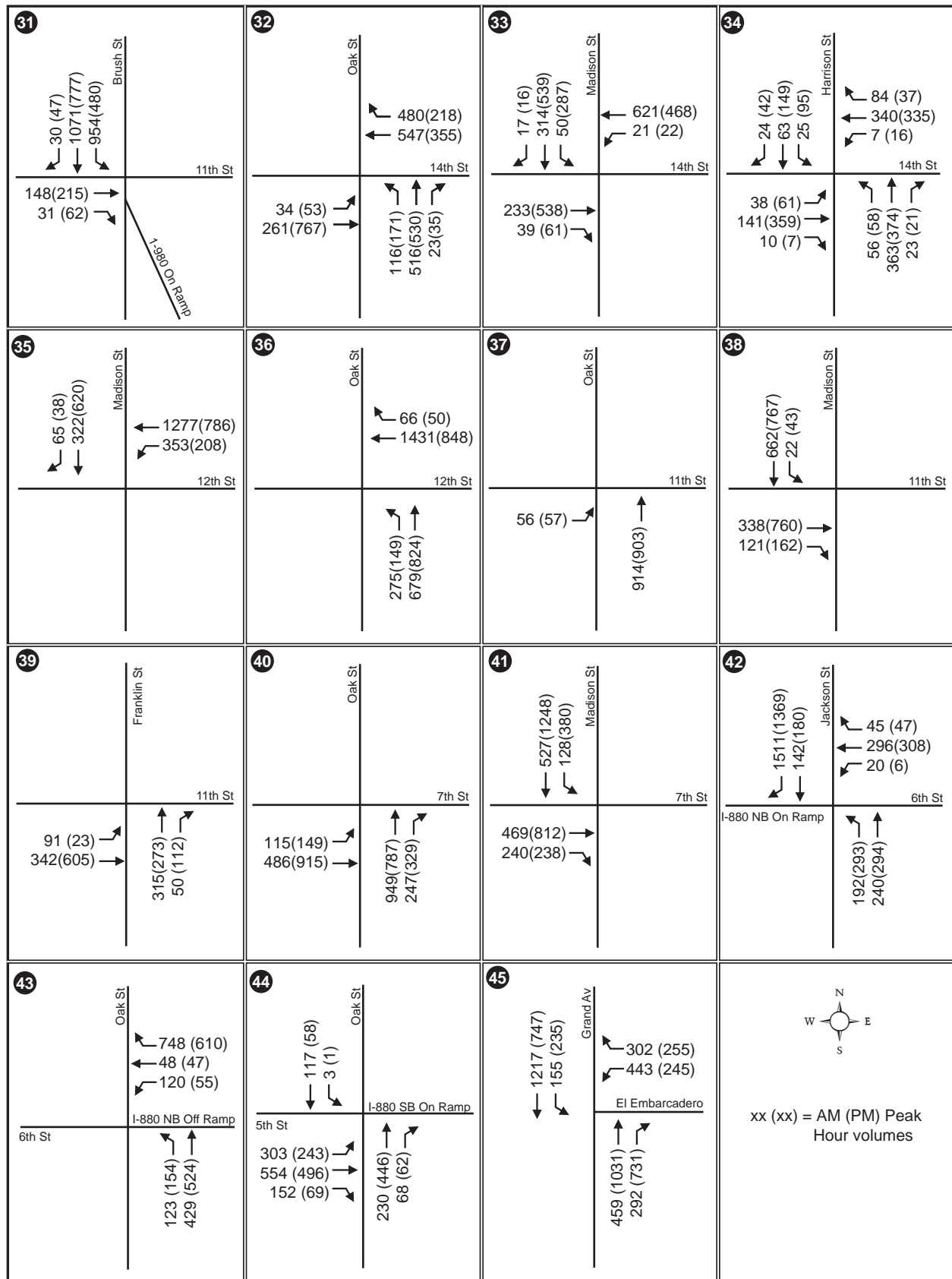
Figure 1a
EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES
AM (PM) Peak Hour



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

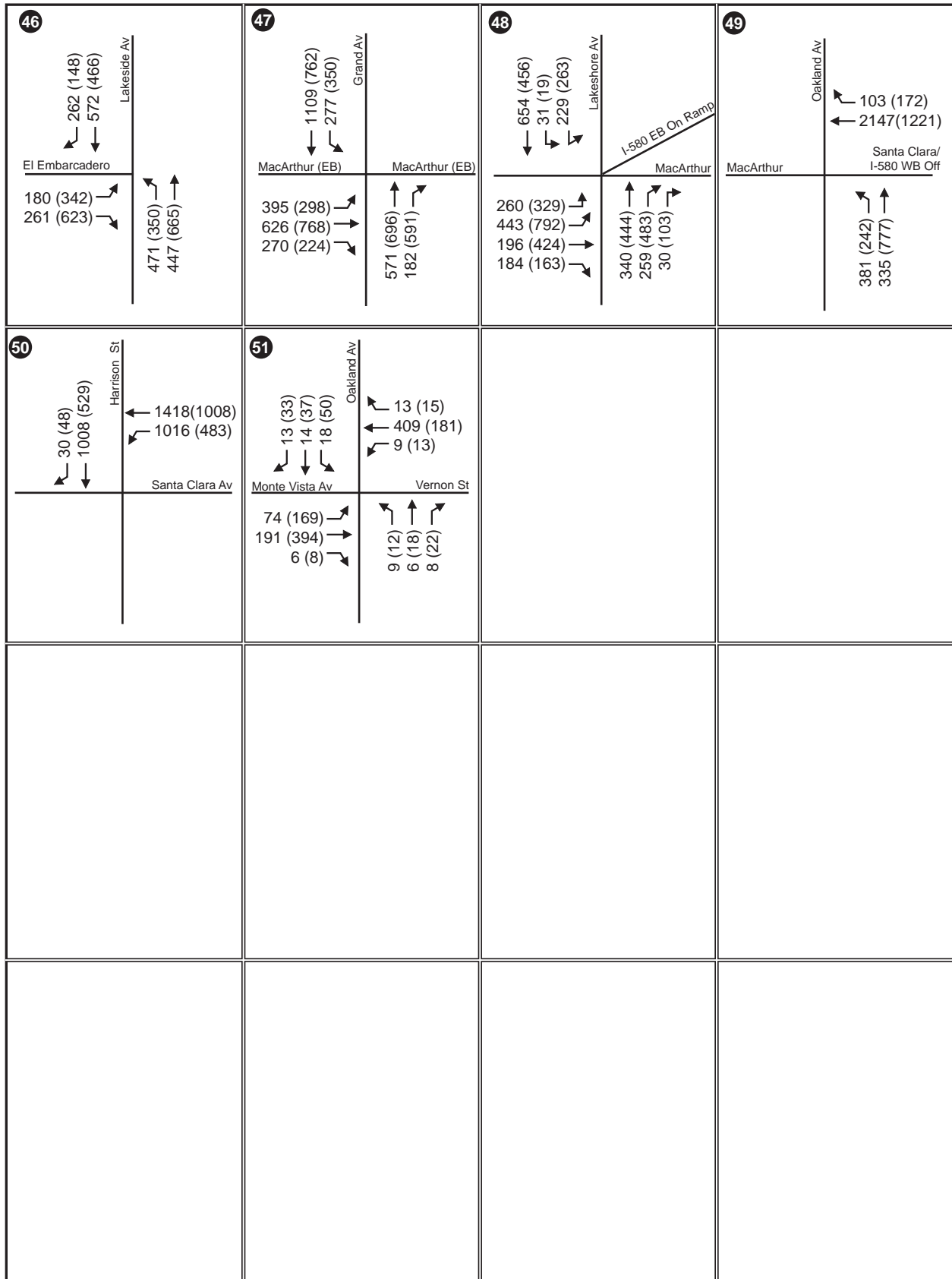
Figure 1b
EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES
AM (PM) Peak Hour



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 1c
EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES
AM (PM) Peak Hour



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 1d
EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES
AM (PM) Peak Hour

TABLE 1
EXISTING WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE (LOS)

| No. | Intersection | Traffic Control ^a | Existing Conditions | | | | Existing plus South Tower Conditions | | | |
|------------------|--|------------------------------|---------------------|--------------------|--------------|--------------------|--------------------------------------|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 1 | Harrison St. / Stanley Pl. / I-580 EB Off-Ramp | SSSC | C | 16.9 | B | 11.9 | C | 18.5 | B | 12.0 |
| 2 | Oakland Ave. / Perry Pl. / I-580 EB Ramps | Signal | B | 18.1 | F | >120 | C | 21.1 | F | >120 |
| 3 | Harrison Street / 27th Street / 24th Street | Signal | C | 27.6 | D | 49.2 | C | 28.3 | E | 65.8 |
| 4 | Broadway / 27th Street | Signal | B | 15.3 | B | 18.0 | B | 15.4 | B | 18.4 |
| 5 | Telegraph Ave. / 27th St. | Signal | B | 18.8 | C | 25.0 | B | 18.8 | C | 25.7 |
| 6 | Northgate Ave. / 27th St. / I-980 EB On-Ramp | Signal | A | 8.9 | B | 10.9 | A | 9.0 | B | 11.6 |
| 7 | Northgate Ave. / 27th St. / I-980 WB Off-Ramp | Signal | B | 12.0 | B | 11.0 | B | 12.2 | B | 11.0 |
| 45 | Grand Avenue / El Embarcadero | Signal | C | 25.7 | F | 90.9 | C | 25.5 | F | 103.4 |
| 46 | Lakeshore Avenue / El Embarcadero | Signal | C | 32.5 | C | 24.5 | C | 32.5 | C | 25.5 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | D | 41.9 | E | 76.2 | D | 41.8 | F | 85.1 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | C | 23.9 | D | 49.2 | C | 23.8 | D | 48.2 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) | Signal | C | 22.8 | B | 12.1 | C | 23.9 | B | 14.9 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | C | 26.1 | B | 16.5 | C | 27.1 | B | 16.4 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | B | 12.7 | B | 12.8 | B | 13.3 | B | 13.8 |
| Within Downtown | | | | | | | | | | |
| 8 | Northgate Avenue / West Grand Avenue | Signal | C | 21.3 | B | 17.7 | C | 21.7 | B | 17.9 |
| 9 | Telegraph Avenue / West Grand Avenue | Signal | C | 24.9 | C | 27.1 | D | 47.4 | C | 30.0 |
| 10 | Broadway / Grand Ave. | Signal | C | 20.9 | B | 17.0 | C | 21.1 | B | 17.3 |
| 11 | Webster St. / Grand Ave. | Signal | C | 29.2 | C | 23.7 | C | 31.6 | C | 24.0 |
| 12 | Harrison St. / Grand Ave. | Signal | C | 27.8 | D | 39.0 | C | 32.9 | D | 49.2 |
| 13 | Harrison St. / 21st Street | Signal | A | 6.9 | B | 13.7 | A | 8.4 | C | 20.7 |
| 14 | Kaiser Ctr. Access Rd. / 21st Street | SSSC | B | 11.6 | B | 10.9 | B | 10.5 | B | 14.3 |
| 15 | Kaiser Ctr. Garage (NE) / 21st Street | SSSC | B | 12.5 | B | 11.4 | B | 12.3 | B | 14.3 |
| 16 | Kaiser Ctr. Garage (NW) / 21st Street | SSSC | B | 11.5 | B | 10.8 | B | 13.6 | B | 11.7 |
| 17 | Webster St. / 21st Street | Signal | B | 13.8 | B | 18.2 | B | 14.4 | B | 18.5 |
| 18 | Franklin St. / 21st Street | Signal | B | 10.1 | B | 10.8 | A | 9.8 | B | 10.5 |

See next page for table footnotes.

TABLE 1 (continued)
EXISTING WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE (LOS)

| No. | Intersection | Traffic Control ^a | Existing Conditions | | | | Existing plus South Tower Conditions | | | |
|-----------------|--|------------------------------|---------------------|--------------------|--------------|--------------------|--------------------------------------|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Within Downtown | | | | | | | | | | |
| 19 | Broadway / 21st Street | Signal | A | 10.0 | B | 10.6 | B | 10.3 | B | 10.6 |
| 20 | Telegraph Ave. / 20th St. | Signal | B | 11.6 | B | 12.5 | B | 11.8 | B | 12.4 |
| 21 | Broadway / 20th St. | Signal | B | 13.3 | B | 17.0 | B | 13.4 | B | 17.1 |
| 22 | Franklin St. / 20th St. | Signal | B | 13.0 | B | 15.1 | B | 14.2 | B | 14.4 |
| 23 | Webster St. / 20th St. | Signal | C | 20.8 | C | 21.0 | C | 22.9 | C | 22.4 |
| 24 | Harrison St. / 20th St. / Kaiser Ctr. Access Rd. | Signal | C | 24.2 | C | 27.2 | D | 36.9 | E | 68.2 |
| 25 | Kaiser Ctr. Access Rd. / 20th St. ^c | SSSC | B | 14.7 | B | 14.8 | -- | -- | -- | -- |
| 26 | Harrison St. / Lakeside Dr. | Signal | A | 6.2 | B | 13.8 | A | 9.2 | C | 20.1 |
| 27 | Lakeside Dr. / 20th St. | Signal | B | 11.6 | B | 10.1 | B | 11.6 | B | 15.2 |
| 28 | Brush St. / 18th St. / I-980 WB Off-Ramp | Signal | A | 5.9 | A | 9.5 | A | 5.9 | A | 9.6 |
| 29 | Castro St. / 17th St. / I-980 EB Off-Ramp | Signal | C | 21.0 | C | 23.8 | C | 21.1 | C | 23.8 |
| 30 | Castro St. / 12th St. / I-980 EB On-Ramp | Signal | C | 21.4 | B | 16.7 | C | 21.4 | B | 16.7 |
| 31 | Brush St. / 11th St. / I-980 WB On-Ramp | Signal | C | 32.9 | B | 15.9 | C | 32.8 | B | 15.9 |
| 32 | Oak Street / 14th Street | Signal | B | 17.4 | C | 34.6 | B | 17.5 | C | 34.5 |
| 33 | Madison St. / 14th St. | Signal | A | 9.6 | B | 10.1 | A | 9.6 | B | 10.2 |
| 34 | Harrison St. / 14th St. | Signal | A | 9.3 | A | 9.7 | A | 9.3 | A | 9.7 |
| 35 | Madison St. / 12th St. | Signal | A | 7.7 | A | 7.8 | A | 7.7 | A | 8.1 |
| 36 | Oak Street / 12th Street | Signal | B | 12.8 | B | 12.8 | B | 12.8 | B | 12.8 |
| 37 | Oak Street / 11th Street | OWSC | B | 10.5 | B | 10.7 | B | 10.5 | B | 10.7 |
| 38 | Madison St. / 11th St. | Signal | B | 12.2 | A | 9.7 | B | 12.1 | A | 9.6 |
| 39 | Franklin St. / 11th St. | Signal | B | 13.3 | B | 14.9 | B | 13.1 | B | 14.8 |
| 40 | Oak Street / 7th Street | Signal | A | 9.4 | B | 14.2 | A | 9.4 | B | 14.2 |
| 41 | Madison St. / 7th St. | Signal | A | 8.8 | B | 11.8 | A | 8.8 | B | 12.1 |
| 42 | Jackson St. / 6th St. / I-880 NB On-Ramp | Signal | F | >120 | F | >120 | F | >120 | F | >120 |
| 43 | Oak St. / 6th St. / I-880 NB Off-Ramp | Signal | B | 14.9 | B | 11.2 | B | 15.1 | B | 11.2 |
| 44 | Oak St. / 5th St. / I-880 SB On-Ramp | Signal | E | 65.3 | F | >120 | E | 66.3 | F | >120 |

Bold indicates significant impact.

^a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

^b The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

^c The Project would eliminate this intersection.

SOURCE: AECOM, 2010.

Impact TRANS-12a: Phase I of the proposed Project, when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was used to evaluate the impact. The intersection operates with a v/c ratio of 0.98 under Existing Conditions and would operate with a v/c ratio of 1.16 under Existing plus South Tower Conditions for the PM peak hour. Because the increase in v/c ratio would be 18 percent, which is greater than the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-12a: Implement the following measures at the Oakland Avenue / Perry Place / I-580 Eastbound Ramps intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections (e.g., Oakland Avenue / MacArthur Boulevard) that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division (TSD) for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

Because the delays at this intersection are primarily on the northbound right turn to the I-580 Eastbound On-Ramp and Perry Place, the existing crosswalk on the southeast side of the intersection (across I-580 Eastbound On-Ramp / Perry Place) could be repositioned to the northwest side of the intersection (across the I-580 Eastbound Off-Ramp), providing more green time to the northbound right-turn. However, this would require pedestrians to cross the I-580 Westbound Off-Ramp on the north side of Oakland Avenue between Perry Place and MacArthur Boulevard. Because this on-ramp is uncontrolled and visibility can be poor, this configuration would likely present more safety issues than the existing crosswalk across the eastbound on-ramp at this intersection, which is a signalized crossing.

Geometric modifications to increase capacity on the northbound right-turn would also be infeasible. The I-580 Eastbound On-Ramp is restricted to one lane, precluding the provision of an additional turn lane onto the on-ramp. A Class 2 bicycle lane has also been recently striped on Oakland Avenue, and adding an additional exclusive right-turn lane could require the removal of the bicycle lane or a reduction to its attractiveness, or could present safety issues for bicycles. Substantial capacity improvements such as additional travel lanes would also conflict with the goals of the Harrison Street / Oakland Avenue CTP.

In addition, signal optimization at this location would require approval of the change by Caltrans, making implementation of the proposed mitigation measure uncertain. Given these considerations, there are no feasible measures to completely mitigate the South Tower's impacts. Therefore, the South Tower impact at this intersection would be significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Existing plus Project (Phase I and Phase II) Conditions.

Impact TRANS-12b: Phase I of the proposed Project, when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street) (Existing). (Significant)*

Mitigation Measure TRANS-12b: Implement the following measures at the Harrison Street / 27th Street / 24th Street intersection:

- Prohibit westbound left turns from Bay Place (to Harrison Street and 24th Street) during the PM peak period.
- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.

-
- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Harrison Street / Grand Avenue and Harrison Street / Westlake Middle School Driveway) that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

The 59 vehicles making these movements during the PM peak hour (45 vehicles to southbound Harrison Street and 14 vehicles to westbound 24th Street) would likely divert to the westbound through movement at this intersection or use other intersections in the area. Given that the volumes are relatively low, the diversion of traffic as a result of the left-turn prohibition would not result in substantial secondary impacts. By prohibiting westbound left turns, the green times can be reallocated to the northbound and southbound through Harrison Street movements. After implementation of the mitigation measure, the intersection would operate at an acceptable LOS C in the PM peak hour.

However, the proposed mitigation measure would represent a less-than-ideal solution and could potentially still result in confusion for drivers who do not regularly use this intersection. This confusion could potentially result in drivers attempting to make abrupt lane changes out of the shared through-left lane or make prohibited traffic movements under the assumption that they have the “right of way.”

Significance after Implementation of Mitigation: Conservatively deemed Significant and Unavoidable. If the City rejects the specific implementation approach described for Mitigation

Measure TRANS-12b for the Project, and no other feasible options are identified, then the impact at this location would be Significant and Unavoidable. Alternatively, if the City accepts the approach identified, the Project impact at this location would be Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Existing plus Project (Phase I and Phase II) Conditions.

Impact TRANS-12c: Phase I of the proposed Project, when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Mitigation Measure TRANS-12c: Implement the following measures at the Grand Avenue / El Embarcadero intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Grand Avenue / Mac Arthur Boulevard and Lakeshore Drive / El Embarcadero) in the same coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals

-
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, the intersection (located outside the Downtown area) is expected to operate at an acceptable LOS D in the PM peak hour, thus mitigating the South Tower's impact at this intersection. However, since the Grand Avenue / El Embarcadero intersection was counted (in November 2008) prior to its modification, new level of service calculations will be needed based on new counts (to be taken after the completion of scheduled modifications to the Lakeshore Drive / Mac Arthur Boulevard intersection). This analysis should be provided to TSD for review and determination whether or not the above improvement measures should be implemented.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Existing plus Project (Phase I and Phase II) Conditions.

Impact TRANS-12d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp) (Existing)*. (Significant)

Mitigation Measure TRANS-12d: Implement the following measures at the Grand Avenue / MacArthur Boulevard (Eastbound) intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Grand Avenue / El Embarcadero and Mac Arthur Boulevard / Lakeshore Drive) in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller

-
- GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, the intersection (located outside the Downtown area) is expected to operate at an acceptable LOS D in the PM peak hour, thus mitigating the South Tower's impact at this intersection. However, since the Grand Avenue / Mac Arthur Boulevard intersection was counted in November 2008, new level of service calculations will be needed based on new counts (to be taken after the completion of scheduled modifications to the Lakeshore Drive / Mac Arthur Boulevard intersection). This analysis should be provided to TSD for review and determination whether or not the above improvement measures should be implemented.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Existing plus Project (Phase I and Phase II) Conditions.

Roadway Impacts

Table 2 summarizes peak-hour LOS for the study roadway segments under Existing plus South Tower Conditions and indicates that South Tower-generated traffic is not expected to have a significant impact on any of the 12 study roadway segments.

Cumulative (2030) plus South Tower Conditions

This section provides the results of the analysis of Cumulative (2030) plus South Tower Conditions. Near Term (2015) plus Project (Phase I or South Tower) Conditions are addressed in Section IV.L of the Draft Environmental Impact Report (DEIR) for the Kaiser Center Office Project.

Intersection Impacts

Impact TRANS-13: Under 2030 cumulative conditions, Phase I of the proposed Project would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-13a through TRANS-13e)

Cumulative (2030) plus South Tower Conditions traffic volumes are illustrated in **Figure 2a** through **Figure 2d**. **Table 3** summarizes the peak hour LOS at the 51 study intersections under Cumulative (2030) plus South Tower Conditions.

Average delay at some intersections would decrease under Cumulative (2030) plus South Tower Conditions (when compared to Cumulative Without Project Conditions) due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table 2, the following intersections would operate at unacceptable conditions under Cumulative (2030) plus South Tower Conditions:

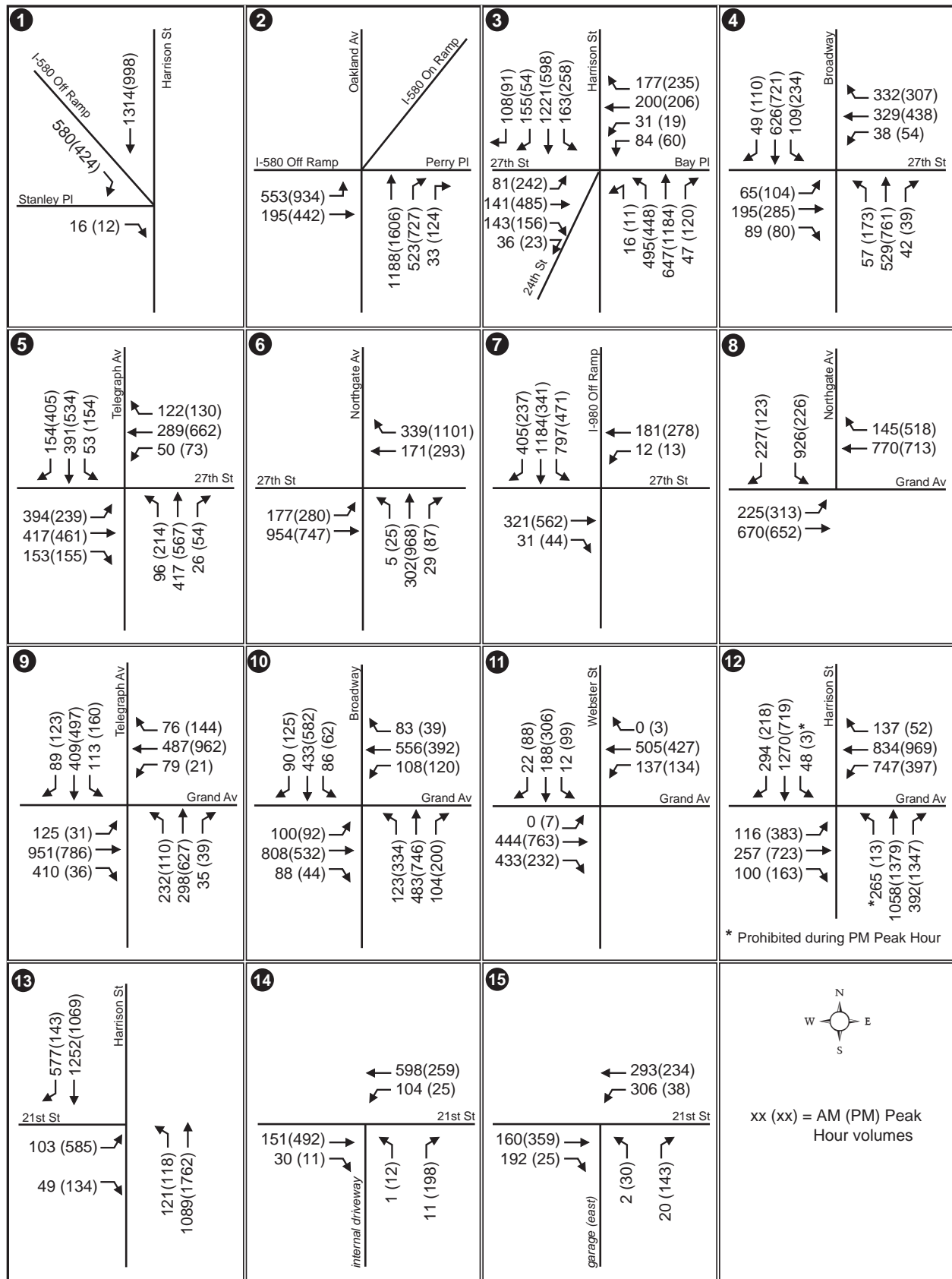
Outside Downtown Area

1. Harrison Street / Stanley Place / I-580 EB Off-Ramp (LOS F in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in AM and PM peak hours)
3. Harrison Street / 27th Street / 24th Street (LOS F in AM and PM peak hours)
5. Telegraph Avenue / 27th Street (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in AM peak hour, and LOS F in PM peak hour)

**TABLE 2
EXISTING WITHOUT AND WITH SOUTH TOWER ROADWAY SEGMENT LEVELS OF SERVICE**

| No. | Roadway Segment | Dir. | Ln. | Capacity
(veh/hr) | Existing Conditions | | | | | | Existing plus South Tower Conditions | | | | | |
|-------------------------|---|------|-----|----------------------|---------------------|-------|------|--------------|-------|------|--------------------------------------|-------|------|--------------|-------|------|
| | | | | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c |
| Caltrans Facilities | | | | | | | | | | | | | | | | |
| 1 | SR 260 (Posey / Webster Tubes)
from Alameda city limits to I-880 | NB | 2 | 3,400 | E | 3,081 | 0.91 | D | 2,478 | 0.73 | E | 3,084 | 0.91 | D | 2,479 | 0.73 |
| | | SB | 2 | 3,400 | B | 1,575 | 0.46 | C | 2,347 | 0.69 | B | 1,576 | 0.46 | C | 2,355 | 0.69 |
| 2 | I-880
from Market Street to I-980 | EB | 4 | 8,000 | B | 3,070 | 0.38 | B | 3,164 | 0.40 | B | 3,111 | 0.39 | B | 3,171 | 0.40 |
| | | WB | 4 | 8,000 | B | 3,720 | 0.47 | B | 3,426 | 0.43 | B | 3,725 | 0.47 | B | 3,462 | 0.43 |
| 3 | I-880
from Oak Street to 5th Avenue | EB | 4 | 8,000 | C | 4,968 | 0.62 | D | 5,737 | 0.72 | C | 4,974 | 0.62 | D | 5,777 | 0.72 |
| | | WB | 4 | 8,000 | C | 5,606 | 0.70 | C | 5,075 | 0.63 | C | 5,651 | 0.71 | C | 5,083 | 0.64 |
| 4 | I-980
from 27th Street to 29th Street | NB | 3 | 6,000 | A | 1,611 | 0.27 | C | 3,609 | 0.60 | A | 1,626 | 0.27 | C | 3,706 | 0.62 |
| | | SB | 3 | 6,000 | D | 4,679 | 0.78 | B | 1,858 | 0.31 | D | 4,732 | 0.79 | B | 1,868 | 0.31 |
| Non-Caltrans Facilities | | | | | | | | | | | | | | | | |
| 5 | Broadway
from 19th Street to Grand Avenue | NB | 2 | 1,800 | A | 513 | 0.29 | B | 876 | 0.49 | A | 524 | 0.29 | C | 948 | 0.53 |
| | | SB | 2 | 1,800 | A | 438 | 0.24 | B | 597 | 0.33 | A | 472 | 0.26 | B | 604 | 0.34 |
| 6 | Telegraph Avenue
from 20th Street to 27th Street | NB | 2 | 1,800 | A | 464 | 0.26 | B | 678 | 0.38 | A | 466 | 0.26 | B | 689 | 0.38 |
| | | SB | 2 | 1,800 | B | 661 | 0.37 | B | 565 | 0.31 | B | 661 | 0.37 | B | 567 | 0.32 |
| 7 | West Grand Avenue
from S. Pablo Ave. to Telegraph Ave. | EB | 2 | 1,800 | C | 1,054 | 0.59 | B | 719 | 0.40 | C | 1,113 | 0.62 | B | 722 | 0.40 |
| | | WB | 2 | 1,800 | B | 672 | 0.37 | B | 862 | 0.48 | B | 677 | 0.38 | B | 897 | 0.50 |
| 8 | Grand Avenue
from Broadway to Harrison Street | EB | 2 | 1,800 | B | 682 | 0.38 | B | 762 | 0.42 | B | 756 | 0.42 | B | 762 | 0.42 |
| | | WB | 2 | 1,800 | B | 644 | 0.36 | B | 783 | 0.44 | B | 644 | 0.36 | B | 783 | 0.44 |
| 9 | Grand Avenue
from Harrison St. to El Embarcadero | EB | 2 | 1,800 | B | 751 | 0.42 | E | 1,700 | 0.94 | B | 751 | 0.42 | E | 1,762 | 0.98 |
| | | WB | 2 | 1,800 | E | 1,531 | 0.85 | C | 968 | 0.54 | E | 1,660 | 0.92 | C | 992 | 0.55 |
| 10 | Harrison Street / Oakland Avenue
from I-580 to 27th Street | NB | 2 | 1,800 | C | 1,189 | 0.66 | E | 1,536 | 0.85 | C | 1,216 | 0.68 | E | 1,651 | 0.92 |
| | | SB | 2 | 1,800 | C | 1,041 | 0.58 | B | 686 | 0.38 | C | 1,117 | 0.62 | B | 700 | 0.39 |
| 11 | Harrison Street
from 27th Street to Grand Avenue | NB | 3 | 2,700 | A | 784 | 0.29 | B | 1,236 | 0.46 | B | 819 | 0.30 | C | 1,400 | 0.52 |
| | | SB | 3 | 2,700 | B | 899 | 0.33 | A | 556 | 0.21 | B | 986 | 0.37 | A | 572 | 0.21 |
| 12 | Harrison Street
from 20th Street to 14th Street | NB | 2 | 1,800 | A | 475 | 0.26 | B | 745 | 0.41 | A | 485 | 0.27 | B | 750 | 0.42 |
| | | SB | 2 | 1,800 | A | 444 | 0.25 | A | 286 | 0.16 | A | 444 | 0.25 | A | 295 | 0.16 |

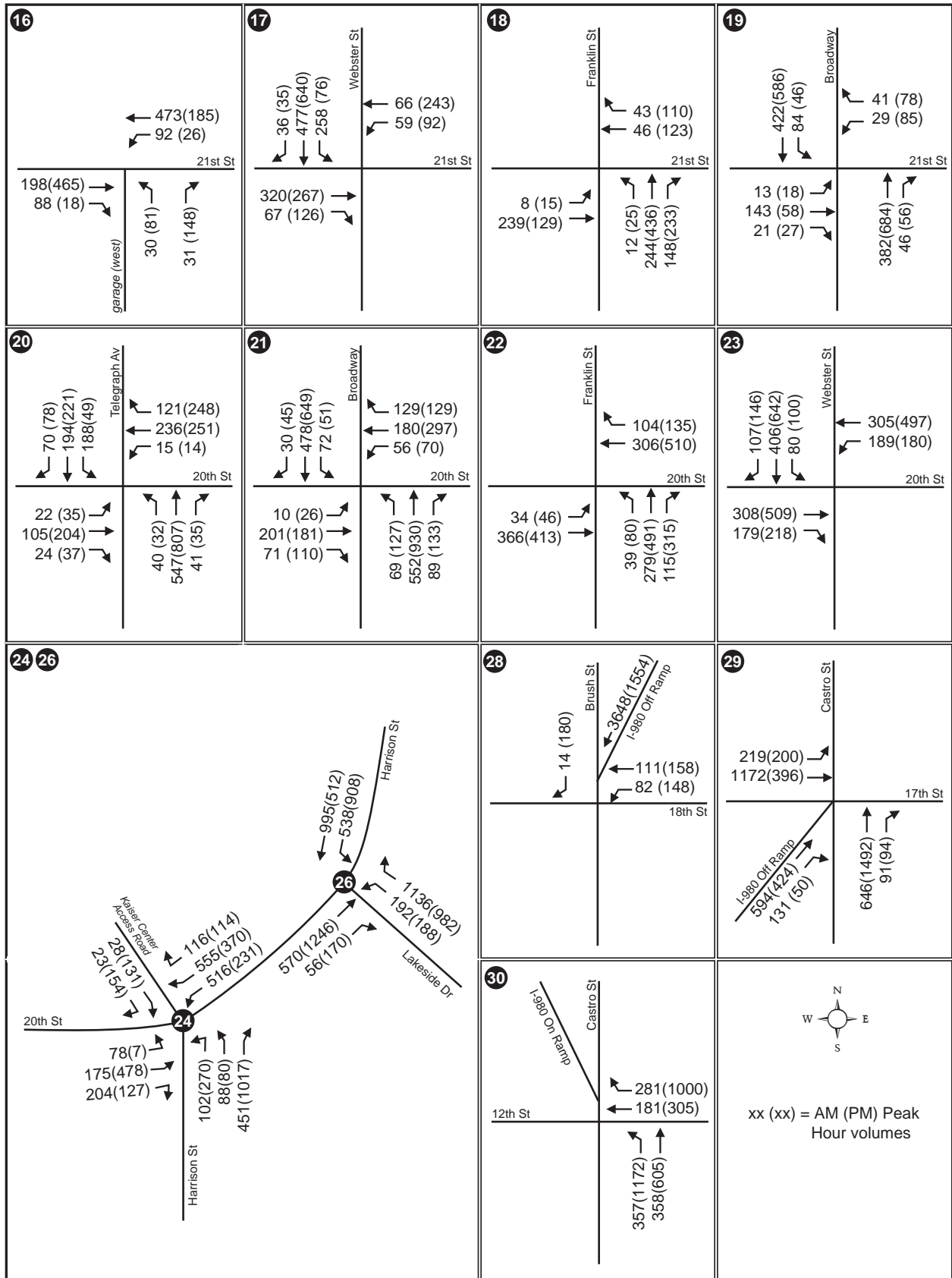
SOURCE: AECOM, 2010.



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

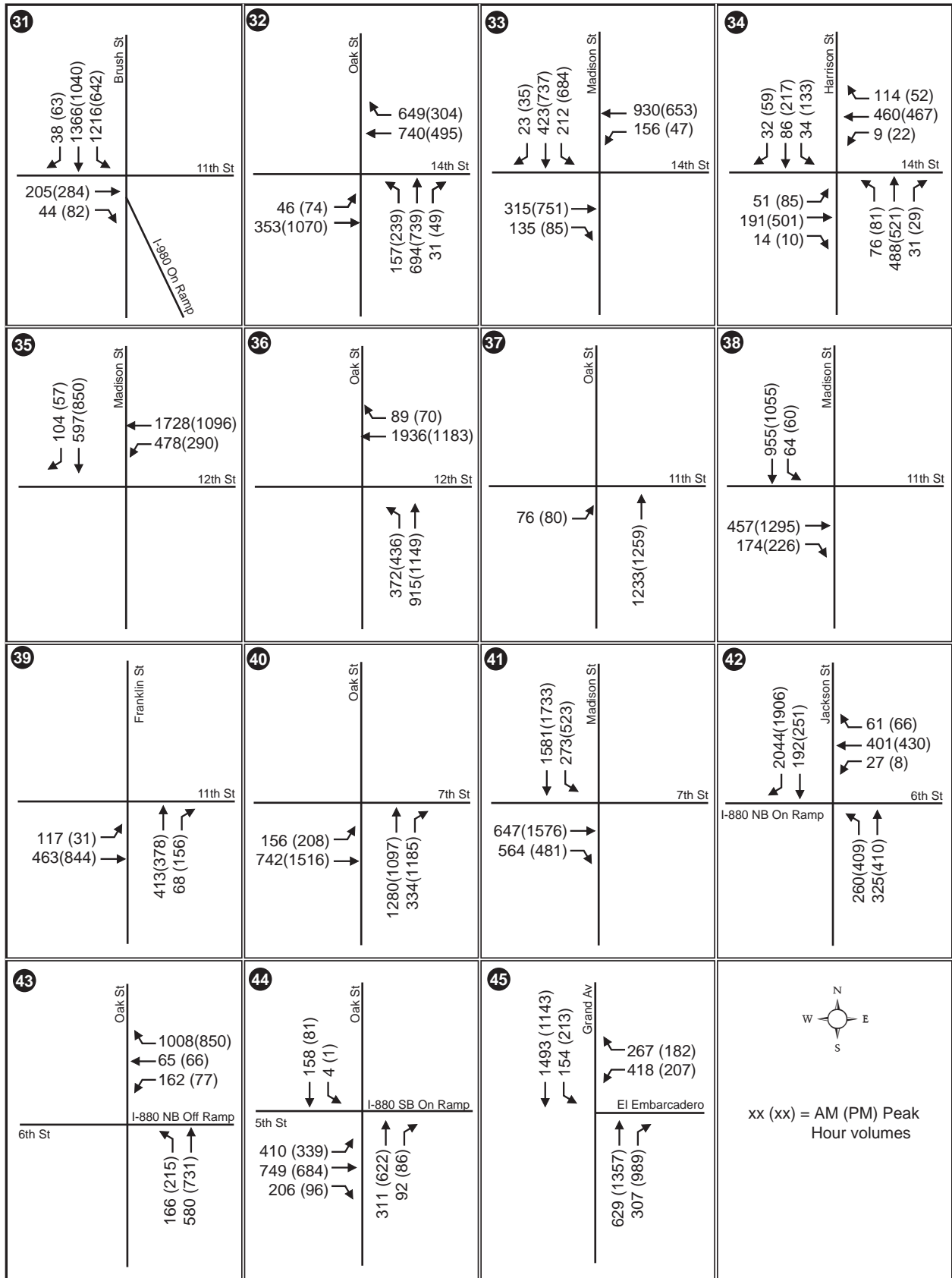
Figure 2a
CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES
AM (PM) Peak Hour



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 2b
CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES
AM (PM) Peak Hour

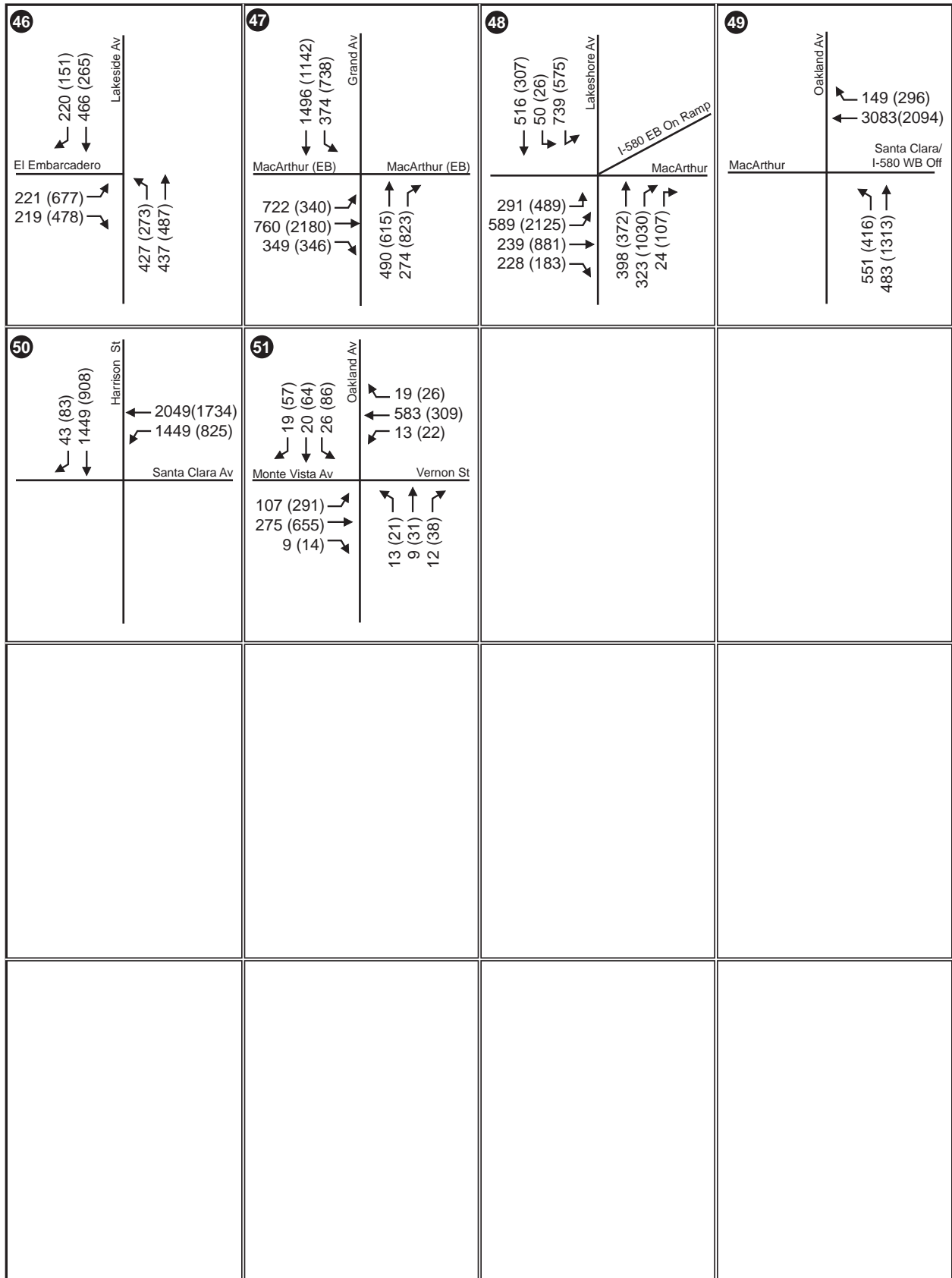


Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 2c

CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES **AM (PM) Peak Hour**



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 2d

CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES
AM (PM) Peak Hour

TABLE 3
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE

| No. | Intersection | Traffic Control ^a | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) + South Tower Conditions | | | |
|------------------|--|------------------------------|--|--------------------|--------------|--------------------|--|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Outside Downtown | | | | | | | | | | |
| 1 | Harrison St. / Stanley Pl. / I-580 EB Off-Ramp | TWSC | F | 68.7 | C | 20.6 | F | 86.5 | C | 21.0 |
| 2 | Oakland Ave. / Perry Pl. / I-580 EB Ramps | Signal | E | 65.9 | F | >120 | E | 74.3 | F | >120 |
| 3 | Harrison Street / 27th Street / 24th Street | Signal | F | 97.0 | E | 78.9 | F | 116.2 | F | 97.7 |
| 4 | Broadway / 27th Street | Signal | B | 17.5 | C | 32.2 | B | 17.7 | C | 34.4 |
| 5 | Telegraph Avenue / 27th Street | Signal | C | 20.5 | E | 67.9 | C | 20.7 | E | 79.9 |
| 6 | Northgate Ave. / 27th St. / I-980 EB On-Ramp | Signal | B | 12.3 | B | 15.8 | B | 12.5 | B | 19.4 |
| 7 | Northgate Ave. / 27th St. / I-980 WB Off-Ramp | Signal | B | 15.7 | B | 12.1 | B | 16.5 | B | 12.1 |
| 45 | Grand Avenue / El Embarcadero | Signal | C | 23.4 | F | >120 | C | 23.6 | F | >120 |
| 46 | Lakeshore Avenue / El Embarcadero | Signal | C | 23.3 | C | 26.0 | C | 23.3 | C | 30.0 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | E | 68.3 | F | >120 | E | 68.3 | F | >120 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | F | 94.5 | F | >120 | F | 94.4 | F | >120 |
| 49 | Oakland Avenue / MacArthur Blvd. (WB) | Signal | F | >120 | C | 21.0 | F | >120 | C | 23.9 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | F | 83.2 | C | 21.3 | F | 88.8 | C | 21.4 |
| 51 | Oakland Avenue / Monte Vista Avenue | AWSC | C | 22.9 | F | 61.2 | D | 25.3 | F | 72.3 |
| Within Downtown | | | | | | | | | | |
| 8 | Northgate Avenue / West Grand Avenue | Signal | C | 26.8 | C | 20.5 | C | 28.0 | C | 21.1 |
| 9 | Telegraph Avenue / West Grand Avenue | Signal | C | 31.5 | D | 52.6 | C | 34.8 | E | 60.6 |
| 10 | Broadway / Grand Avenue | Signal | C | 22.5 | C | 21.4 | C | 23.4 | C | 26.5 |
| 11 | Webster St. / Grand Ave. | Signal | C | 29.9 | C | 29.4 | C | 30.4 | C | 30.0 |
| 12 | Harrison St. / Grand Ave. | Signal | F | 93.8 | F | >120 | F | >120 | F | >120 |
| 13 | Harrison St. / 21st St. | Signal | A | 7.5 | B | 19.9 | A | 9.8 | D | 50.7 |
| 14 | Kaiser Ctr. Access Rd. / 21st Street | SSSC | B | 12.4 | B | 12.3 | B | 10.3 | C | 17.8 |
| 15 | Kaiser Ctr. Garage (NE) / 21st Street | SSSC | B | 13.6 | B | 12.9 | B | 12.5 | C | 15.2 |
| 16 | Kaiser Ctr. Garage (NW) / 21st Street | SSSC | B | 12.8 | B | 12.7 | C | 15.2 | B | 13.7 |
| 17 | Webster St. / 21st St. | Signal | B | 14.4 | B | 19.2 | B | 14.9 | B | 19.0 |

See next page for table footnotes.

TABLE 3 (Continued)
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE

| No. | Intersection | Traffic Control ^a | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) + South Tower Conditions | | | |
|-----|---|------------------------------|--|--------------------|--------------|--------------------|--|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| 18 | Franklin St. / 21st St. | Signal | B | 10.3 | B | 11.0 | A | 10.0 | B | 10.9 |
| 19 | Broadway / 21st Street | Signal | B | 10.8 | B | 12.4 | B | 11.2 | B | 12.5 |
| 20 | Telegraph Ave. / 20th St. | Signal | B | 13.1 | B | 13.0 | B | 13.3 | B | 13.1 |
| 21 | Broadway / 20th Street | Signal | B | 14.5 | C | 34.5 | B | 14.6 | C | 34.9 |
| 22 | Franklin St. / 20th St. | Signal | B | 11.6 | B | 14.8 | B | 13.6 | B | 14.5 |
| 23 | Webster St. / 20th St. | Signal | C | 24.0 | C | 24.6 | C | 21.5 | C | 24.4 |
| 24 | Harrison St. / 20th St. / Kaiser Ctr. Access Road | Signal | C | 25.7 | D | 42.3 | E | 65.8 | F | >120 |
| 25 | Kaiser Ctr. Access Rd. / 20th Street ^c | SSSC | B | 10.5 | B | 10.1 | -- | -- | -- | -- |
| 26 | Harrison St. / Lakeside Dr. | Signal | C | 21.3 | D | 49.0 | C | 20.8 | D | 51.1 |
| 27 | Lakeside Dr. / 20th St. ^d | Signal | -- | -- | -- | -- | -- | -- | -- | -- |
| 28 | Brush St. / 18th St. / I-980 WB Off-Ramp | Signal | A | 7.6 | A | 8.4 | A | 7.6 | A | 8.5 |
| 29 | Castro St. / 17th St. / I-980 EB Off-Ramp | Signal | E | 58.0 | D | 43.9 | E | 59.1 | D | 44.1 |
| 30 | Castro St. / 12th St. / I-980 EB On-Ramp | Signal | C | 20.9 | B | 19.0 | C | 20.9 | B | 19.1 |
| 31 | Brush St. / 11th St. / I-980 WB On-Ramp | Signal | E | 58.5 | B | 17.4 | E | 58.4 | B | 17.4 |
| 32 | Oak Street / 14th Street | Signal | D | 44.7 | F | 89.8 | D | 45.4 | F | 89.8 |
| 33 | Madison St. / 14th St. | Signal | B | 19.6 | B | 19.3 | B | 19.5 | B | 19.3 |
| 34 | Harrison St. / 14th St. | Signal | A | 9.8 | B | 10.7 | A | 9.9 | B | 10.8 |
| 35 | Madison St. / 12th St. | Signal | A | 9.7 | A | 10.0 | A | 9.7 | B | 10.1 |
| 36 | Oak Street / 12th Street | Signal | B | 14.7 | B | 16.0 | B | 14.7 | B | 16.0 |
| 37 | Oak Street / 11th Street | SSSC | B | 11.4 | B | 11.7 | B | 11.5 | B | 11.8 |
| 38 | Madison St. / 11th St. | Signal | B | 11.6 | B | 11.7 | B | 11.5 | B | 11.5 |
| 39 | Franklin St. / 11th St. | Signal | B | 14.2 | B | 14.1 | B | 14.1 | B | 14.1 |
| 40 | Oak Street / 7th Street | Signal | B | 11.5 | F | 92.3 | B | 11.6 | F | 92.3 |
| 41 | Madison St. / 7th St. | Signal | B | 13.2 | C | 32.9 | B | 13.3 | D | 36.6 |
| 42 | Jackson St. / 6th St. / I-880 NB On-Ramp | Signal | F | >120 | F | >120 | F | >120 | F | >120 |
| 43 | Oak Street / 6th Street / I-880 NB Off-Ramp | Signal | C | 26.5 | B | 15.7 | C | 27.5 | B | 15.7 |
| 44 | Oak Street / 5th Street / I-880 SB On-Ramp | Signal | F | >120 | F | >120 | F | >120 | F | >120 |

Bold indicates significant impact.

^a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

^b The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

^c The Project would eliminate this intersection.

^d After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2010.

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48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in AM and PM peak hours)
 49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)
 50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (LOS F in AM peak hour)
 51. Oakland Avenue / Monte Vista Avenue / Vernon Street (LOS F in PM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in AM and PM peak hours)
24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
32. Oak Street / 14th Street (LOS F in PM peak hour)
40. Oak Street / 7th Street (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

South Tower-generated traffic would not result in a significant impact at the following intersections:

- #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM). Although the side-street service level at this unsignalized intersection would operate at LOS F during the AM peak hour under Near-Term (2030) plus South Tower Conditions, the intersection would not satisfy the California MUTCD peak-hour signal warrant.
- #45: Grand Avenue / El Embarcadero (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.
- #47: Grand Avenue / MacArthur Boulevard (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.
- #48: Lakeshore Avenue / El Embarcadero (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.
- #49: Oakland Avenue / MacArthur Boulevard / I-580 WB Off-ramp (AM). Although the intersection would operate at LOS F during the AM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.

- #32: Oak Street / 14th Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.
- #40: Oak Street / 7th Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.
- #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM). Although the intersection would operate at LOS F during the AM and PM peak hours under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause the v/c ratio to increase above the three percent threshold.
- #44: Oak Street / 5th Street / I-880 SB On-Ramp (AM / PM). Although the intersection would operate at LOS F during the AM and PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause the v/c ratio to exceed the three percent threshold.
- #51: Oakland Avenue / Monte Vista Avenue / Vernon Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the intersection is expected to be already meet the peak hour signal warrant under Cumulative (2030) without Project Conditions. Therefore, the Project would not result in a significant impact at this intersection.

Impacts due to South Tower-generated traffic at the remaining intersections above are discussed below.

Impact TRANS-13a: Under 2030 cumulative conditions, Phase I of the proposed Project would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.43 under Cumulative (2030) without Project Conditions and 1.49 under Cumulative (2030) plus South Tower Conditions in the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, South Tower-generated traffic would result in a significant impact at this intersection.

Mitigation Measure TRANS-13a: Implement Mitigation Measure TRANS-12a.

This measure alone should be sufficient to completely mitigate the South Tower impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13b: Under 2030 cumulative conditions, Phase I of the proposed Project would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-13b: Implement Mitigation Measure TRANS-12b, and also prohibit westbound left turns during the AM peak hour (in addition to the PM peak hour).

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in both the AM and PM peak hours, mitigating the South Tower impacts at this intersection.

As discussed for Mitigation Measure TRANS-12b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion.

Significance after Implementation of Mitigation: Conservatively deemed Significant and Unavoidable. If the City rejects the specific implementation approach described for Mitigation Measure TRANS-12b for the Project, and no other feasible options are identified, then the impact at this location would be Significant and Unavoidable. Alternatively, if the City accepts the approach identified, the Project impact at this location would be Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13c: Under 2030 cumulative conditions, Phase I of the proposed Project would increase average intersection vehicle delay by more than four seconds during the PM peak hour at *Intersection #5 (Telegraph Avenue / 27th Street)* (2030), which would operate at an unacceptable LOS E during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-13c: Implement Mitigation Measure TRANS-5d at Telegraph Avenue / 27th Street:

-
- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
 - Coordinate the signal timing changes at this intersection with the adjacent intersections (e.g., Telegraph Avenue / 26th Street and 27th Street / Northgate Avenue-SR 24 EB On-ramp) that are in the same signal coordination group.
 - Redesign the signal plan to give the northbound Telegraph Avenue left-turn movement protected-permitted phasing.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the South Tower's impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13d: Under 2030 cumulative conditions, Phase I of the proposed Project would increase the average intersection delay by more than two seconds during the AM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of South Tower-generated traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.32 under Cumulative (2030) without Project Conditions and 1.37 under Cumulative (2030) plus South Tower Conditions in the PM peak hour. Because the increase in v/c ratio would be 5 percent, which is above the three percent threshold of significance, South Tower-generated traffic would result in a significant impact at this intersection.

Mitigation Measure TRANS-13d: Implement Mitigation Measure TRANS-3c, and also prohibit southbound Harrison Street left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches.

These measures alone would not be sufficient to completely mitigate the South Tower impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the South Tower impacts. Therefore, the South Tower impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13e: Under 2030 cumulative conditions, Phase I of the proposed Project would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2030). (Significant)

Mitigation Measure TRANS-13e: Implement Mitigation Measure TRANS-1c at Harrison Street / 20th Street / Kaiser Center Access Road:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Webster Street / 20th Street and Harrison Street / Lakeside Drive) in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements. After implementation of the mitigation measure, the intersection (located within the Downtown area) would operate at an acceptable LOS E in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at *Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue) (2030)*, which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-13f: Implement the following measures at the Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue intersection:

- Optimize the traffic signal (to include determination of the allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.

-
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
 - 2070L Type Controller
 - GPS communication (clock)
 - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
 - City Standard ADA wheelchair ramps
 - Full actuation (video detection, pedestrian push buttons, bicycle detection)
 - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
 - Countdown Pedestrian Signals
 - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
 - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection (located within the Downtown area) would remain unacceptable, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as additional lanes on both the Harrison Street and MacArthur Boulevard (Westbound) approaches. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Roadway Impacts

Impact TRANS-14: Under 2030 cumulative traffic conditions, Phase I of the proposed Project would worsen level of service conditions on area roadway segments. (Significant at intersections described above under Impacts TRANS-13a to TRANS-13e)

Table 4 summarizes peak hour Level of Service for the study roadway segments under Cumulative (2030) plus South Tower Conditions, with the following roadway segments expected to operate at LOS F:

- Caltrans Facilities
 - #1: SR 260 (Posey/Webster Tubes) from Alameda city limits to I-880 (Northbound, AM and PM peak hours; and Southbound, PM peak hour)
 - #3: I-880 from Oak Street to 5th Avenue (Westbound, AM peak hour; and Eastbound PM peak hour)
 - #4: I-980 from 27th Street to 29th Street (Southbound, AM peak hour)
- Non-Caltrans Facilities
 - #9: Grand Avenue from Harrison Street to El Embarcadero (Westbound, AM peak hour; and Eastbound, PM peak hour)
 - #10: Harrison Street/Oakland Avenue between I-580 and 27th Street (Southbound, AM peak hour; and Northbound, PM peak hour)
 - #10: Harrison Street / Oakland Avenue from 27th Street to Grand Avenue (Southbound, AM peak hour; and Northbound, PM peak hour)

**TABLE 4
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER ROADWAY SEGMENT LEVELS OF SERVICE**

| No. | Roadway Segment | Dir. | Ln. | Capacity
(veh/hr) | Cumulative (2030)
without Project Conditions | | | | | | Cumulative (2030) plus South Tower Conditions | | | | | |
|-------------------------|---|------|-----|----------------------|---|-------|------|--------------|-------|------|---|-------|------|--------------|-------|------|
| | | | | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c |
| Caltrans Facilities | | | | | | | | | | | | | | | | |
| 1 | SR 260 (Posey / Webster Tubes)
from Alameda city limits to I-880 | NB | 2 | 3,400 | F | 4,084 | 1.20 | F | 3,885 | 1.14 | F | 4,087 | 1.20 | F | 3,886 | 1.14 |
| | | SB | 2 | 3,400 | E | 3,327 | 0.98 | F | 4,329 | 1.27 | E | 3,328 | 0.98 | F | 4,337 | 1.28 |
| 2 | I-880
from Market Street to I-980 | EB | 4 | 8,000 | B | 3,835 | 0.48 | B | 3,394 | 0.42 | B | 3,876 | 0.48 | B | 3,401 | 0.43 |
| | | WB | 4 | 8,000 | C | 4,441 | 0.56 | C | 4,031 | 0.50 | C | 4,446 | 0.56 | C | 4,067 | 0.51 |
| 3 | I-880
from Oak Street to 5th Avenue | EB | 4 | 8,000 | E | 7,390 | 0.92 | E | 7,920 | 0.99 | E | 7,396 | 0.92 | E | 7,960 | 1.00 |
| | | WB | 4 | 8,000 | E | 7,925 | 0.99 | E | 7,217 | 0.90 | E | 7,970 | 1.00 | E | 7,225 | 0.90 |
| 4 | I-980
from 27th Street to 29th Street | NB | 3 | 6,000 | B | 2,300 | 0.38 | D | 4,806 | 0.80 | B | 2,315 | 0.39 | D | 4,903 | 0.82 |
| | | SB | 3 | 6,000 | F | 6,653 | 1.11 | C | 3,009 | 0.50 | F | 6,706 | 1.12 | C | 3,019 | 0.50 |
| Non-Caltrans Facilities | | | | | | | | | | | | | | | | |
| 5 | Broadway
from 19th Street to Grand Ave. | NB | 2 | 1,800 | B | 699 | 0.39 | C | 1,207 | 0.67 | B | 710 | 0.39 | D | 1,279 | 0.71 |
| | | SB | 2 | 1,800 | B | 595 | 0.33 | B | 823 | 0.46 | B | 629 | 0.35 | B | 830 | 0.46 |
| 6 | Telegraph Avenue
from 20th Street to 27th Street | NB | 2 | 1,800 | B | 688 | 0.38 | C | 1,080 | 0.60 | B | 690 | 0.38 | C | 1,091 | 0.61 |
| | | SB | 2 | 1,800 | B | 897 | 0.50 | B | 779 | 0.43 | B | 897 | 0.50 | B | 781 | 0.43 |
| 7 | West Grand Avenue
from Telegraph to San Pablo | EB | 2 | 1,800 | D | 1,427 | 0.79 | C | 962 | 0.53 | D | 1,486 | 0.83 | C | 965 | 0.54 |
| | | WB | 2 | 1,800 | C | 910 | 0.51 | C | 1,160 | 0.64 | C | 915 | 0.51 | C | 1,195 | 0.66 |
| 8 | Grand Avenue
from Broadway to Harrison | EB | 2 | 1,800 | C | 924 | 0.51 | D | 1,269 | 0.71 | C | 998 | 0.55 | C | 1,269 | 0.71 |
| | | WB | 2 | 1,800 | D | 1,393 | 0.77 | C | 1,199 | 0.67 | D | 1,393 | 0.77 | C | 1,199 | 0.67 |
| 9 | Grand Avenue
from Harrison St. to El Embarcadero | EB | 2 | 1,800 | C | 936 | 0.52 | F | 2,284 | 1.27 | C | 936 | 0.52 | F | 2,346 | 1.30 |
| | | WB | 2 | 1,800 | E | 1,782 | 0.99 | D | 1,326 | 0.74 | F | 1,911 | 1.06 | D | 1,350 | 0.75 |
| 10 | Harrison Street / Oakland Avenue
from I-580 to 27th St. | NB | 2 | 1,800 | E | 1,718 | 0.95 | F | 2,342 | 1.30 | E | 1,745 | 0.97 | F | 2,457 | 1.36 |
| | | SB | 2 | 1,800 | E | 1,571 | 0.87 | C | 987 | 0.55 | E | 1,647 | 0.92 | C | 1,001 | 0.56 |
| 11 | Harrison Street | NB | 3 | 2,700 | B | 1,276 | 0.47 | C | 1,650 | 0.61 | B | 1,311 | 0.49 | C | 1,814 | 0.67 |

| | | | | | | | | | | | | | | | | |
|----|--|----|---|-------|---|-------|------|---|-------|------|---|-------|------|---|-------|------|
| | from 27th Street to
Grand Ave. | SB | 3 | 2,700 | C | 1,361 | 0.50 | B | 924 | 0.34 | C | 1,448 | 0.54 | B | 940 | 0.35 |
| 12 | Harrison Street
from 20th Street to
14th Street | NB | 2 | 1,800 | B | 643 | 0.36 | D | 1,362 | 0.76 | B | 653 | 0.36 | D | 1,367 | 0.76 |

Bold indicates significant impact.

SOURCE: AECOM, 2010.

The South Tower would not result in a significant impact on the following segments because the addition of South Tower-generated traffic would not cause an increase in v/c ratio greater than the three percent threshold of significance:

- #1: SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880
- #4: I-980 from 27th Street to 29th Street

The Project's potential impacts on each of the remaining segments are discussed below:

Impact TRANS-14a: Under 2030 cumulative traffic conditions, Phase I of the proposed Project would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on Segment #3 (I-880 from Oak Street to 5th Avenue) (2030). (Significant)

It should also be noted that, in each case, while the South Tower would cause the segment to operate to LOS F (because the traffic volumes would exceed the 8,000 vehicles hourly capacity), the increase in v/c ratio would be only one percent, and rounded to the hundredths place (per standard practice), the v/c ratio is 1.00, which is LOS E.

Mitigation Measure TRANS-14a: There are no feasible measures to mitigate the South Tower impact, given the existing alignment and constraints due to lack of right-of-way for both the roadway on the west end of the channel and possibly for support columns above the Union Pacific right-of-way. The segment of I-880 from Oak Street to 5th Avenue consists of two four-lane aerial structures, with the segment immediately west of Lake Merritt Channel bordered on the north by the Laney College parking lot and on the south by industrial uses. The aerial structure continues east of the channel, crossing over the existing Union Pacific railroad right-of-way. Increasing capacity on the freeway would likely require increasing the number of travel lanes. Also, any proposed mitigation measure would also require Caltrans project approval. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-14b: Under 2030 cumulative traffic conditions, Phase I of the proposed Project would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-14b: Implement Mitigation Measure TRANS-2a along Grand Avenue:

-
- Optimize traffic signals (i.e., adjust the allocation of green time for each intersection approach) at intersections along Grand Avenue (i.e., Harrison Street, Bay Place, Park View Terrace / Bellevue Avenue, Perkins Street, Staten Avenue, Euclid Avenue, and El Embarcadero) for the AM and PM peak hours.
 - Coordinate the signal timing at the intersections in the road segment.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersections. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersections should be brought up to

After implementation of this measure, conditions would remain at an unacceptable LOS, and the South Tower impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the South Tower impacts on this segment, but as discussed for Impact TRANS-2a, there are no feasible mitigation measures to completely mitigate the South Tower impacts. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-14c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-14c: To completely mitigate the South Tower's impacts would require substantial capacity improvements such as an additional travel lane on Harrison Street / Oakland Avenue in the northbound direction, which may conflict with objectives of Harrison Street / Oakland Avenue Community Transportation Plan currently in progress and require removal of bike lanes or substantial amounts of on-street parking. Therefore, there are no feasible measures to completely mitigate the impacts of the South Tower, and the impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Bicycle Impacts

Table 5 specifies the City of Oakland Municipal Code requirements for the provision of short- and long-term bicycle parking facilities, as well as shower and locker facilities, for the South Tower. The 136 long-term bicycle spaces should be secure and serve office workers who may leave their bicycles at the same location all day or overnight, and should be provided in the form of bicycle lockers or bicycle cages.

**TABLE 5
SOUTH TOWER BICYCLE FACILITY REQUIREMENTS**

| Facility / Land Use | Amount (KSF) ^a | Municipal Code Provision | Facility Requirement |
|------------------------------------|---------------------------|---|--|
| Bicycle Parking | | | |
| Office | 552 | 1 long-term space per 10 KSF
1 short-term space per 20 KSF | 55 long-term spaces
28 short-term spaces |
| Retail | 27 | 1 long-term space per 12 KSF
1 short-term space per 5 KSF | 2 long-term spaces
5 short-term spaces |
| Total | | | 57 long-term spaces
33 short-term spaces |
| Bicycle Showers and Lockers | | | |
| Office | 552 | 2 showers per gender, plus one shower per gender for each 150 KSF above 150 KSF | 4 showers per gender (8 total) |
| | | 4 lockers per shower | 32 lockers |
| Retail | 27 | No locker or shower requirements (less than 150 KSF) | -- |
| Total | | | 4 showers per gender (8 total)
32 lockers |

^a KSF = 1,000 sq. ft.

SOURCE: AECOM, 2010.

The 33 short-term bicycle racks would accommodate visitors who leave their bikes for a reasonably short period of time and should be provided in areas that provide shelter and, ideally, a high level of passive security from surrounding pedestrians. Other visible security measures such as security cameras may also be considered.

South Tower site plans do not include provisions to accommodate bicycle parking. City of Oakland's SCAs include SCA TRANS-2, which requires that prior to the issuance of first certificate of occupancy, the applicant shall submit for review and approval of the Planning and Zoning Division, plans that show bicycle storage and parking facilities to accommodate 33 short-term bicycle parking spaces onsite or on public sidewalk, and 57 long-term bicycle parking spaces.

Although not required to mitigate a significant impact, Class 2 bicycle facilities (bicycle lane) should be considered on Franklin Street and Webster Street to improve bicycle conditions in the immediate vicinity of the South Tower. As discussed in the Existing Bicycle Conditions section, the section of Franklin Street and Webster Street between 8th Street and Broadway is proposed for Class 2 bicycle facilities (bicycle lanes) and Class 3 (bicycle route). In order to encourage use of alternative modes of travel such as bicycling and provide greater safety for bicyclists; it is recommended that these sections of the bikeway network be completed. **Table 6** presents the

TABLE 6
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE –
WITH FRANKLIN STREET AND WEBSTER STREET BIKE LANES

| No. | Intersection | Traffic Control ^a | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) + South Tower Conditions | | | |
|-----------------|------------------------|------------------------------|--|--------------------|------------|--------------------|--|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b | LOS | Delay ^b |
| Within Downtown | | | | | | | | | | |
| 17 | Webster St. /21st St. | Signal | B | 14.7 | B | 19.9 | B | 15.1 | B | 19.1 |
| 18 | Franklin St. /21st St. | Signal | B | 10.4 | B | 12.0 | A | 9.6 | B | 10.1 |
| 22 | Franklin St. /20th St. | Signal | B | 11.7 | B | 14.9 | B | 13.9 | B | 14.1 |
| 23 | Webster St. /20th St. | Signal | C | 24.6 | C | 25.9 | C | 22.0 | C | 25.2 |

^a The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2010.

LOS results (without and with the South Tower) at four study intersections that would have its vehicle approach lanes modified to accommodate the proposed bike lane. More specifically, the proposed bike lanes would result in the following changes to the existing vehicle approach lanes:

SB Webster at 21st: Existing = 1 Shared Left-Thru, 1-Thru and 1-Shared Thru-Right
With Bike Lane=1-Shared Left-Thru and 1-Shared Thru-Right

NB Franklin at 21st: Existing = 1 Shared Left-Thru, 1-Thru and 1-Shared Thru-Right
With Bike Lane=1-Shared Left-Thru and 1-Shared Thru-Right

NB Franklin at 20th: Existing = 1 Shared Left-Thru, 2-Thru and 1-Right Turn Only
With Bike Lane=1-Shared Left-Thru, 1-Thru and 1-Right Turn Only

SB Webster at 20th: Existing = 1 Shared Left-Thru, 1-Thru and 1-Shared Thru-Right
With Bike Lane=1-Shared Left-Thru, 1-Thru and 1-Right Turn Only

Under Cumulative Conditions with the bike lanes on Franklin Street and Webster Street, the South Tower is not expected to have a significant impact on the four study intersections. In most cases, the South Tower is expected to add volume to non-critical movements, thus reducing the average delay at the intersections.

AC Transit Travel Time

Travel time along the following corridors was evaluated in order to determine the impacts of Project-generated traffic on the operations of key AC Transit trunk lines in Downtown Oakland:

1. 11th Street (eastbound) from Brush Street to Oak Street
2. 12th Street (westbound) from Oak Street to Brush Street
3. 20th Street (eastbound) from Telegraph Avenue to Harrison Street
4. 20th Street (westbound) from Harrison Street to Telegraph Avenue
5. Broadway (southbound) from 27th Street to 20th Street
6. Broadway (southbound) from 20th Street to 11th Street
7. Broadway (northbound) from 11th Street to 20th Street
8. Broadway (northbound) from 20th Street to 27th Street
9. Grand Avenue between MacArthur Boulevard and Harrison Street – (westbound AM and eastbound PM)
10. Harrison Street between MacArthur Boulevard and Grand Avenue (southbound AM and northbound PM)
11. Telegraph Avenue between 20th Street and 27th Street (southbound AM and northbound PM)

Corridors #1 through #8 were analyzed in both directions during both the AM and PM peak hours. Corridors #9, #10, and #11 were analyzed for only one direction during each peak hour, as traffic on these segments is highly directional. For the previous AC Transit Travel Time analysis, Phase I of the Project represented build-out of only the North Tower. The following analysis represents conditions with build-out of only the South Tower

Table 7 summarizes the results of the travel time analysis for the AM and PM peak hours. Observations of corridor travel times were taken for Existing Conditions and travel time differentials obtained from the Synchro networks used in the intersection LOS analysis. A minimum of three field runs were conducted in each direction for each corridor in September 2008.

It should be noted that the travel times presented here only represent the time it takes automobiles to travel the length of the corridor. Obtaining a travel time estimate for transit vehicles traveling through corridors can be difficult considering that the travel time for transit vehicles is much

more variable than that for automobiles. This variability is due to a wide variety of factors, but primarily involves schedule adherence and on-time performance. A transit vehicle that is already behind schedule can quickly get further behind schedule due to accumulating passenger demand at transit stops, resulting in longer than usual dwell times to allow passengers to board and alight. In addition, because transit vehicles must follow the same route, there is less flexibility than with automobiles in events such as accidents or unexpected congestion, increasing delays further. Given these considerations, the values in Table 8 should be viewed as the incremental increase in transit travel time compared to Existing Conditions.

TABLE 7
TRANSIT CORRIDOR TRAVEL TIMES COMPARED TO EXISTING CONDITIONS

| | | <u>Incremental Increase (sec.) compared to Existing</u> | | | |
|-----------------------------|--|---|--|---|--|
| No. | Route | Existing
(Sept. 2008)
Travel Time | Existing plus
South Tower
Conditions | Cumulative
(2030) without
Project
Conditions | Cumulative
(2030) plus
South Tower
Conditions |
| Weekday AM Peak Hour | | | | | |
| 1 | 11th Street EB
Brush Street to Oak Street | 3:35 | + 0 | + 5 | + 4 |
| 2 | 12th Street WB
Oak Street to Brush Street | 3:19 | + 0 | + 5 | + 5 |
| 3 | 20th Street EB
Telegraph Avenue to Harrison Street | 2:17 | + 20 | + 25 | + 8 |
| 4 | 20th Street WB
Harrison Street to Telegraph Avenue | 1:40 | + 5 | (- 23) | (- 7) |
| 5 | Broadway SB
27th Street to 20th Street | 2:21 | + 2 | + 10 | + 13 |
| 6 | Broadway SB
20th Street to 11th Street | 2:28 | + 0 | + 16 | + 17 |
| 7 | Broadway NB
11th Street to 20th Street | 2:19 | + 0 | + 19 | + 21 |
| 8 | Broadway NB
20th Street to 27th Street | 1:03 | + 1 | + 7 | + 8 |
| 9 | Grand Avenue WB
MacArthur Blvd. to Harrison Street | 3:30 | + 1 | + 15 | + 24 |
| 10 | Harrison Street SB
MacArthur Blvd. to Grand Avenue | 3:28 | + 11 | + 390 | + 390 |
| 11 | Telegraph Street SB
27th Street to 20th Street | 2:23 | + 1 | + 4 | + 4 |
| Weekday PM Peak Hour | | | | | |
| 1 | 11th Street EB
Brush Street to Oak Street | 4:40 | + 0 | + 5 | + 5 |
| 2 | 12th Street WB
Oak Street to Brush Street | 3:28 | + 0 | + 14 | + 14 |
| 3 | 20th Street EB
Telegraph Avenue to Harrison Street | 2:18 | + 28 | + 6 | + 4 |
| 4 | 20th Street WB
Harrison Street to Telegraph Ave. | 3:29 | + 9 | (- 32) | (- 13) |
| 5 | Broadway SB
27th Street to 20th Street | 2:18 | + 0 | + 9 | + 10 |
| 6 | Broadway SB
20th Street to 11th Street | 2:58 | + 0 | + 163 | + 163 |
| 7 | Broadway NB
11th Street to 20th Street | 3:33 | + 3 | + 204 | + 206 |
| 8 | Broadway NB
20th Street to 27th Street | 1:45 | + 1 | + 101 | + 103 |
| 9 | Grand Avenue EB
Harrison Street to MacArthur Blvd. | 4:21 | + 17 | + 138 | + 155 |
| 10 | Harrison Street NB
Grand Avenue to Perry Place | 3:44 | + 51 | + 79 | + 146 |
| 11 | Telegraph Street NB
20th Street to 27th Street | 2:03 | + 0 | + 6 | + 7 |

SOURCE: AECOM, 2010.

As shown in Table 8, the South Tower would increase peak hour travel times along most corridors, mostly as a result of increases in intersection average delay. Some corridors would see average travel time decrease slightly between existing and future-year scenarios and between baseline and South Tower scenarios, primarily as a result of geometry changes or better-performing movements at intersections. Travel time on westbound 20th Street, for example, is lower under Cumulative (2030) without Project Conditions than under Existing Conditions, partially as a result of reduced delays due to Measure DD modifications at this intersection.

A comparison between Existing Conditions and Existing plus South Tower Conditions, indicate that the South Tower would increase travel time the most on the following transit corridors:

- #3: 20th Street EB (from Telegraph Avenue to Harrison Street)- 20 seconds in the AM and 28 seconds in the PM;
- #10: Harrison Street NB (from Grand Avenue to Perry Place) –51 seconds in the PM.

Under Cumulative (2030) plus South Tower Conditions, the South Tower (when compared to Cumulative without Project Conditions) would cause an increase in corridor travel time of nine seconds (=24-15) along westbound Grand Avenue (from MacArthur Boulevard to Harrison Street) in the AM peak hour and an increase of 67 seconds (=146-79) in the PM peak hour along northbound Harrison Street (from Grand Avenue to Perry Place). Other corridors such as Broadway would also experience substantial increases in travel time under Cumulative Conditions, but the South Tower contribution to these increases would be minimal.

Given that Grand Avenue and Harrison Street are major corridors with significant vehicle traffic traveling to and from I-580 ramps, transit vehicles on these routes already experience some delay during the peak periods and would continue to do so in Cumulative (2030) with South Tower Conditions.

Mitigation: None required.

Planning-Related Non-CEQA Issues

The following section discusses transportation-related planning issues that do not constitute physical environmental impacts under CEQA, but that are evaluated to inform decision makers and the public about these issues.

Transit

Based on the 30 percent transit mode share assumed for the trip generation analysis, the South Tower would generate about 256 transit trips in the weekday AM peak hour and 243 transit trips in the weekday PM peak hour. Given that the Project would consist primarily of office space, these trips would almost exclusively be inbound during the AM peak hour and outbound during the PM peak hour. The expected distribution of transit trips was developed based on the trip distributions derived from the ACCMA Travel Demand Model.

For origins and destinations with both BART and AC Transit service, the split of Project-generated new transit riders on BART and AC Transit was based on a transit mode split of 7 percent AC Transit and 23 percent BART (for a total transit share of 30 percent) presented in the *Downtown Transportation and Parking Plan* (2003) for the Old Oakland / Metro Center / County Center Downtown subareas. The results of this analysis are summarized in **Table 8**.

TABLE 8
SOUTH TOWER WEEKDAY PEAK-HOUR TRANSIT TRIPS

| Origin / Destination | Transit Routes | | | | Transit Routes |
|---|----------------|----|--------------|----|---|
| | AM Peak Hour | | PM Peak Hour | | |
| | BART | AC | BART | AC | |
| San Francisco | 52 | 13 | 51 | 13 | BART, NL |
| Hayward / Fremont | 51 | 12 | 49 | 12 | BART, 1, 1R, 40 |
| West Oakland | 17 | 11 | 16 | 11 | BART, 13, 14, 19, NL |
| East Oakland | 23 | 10 | 22 | 9 | BART, 1, 1R, 11, 14, 18, 40, NL |
| North Oakland / Berkeley / Albany / El Cerrito / Richmond | 27 | 11 | 26 | 11 | BART, 1, 1R, 15, 18, 51, 72, 72R, 72M, 88 |
| Walnut Creek / Pleasant Hill | 25 | 0 | 25 | 0 | BART |
| Total | 195 | 58 | 189 | 56 | |

SOURCE: AECOM, 2010.

AC Transit Loading

As shown in Table 6, the most substantial increase in transit ridership as a result of the South Tower would occur on the NL route, which would carry about 12 new riders in both the AM and PM peak hours. With 15-minute headways, this increase in ridership is equivalent to about three new riders per bus. The NL is has substantial capacity to accommodate these additional riders.

The South Tower would also cause increases of 8 to 12 passengers in the AM and PM peak hours to and from other origins and destinations, but these areas are served by multiple AC Transit bus lines. The South Tower transit ridership would likely only result in a maximum increase of two passengers per bus on these lines.

Given this increase in AC Transit ridership, it is not expected that the South Tower would increase the average ridership on AC Transit lines by three percent at bus stops where the average load factor in place would exceed 125 percent over a peak 30-minute period.

BART Loading

As shown in Table 6, the most substantial increase in transit ridership as a result of the South Tower would occur on the San Francisco and Fremont corridors of the BART network, which would see increases of about 50 passengers each in both the AM and PM peak hours.

Based on BART fleet statistics, the maximum capacity of a BART car was assumed to be 150 passengers, with an average of 68 to 72 seats in each car. Therefore, cars would have only standing room available at about 45 to 48 percent capacity utilization.

Under Existing plus South Tower Conditions, ridership would increase by about 12 passengers per train for these lines during the peak hours, or about two passengers per car. This is equivalent to a one percent increase in capacity utilization for these lines, bringing maximum capacity utilization on Fremont – Richmond trains in the AM peak hour to 83 percent and on Richmond – Fremont trains in the PM peak hour to 81 percent. However, the South Tower would not cause BART passenger volumes to exceed the standing capacity of trains.

Trains on other lines would see similar increases, but because they currently operate at well under 100 percent capacity utilization, these trains have capacity to accommodate additional South Tower-generated riders without exceeding standing capacity.

BART Faregate Queuing

Based on the estimates of BART ridership in Table 6, South Tower would add about 20 passengers during the peak queuing scenario (13 passengers from the Fremont – Richmond train and 7 passengers from the SFO – Pittsburg / Bay Point train). Based on a BART faregate capacity of 25 passengers per minute and assuming that these additional South Tower-generated riders all arrive at the faregates at the same time, the South Tower would theoretically increase the maximum faregate queues by 7 passengers to 13 passengers in length. It is likely that the South Tower would increase maximum queue delay by ten seconds at the most, but still keeping the maximum queue delay well under the one minute performance standard of the City of Oakland.

Intersection and Roadway Segment Operations with BRT

The AC Transit East Bay Bus Rapid Transit (BRT) Project is in the planning and are neither fully funded nor approved. Although only funded and approved projects are typically considered for inclusion in impact analyses, the following describes the result of separate supplementary BRT related traffic analyses.

As described on page IV.L-36, the proposed BRT improvements would generally require the removal of one through lane in each direction along Telegraph Avenue, narrowing the roadway to one vehicular lane in each direction. BRT vehicles would run in a protected median, with left turn pockets for autos provided at key intersections. Along 11th and 12th streets in Downtown Oakland, the BRT service would operate in a side-running configuration, removing one lane of through traffic and eliminating some parking to allow for bulbouts at stations. The LOS at eight study intersections (**Table 9**) and the roadway segment (**Table 10**) closest to the proposed BRT were calculated for Cumulative Conditions. Under Cumulative Conditions with the BRT, the South Tower is expected to increase the V/C ratio by 0.10 (from 1.71 to 1.81) at Telegraph Avenue/27th Street, thus exceeding the three percent threshold of significance. Since it is not feasible to add lane capacity at this intersection and still accommodate the BRT, this impact will be Significant and Unavoidable. The proposed removal of one lane in each direction on Telegraph Avenue to accommodate the BRT reduces the capacity of each direction in half (from

1,800 vehicles/hour to 900) thus causing the northbound direction to operate at LOS F during the PM peak. In the northbound direction, the South Tower increases the V/C ratio by 0.01 (from 1.20 to 1.21), which is below the three percent threshold of significance.

Intersection Queuing Analysis

Queuing analysis was carried out for all of the “plus South Tower” scenarios using the Synchro software. Signalized intersections operating at unacceptable conditions as shown in Table IV.L-10, Table IV.L-12, Table IV.L-14, and Table IV.L-16 were selected for evaluation as the South Tower is expected to have its largest effect on 95th percentile queues at these intersections. A 95th percentile queue of 100 feet means that 95 percent of the time, the queue is expected to be

TABLE 9
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE – WITH BRT

| No. | Intersection | Traffic Control | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) plus South Tower Conditions | | | |
|------------------|---------------------------|-----------------|--|--------------------|------------|--------------------|---|--------------------|------------|--------------------|
| | | | AM Pk. Hr. | | PM Pk. Hr. | | AM Pk. Hr. | | PM Pk. Hr. | |
| | | | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a |
| Outside Downtown | | | | | | | | | | |
| 5 | Telegraph Ave. / 27th St. | Signal | C | 29.0 | F | >120.0 | C | 30.5 | F | >120.0 |
| Within Downtown | | | | | | | | | | |
| 9 | Telegraph / West Grand | Signal | D | 37.9 | E | 59.2 | D | 40.9 | E | 64.5 |
| 20 | Telegraph Ave. / 20th St. | Signal | B | 18.3 | D | 38.0 | B | 19.5 | D | 36.7 |
| 21 | Broadway / 20th Street | Signal | B | 15.1 | C | 34.0 | B | 15.3 | D | 36.1 |
| 35 | Madison St. / 12th Street | Signal | C | 25.3 | B | 10.9 | C | 25.5 | B | 11.0 |
| 36 | Oak Street /12th Street | Signal | B | 16.1 | B | 16.3 | B | 16.1 | B | 16.3 |
| 38 | Madison St. /11th Street | Signal | B | 10.8 | B | 11.2 | B | 10.7 | B | 11.1 |
| 39 | Franklin St. /11th Street | Signal | B | 14.5 | B | 14.0 | B | 14.5 | B | 14.0 |

^a The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2010.

100 feet or less. The 95th percentile queue is used for analysis, because it is standard practice to design a storage pocket to accommodate expected peak traffic demand 95 percent of the time. In all cases, the storage capacity (rounded to the nearest 25 feet) is taken as the distance to the nearest intersection, major driveway, or pedestrian crossing. **Table 11** and **Table 12** summarize the queuing analysis for Existing plus South Tower Conditions and Cumulative plus South Tower Conditions, respectively.

Identified below are instances where the South Tower trips would add 25 or more feet to the baseline (without South Tower) 95th percentile queue (if the baseline 95th percentile queue was already over the available storage length), or where South Tower trips would extend the queue over the available storage length. The findings are summarized below.

Existing plus South Tower Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM)-Jackson Street NBL and SBR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (PM) – Grand Avenue NER.

**TABLE 10
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT**

| No. | Roadway Segment | Dir. | Lane | Capacity
(veh./hr.) | Cumulative without Project Conditions | | | | | | Cumulative plus South Tower Conditions | | | | | |
|-------------------------|---|------|------|------------------------|---------------------------------------|--------|------|--------------|--------|------|--|--------|------|--------------|--------|------|
| | | | | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Volume | v/c | LOS | Volume | v/c | LOS | Volume | v/c | LOS | Volume | v/c |
| Non-Caltrans Facilities | | | | | | | | | | | | | | | | |
| 6 | Telegraph Avenue
from 20th Street to 27th Street | NB | 1 | 900 | D | 688 | 0.76 | F | 1,080 | 1.20 | D | 690 | 0.77 | F | 1,091 | 1.21 |
| | | SB | 1 | 900 | E | 897 | 1.00 | E | 779 | 0.87 | E | 897 | 1.00 | E | 781 | 0.87 |

SOURCE: AECOM, 2010.

TABLE 11
EXISTING WITHOUT AND WITH SOUTH TOWER CONDITIONS: 95TH PERCENTILE QUEUES

| No. | Intersection | Lane Group | Existing Conditions | | | | Existing plus South Tower Conditions | | | | |
|-----|---|------------|--|-------------------|-------------|---------------------|--------------------------------------|-------------|-----|-----|-----|
| | | | Storage Cap. (feet) | Queue Length (ft) | | Storage Cap. (feet) | Queue Length (ft) | | | | |
| | | | | AM Pk. Hour | PM Pk. Hour | | AM Pk. Hour | PM Pk. Hour | | | |
| 2 | Oakland Ave. / Perry Pl. / I-580 EB Ramps | NE | T | 400 | -- | 125 | 400 | -- | 125 | | |
| | | | R | 400 | -- | 600 | 400 | -- | 650 | | |
| | | SE | L | 350 | -- | 275 | 350 | -- | 275 | | |
| | | | T | 350 | -- | 300 | 350 | -- | 300 | | |
| 3 | Harrison St. / 27th St. / 24th St. | NB | L | 400 | -- | 125 | 400 | -- | 150 | | |
| | | | TR | 400 | -- | 475 | 400 | -- | 575 | | |
| | | SB | L | 150 | -- | 250 | 150 | -- | 250 | | |
| | | | TR | 375 | -- | 200 | 375 | -- | 200 | | |
| | | EB | L | 725 | -- | 225 | 725 | -- | 225 | | |
| | | | T | 725 | -- | 150 | 725 | -- | 150 | | |
| | | | R | 725 | -- | 100 | 725 | -- | 100 | | |
| | | WB | L | 175 | -- | 75 | 175 | -- | 75 | | |
| | | | T | 175 | -- | 150 | 175 | -- | 150 | | |
| | | | R | 175 | -- | 50 | 175 | -- | 50 | | |
| | | 24 | Harrison St. / 20th St. / Kaiser Ctr. Access Rd. | NB | LTR | 575 | -- | 250 | 575 | -- | 400 |
| | | | | SB | T | 575 | -- | 75 | 575 | -- | 75 |
| R1 | 575 | | | | -- | 75 | 575 | -- | 100 | | |
| SE | R2 | | | 125 | -- | 25 | 125 | -- | 25 | | |
| | LT | | | -- | -- | -- | 150 | -- | 200 | | |
| R | -- | | | -- | -- | 50 | -- | 25 | | | |
| EB | L2 | | | -- | -- | -- | 100 | -- | 25 | | |
| | L | | | 375 | -- | 75 | 375 | -- | 125 | | |
| WB | TR | | | 375 | -- | 125 | 375 | -- | 150 | | |
| | L | | | 175 | -- | 25 | 175 | -- | 25 | | |
| T | 175 | | | -- | 25 | 175 | -- | 50 | | | |
| 42 | Jackson St. / 6th St. / I-880 NB On-Ramp | | | NB | LT | 175 | 225 | 400 | 175 | 225 | 400 |
| | | SB | T | 250 | 50 | 50 | 250 | 50 | 50 | | |
| | | | R | 500 | 875 | 950 | 500 | 875 | 950 | | |
| | | WB | L | 300 | 25 | 25 | 300 | 25 | 25 | | |
| | | | T | 300 | 125 | 225 | 300 | 125 | 225 | | |
| 44 | Oak St. / 5th St. / I-880 SB On-Ramp | NB | TR | 100 | -- | 275 | 100 | 125 | 275 | | |
| | | EB | LTR | 300 | -- | 200 | 300 | 200 | 200 | | |
| 45 | Grand Avenue / El Embarcadero | NW | L | 150 | -- | 200 | 150 | -- | 200 | | |
| | | | R | 300 | -- | 25 | 300 | -- | 25 | | |
| | | NE | T | 600 | -- | 825 | 600 | -- | 875 | | |
| | | SW | L | 150 | -- | 225 | 150 | -- | 225 | | |
| | | | T | 325 | -- | 200 | 325 | -- | 225 | | |
| 47 | Grand Ave. / MacArthur Blvd. (EB) | NE | T | 350 | -- | 225 | 350 | -- | 200 | | |
| | | | R | 350 | -- | 400 | 350 | -- | 425 | | |
| | | SE | LTR | 350 | -- | 300 | 350 | -- | 300 | | |
| | | SW | L | 150 | -- | 300 | 150 | -- | 300 | | |
| | | | T | 425 | -- | 175 | 425 | -- | 175 | | |

Bold indicates storage capacity exceeded.

All storage capacities and queue lengths rounded to the nearest 25 feet.

SOURCE: AECOM, 2010.

TABLE 12
CUMULATIVE (2030) WITHOUT & WITH SOUTH TOWER CONDITIONS: 95TH PERCENTILE QUEUES

| No. | Intersection | Lane Group | | Cumulative (2030) without
Project Conditions | | | Cumulative (2030) plus South
Tower Conditions | | |
|-----|---|------------|-----|---|-------------------|---------------|--|-------------------|---------------|
| | | | | Storage
Cap.
(feet) | Queue Length (ft) | | Storage
Cap.
(feet) | Queue Length (ft) | |
| | | | | | AM
Pk. Hr. | PM
Pk. Hr. | | AM
Pk. Hr. | PM
Pk. Hr. |
| 1 | Harrison / Stanley / I-580 | E | R | 500 | 400 | -- | 500 | 475 | -- |
| 2 | Oakland Ave. / Perry Pl. /
I-580 EB Ramps | NE | T | 400 | 175 | 300 | 400 | 175 | 300 |
| | | | R | 400 | 475 | 700 | 400 | 500 | 775 |
| | | SE | L | 350 | 250 | 625 | 350 | 250 | 625 |
| | | | T | 350 | 250 | 625 | 350 | 250 | 625 |
| 3 | Harrison St. /
27th St. / 24th St. | NB | L | 400 | 250 | 200 | 400 | 250 | 225 |
| | | | TR | 400 | 250 | 600 | 400 | 250 | 675 |
| | | SB | L | 150 | 200 | 350 | 150 | 200 | 350 |
| | | | TR | 375 | 825 | 325 | 375 | 875 | 325 |
| | | EB | L | 725 | 100 | 325 | 725 | 100 | 350 |
| | | | T | 725 | 50 | 200 | 725 | 50 | 200 |
| | | | R | 725 | 150 | 150 | 725 | 150 | 150 |
| | | WB | L | 175 | 125 | 100 | 175 | 125 | 100 |
| | | | T | 175 | 175 | 175 | 175 | 175 | 175 |
| | | | R | 175 | 50 | 50 | 175 | 50 | 50 |
| | | NB | L | 75 | -- | 300 | 75 | -- | 325 |
| | | | TR | 200 | -- | 100 | 200 | -- | 100 |
| 5 | Telegraph Ave. /
27th St. | SB | L | 75 | -- | 175 | 75 | -- | 175 |
| | | | TR | 75 | -- | 250 | 75 | -- | 250 |
| | | EB | L | 475 | -- | 225 | 475 | -- | 225 |
| | | | T | 475 | -- | 350 | 475 | -- | 350 |
| | | | R | 475 | -- | 50 | 475 | -- | 50 |
| | | WB | L | 375 | -- | 50 | 375 | -- | 50 |
| | | | T | 375 | -- | 600 | 375 | -- | 650 |
| | | | R | 50 | -- | 50 | 50 | -- | 50 |
| 12 | Harrison St. /
Grand Ave. | NB | T | 500 | 475 | 325 | 500 | 500 | 400 |
| | | | R | 525 | 75 | 1,450 | 525 | 75 | 1,550 |
| | | SB | TR | 125 | 575 | 200 | 125 | 625 | 225 |
| | | | L | 250 | 75 | 175 | 250 | 75 | 175 |
| | | EB | T | 450 | 100 | 300 | 450 | 100 | 300 |
| | | | R | 100 | 100 | 125 | 100 | 100 | 125 |
| | | WB | L | 225 | 375 | 175 | 225 | 475 | 175 |
| | | | T | 425 | 300 | 425 | 425 | 300 | 425 |
| 24 | Harrison St. / 20th St. /
Kaiser Ctr. Access Rd. | NB | LTR | 575 | -- | 500 | 575 | -- | 650 |
| | | | T | 575 | -- | 100 | 575 | -- | 175 |
| | | SB | R1 | 575 | -- | 100 | 575 | -- | 150 |
| | | | R2 | 125 | -- | 25 | 125 | -- | 50 |
| | | SE | LT | -- | -- | -- | 150 | -- | 150 |

| No. | Intersection | Lane Group | Cumulative (2030) without
Project Conditions | | | Cumulative (2030) plus South
Tower Conditions | | |
|-----|--------------|------------|---|-------------------|---------------|--|-------------------|---------------|
| | | | Storage
Cap.
(feet) | Queue Length (ft) | | Storage
Cap.
(feet) | Queue Length (ft) | |
| | | | | AM
Pk. Hr. | PM
Pk. Hr. | | AM
Pk. Hr. | PM
Pk. Hr. |
| | | R | -- | -- | -- | 50 | -- | 50 |
| | | EB | | | | | | |
| | | L2 | -- | -- | -- | 100 | -- | 25 |
| | | TR | 375 | -- | 100 | 375 | -- | 100 |

TABLE 12 (Continued)
CUMULATIVE (2030) WITHOUT & WITH SOUTH TOWER CONDITIONS: 95TH PERCENTILE QUEUES

| No. | Intersection | Lane Group | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) plus South Tower Conditions | | |
|-----|--|------------|--|-------------------|------------|---------------------|---|------------|-------|
| | | | Storage Cap. (feet) | Queue Length (ft) | | Storage Cap. (feet) | Queue Length (ft) | | |
| | | | | AM Pk. Hr. | PM Pk. Hr. | | AM Pk. Hr. | PM Pk. Hr. | |
| 32 | Oak St. / 14th St. | NB | LT | 200 | -- | 175 | 200 | -- | 175 |
| | | | R | 200 | -- | 25 | 200 | -- | 25 |
| | | EB | LT | 300 | -- | 450 | 300 | -- | 450 |
| | | | LT | 1,000 | -- | 125 | 1000 | -- | 125 |
| | | | R | 150 | -- | 125 | 150 | -- | 125 |
| 40 | Oak St. / 7th St. | NB | TR | 200 | -- | 400 | 200 | -- | 400 |
| | | EB | TR | 300 | -- | 75 | 300 | -- | 100 |
| 42 | Jackson St. / 6th St. / I-880 NB On-Ramp | NB | LT | 175 | 325 | 600 | 175 | 325 | 600 |
| | | | T | 250 | 50 | 75 | 250 | 50 | 75 |
| | | SB | R | 500 | 1,250 | 1,425 | 500 | 1,250 | 1,425 |
| | | | L | 300 | 25 | 25 | 300 | 25 | 25 |
| | | WB | T | 300 | 200 | 350 | 300 | 200 | 350 |
| | | | R | 300 | 25 | 25 | 300 | 25 | 25 |
| 44 | Oak St. / 5th St. / I-880 SB On-Ramp | NB | TR | 100 | 175 | 425 | 100 | 175 | 425 |
| | | SB | LT | 200 | 75 | 25 | 200 | 75 | 25 |
| | | EB | LTR | 300 | 275 | 275 | 300 | 275 | 275 |
| 45 | Grand Avenue / El Embarcadero | NW | L | 150 | -- | 175 | 150 | -- | 175 |
| | | | R | 300 | -- | 50 | 300 | -- | 50 |
| | | NE | T | 600 | -- | 1,175 | 600 | -- | 1,225 |
| | | SW | L | 150 | -- | 125 | 150 | -- | 125 |
| | | | T | 325 | -- | 200 | 325 | -- | 175 |
| 47 | Grand Ave. / MacArthur Blvd. (EB) | NE | T | 350 | 275 | 150 | 350 | 275 | 150 |
| | | | R | 350 | 225 | 525 | 350 | 225 | 550 |
| | | SE | LTR | 350 | 675 | 1,050 | 350 | 675 | 1,050 |
| | | SW | L | 150 | 325 | 825 | 150 | 325 | 825 |
| | | | T | 425 | 450 | 275 | 425 | 525 | 300 |
| 48 | Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp | NE | TR | 250 | 375 | 750 | 250 | 375 | 775 |
| | | | L | 150 | 1,075 | 850 | 150 | 1,075 | 850 |
| | | SW | T | 150 | 125 | 50 | 150 | 125 | 50 |
| | | | L | 475 | 150 | 75 | 475 | 150 | 75 |
| | | | EB | T | 475 | 275 | 550 | 475 | 275 |
| | R | 475 | 75 | 425 | 475 | 75 | 425 | | |
| 49 | Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp | NE | T | 175 | 200 | -- | 175 | 200 | -- |
| | | NW | TR | 200 | 850 | -- | 200 | 875 | -- |
| 50 | Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue | NW | L | 250 | 300 | -- | 250 | 300 | -- |
| | | | T | 250 | 300 | -- | 250 | 300 | -- |
| | | SW | T | 300 | 700 | -- | 300 | 700 | -- |

Bold indicates storage capacity exceeded. All storage capacities and queue lengths rounded to the nearest 25 ft. Source: AECOM, 2010.

Cumulative (2030) plus South Tower Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (AM / PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (AM / PM) – Harrison Street SBLTR (AM) and NBTR (PM);
- Intersection #5: Telegraph Avenue / 27th Street (PM) – Telegraph Avenue NBL and SBLTR, and 27th Street WBT;
- Intersection #12: Harrison Street / Grand Avenue (AM / PM) – Harrison Street NBTR (PM) and SBTR (AM / PM), and Grand Avenue WBL (AM);
- Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM) – Harrison Street NBLTR;
- Intersection #32: Oak Street / 14th Street (PM)-14th Street EBLT;
- Intersection #40: Oak Street / 7th Street (PM)-Oak Street NBTR;
- Intersection #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM)-Jackson Street NBL and SBR (AM / PM), and 6th Street WBT (AM);
- Intersection #44: Oak Street / 5th Street / I-880 SB On-Ramp (AM / PM)-Oak Street NBTR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (AM / PM) – MacArthur Boulevard SELTR (AM / PM); and Grand Avenue SWLT (AM / PM) and NER (PM);
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (AM / PM) – MacArthur Boulevard EBT (PM) and Lakeshore NETR and SWL (AM / PM);
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Ave. / I-580 WB Off-Ramp (AM) – Oakland Avenue NET and I-580 WB Off-Ramp NWTR;
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – Harrison Street SWT and MacArthur Boulevard NWLT.

It should be noted, however, that most of these locations have already been proposed for mitigation measures as a result of intersection LOS impacts. These measures, which include optimization of signal timing and phasing and upgrading of traffic signal hardware, would mitigate some of the Project's intersection LOS impacts at these locations, and would generally improve 95th percentile queues. In cases where the proposed mitigation measures would not completely mitigate the Project's intersection LOS impacts, further improvements to reduce 95th percentile queues would generally be infeasible, as these are typically geometrically-constrained intersections and may be locations where further improvements would conflict with policies for other modes or even with objectives of the Harrison Street / Oakland Avenue CTP.

South Tower Loading Docks and Parking Demand

Loading Docks

Three berths would be located in a single dock on the east side of the Project site, with access from the Access Road running through the Kaiser Center block. These berths would serve the South Tower and are shown in Figure IV.L-11 in the DEIR.

Impact TRANS-9 (as identified in the DEIR for Project Buildout): The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)

The following mitigation measure (shall be applied to South Tower Phase 1 Build only).

Mitigation Measure TRANS-9 (as identified in the DEIR for Project Buildout):

Prohibit delivery and service vehicles from accessing the loading docks during the AM and PM peak periods in order to minimize the impact of loading operations on access for the Kaiser Center Garage. The section of the Access Road from Harrison Street / 20th Street to the garage entrance should be restricted to delivery and service vehicles during off-peak hours. During off-peak periods, the Access Road approach onto Harrison Street / 20th Street should be separated off by bollards or other removable barriers to prevent passenger vehicles from crossing the site and expand pedestrian space in this immediate area. Adequate additional site management staff should be made available to direct loading maneuvers to improve the safety of pedestrians, bicyclists, and drivers during deliveries into and out of this dock. Concurrent with the submittal of a Final Development Plan, the Project Applicant shall prepare and submit a loading dock plan and operational analysis which demonstrates there are no conflicts with vehicular, pedestrian, and bicycle access to or adjacent to the site for City review and approval. The Project Applicant shall implement the approved plan.

Potential Additional Recommended Conditions for Pedestrians

Site observations concluded that existing pedestrian facilities generally are insufficient. Given those concerns, and the fact that the Project will add a significant number of new pedestrian trips, the following “Recommended Conditions” should be considered to improve safety operations of pedestrian facilities in the immediate vicinity of the Project and are consistent with the City’s Pedestrian Master Plan. These Recommendations are the same as those identified in this DEIR for Project Buildout. Although not required by CEQA, these Recommended Conditions are recommended herein by City Staff to be included as Project specific conditions of approval. They are not necessary to address or mitigate any environmental impacts of the Project. .

Recommendation TRANS-1: Increase sidewalk capacity on the north side of 20th Street between Broadway and Harrison Street.

In order to improve pedestrian flow, it is recommended that the sidewalk capacity along the north side of 20th Street between Broadway and Harrison Street be increased as follows:

- **Between Broadway and Franklin Street, remove parking and widen the sidewalk.** Currently, a limited amount of metered on-street parking is provided just east of the BART station entrance (three spaces on the north side of 20th Street and two spaces on the south side of 20th Street). The section on the north side directly east of the entrance is used as a de facto “kiss-and-ride” zone in the mornings and pickup zone in the afternoon and evenings. Several employee shuttles from the office buildings at 180 Grand, 155 Grand and 1 Kaiser Plaza also use this curb space to load

and offload passengers. However, circulation space is limited because the sidewalk begins to narrow 30 feet east of the entrance. This section of curb also includes an exit driveway for the existing building on the northeast corner of the intersection of Franklin Street / 20th Street.

In the AM peak periods, pedestrian traffic exiting the BART station via the escalator (located on the north side of the station entrance) conflicts with pedestrian traffic entering the station attempting to access the stairwell (located on the south side of the station entrance). Employees attempting to board the special shuttles also cross against opposing pedestrian traffic in order to reach the shuttle boarding area.

By removing parking and widening the sidewalk, circulation space directly east of the entrance could be increased.

Once the three parking spaces on the north side of 20th Street are removed, the existing bus stop serving AC Transit Lines 11, 59, 59A, and 805 would then be moved out to the new curb line, resulting in a larger unobstructed width on the main part of the sidewalk. The extended curb could align with the existing “bulbout” for the BART station entrance and 20th Street restriped to remove the misalignment in the pavement markings. A bulbout could also be provided at the northwest corner of Franklin Street / 20th Street in the east-west direction. This would not require removal of any parking as that section of curb is already marked red, but would significantly increase queuing space for pedestrians waiting to cross.

Removal of three spaces would have a negligible impact on overall parking conditions in the area. It is important to note that the schematic is only a conceptual illustration, and implementation of any or all of the improvements would require further analysis and design.

It should also be noted that there are several AC Transit stops in close proximity along westbound 20th Street between Telegraph Avenue and Harrison Street:

- North side of 20th Street between Telegraph Avenue and Broadway (three stops occupying the full length of block);
- Northwest corner of Franklin Street / 20th Street; and,
- Northeast corner of Webster Street / 20th Street.

While most AC transit services do not use all three stops, some consolidation of stops could also be considered to streamline service, reduce transit vehicle travel times, and improve passenger connections.

- **Between Franklin Street and Webster Street, widen the sidewalk.**

This section of 20th Street is proposed for Class 2 bicycle facilities (bicycle lanes), which would require removal of the exclusive westbound right-turn lane. Additional space obtained as part of those improvements could be set aside for sidewalk widening along the north side of 20th Street, which has an extremely limited unobstructed width due to building frontage.

If the westbound right-turn lane were removed, the intersection of Franklin Street / 20th Street would still operate at LOS B (14.0 seconds of intersection average delay) during the weekday AM peak hour and LOS B (14.7 seconds of intersection average

delay during the weekday PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Without removal of the westbound right-turn lane, the intersection would operate at LOS B under both peak hours, with intersection average delay at 14.1 seconds during the weekday AM peak hour and 14.5 seconds during the weekday PM peak hour. Therefore, removal of the westbound right-turn lane would produce a negligible change in intersection operations and would not result in secondary impacts if implemented.

The northeast corner of Franklin Street / 20th Street could be redesigned so as to reduce the curb radius, shortening crossing distances for pedestrians and encouraging drivers to take their turns slower. A bulbout could also be provided at this corner to further reduce crossing distances.

- **Between Webster Street and Harrison Street, redesign the Project frontage to be pedestrian-friendly.** The portion of 20th Street abutting the site is split into two narrow paths as a result of landscaping and a slight grade from the edge of the existing buildings to the curb. The path closest to the curb is extremely narrow and is partially restricted by the AC Transit bus stop east of the intersection of Webster Street / 20th Street. The path closer to the existing building is restricted by outdoor cafe seating.

The sidewalk could be redesigned to reduce or eliminate the grade difference and better position the landscaping so as to buffer the sidewalk from the roadway as opposed to divide the sidewalk in two. Given the wide curb lane, the sidewalk closest to the intersection with Webster Street could be widened in a similar fashion to the section of 20th Street between Broadway and Franklin Street. The existing bus stop would be moved out to the new curb line. This may, however, restrict some through capacity along westbound 20th Street, as vehicles could queue up behind stopped transit vehicles, unable to pass around them.

Bulbouts could be provided at the northwest and northeast corners of this intersection in the east-west direction, shortening crossing distances and increasing queuing space on the major pedestrian route to and from BART.

Recommendation TRANS-2: Reduce cycle times of signals at the intersections of Franklin Street / 20th Street and Webster Street / 20th Street.

Due to long cycle lengths, one-way traffic, and relatively low traffic volumes, there is a high occurrence of pedestrians on the north side of 20th Street crossing Franklin Street and Webster Street illegally. Reducing the cycle length of these signals would shorten wait times for pedestrians attempting to cross, improving safety for all road users, including drivers, bicyclists, and pedestrians. Currently, these intersections operate with 80-second cycle lengths, but these could be reduced to 60- or 70-second cycle lengths to reduce waiting times for pedestrians attempting to cross.

Parking Demand Evaluation

This section evaluates if the South Tower estimated parking demand would be met by the existing parking supply within a reasonable walking distance (five minutes or 900 feet) of the Project site.

Table 13 summarizes vehicle parking code requirements and estimated parking demand for the South Tower. Because the proposed retail space is assumed to be a one-to-one replacement of existing retail space at the Project site, the proposed retail space is omitted from the code requirement and demand calculations.

The South Tower would construct 467 new parking spaces, but would not involve demolition of any existing parking spaces in the Kaiser Center Garage, resulting in a net new increase of 467 parking spaces. After completion of the South Tower, the Kaiser Center Garage would have a capacity of 1,807 spaces and be operated as a single garage shared between the existing Kaiser Center tower and the South tower. For the purposes of comparing parking supply and demand, however, the South tower is assumed to have an on-site parking supply of 467 spaces.

**TABLE 13
PARKING CODE REQUIREMENTS AND PARKING DEMAND FOR THE SOUTH TOWER**

| Land Use ^a | Size (KSF) ^b | Code Requirement | Parking Demand | | |
|---------------------------|-------------------------|------------------|----------------|--|-----------------------|
| | | | ITE | Downtown Transportation and Parking Plan | Spaces Proposed (Net) |
| Office (South Tower Only) | 552 | 0 | 1,325 | 773 | 467 |

^a For office use (Land Use 701 – Office Building, Urban):
Average Peak Period Parking Demand: 2.40 vehicles per 1,000 sq. ft. GFA

^b KSF = 1,000 sq. ft.

SOURCE: City of Oakland *Municipal Code* 17.116.080; Institute of Transportation Engineers (ITE), *Parking Generation* (3rd Edition), 2003; AECOM, 2010.

According to the City of Oakland Municipal Code, the Project is not required to provide any off-street parking because of its location in a C-55 / S-17 zoning district. Therefore, no additional parking is being proposed with the South Tower only option.

According to national Institute of Transportation Engineers (ITE) statistics, the South Tower would generate a parking demand of approximately 1,325 spaces. The available existing capacity within the Kaiser Center Garage and in the surrounding area would be about 913 spaces:

- 419 spaces in average existing capacity available at the Kaiser Center Garage, based on occupancy data as of July 2010 (Table IV.L-7); and,
- 494 spaces in average existing capacity available at off-street parking facilities in the vicinity of the Project, based on occupancy surveys as of October 2008 (Table IV.L-7, all facilities other than the Kaiser Center Garage).

Based on this available capacity and ITE parking demand estimates, the South Tower may result in a parking shortfall of about 412 spaces.

It should be noted, however, that the estimated parking demand rate of 2.4 vehicles per 1,000 square feet represents an average for suburban locations where private automobiles are the primary mode

of travel, and is therefore not entirely applicable for areas with comprehensive transit service such as Downtown Oakland. The *Downtown Transportation and Parking Plan*, compiled by Dowling Associates for the City of Oakland Redevelopment Agency and the Community and Economic Development Agency (CEDA) in October 2003, recommended off-street parking ratios of 1.4 vehicles per 1,000 square feet for locations in Downtown outside of the City Center area, within two blocks of BART. Based on these calculations, the South Tower would generate a parking demand of about 773 spaces, which could be met by available off-street parking capacity in the surrounding area.

Alternative Measure DD Analysis for South Tower

The following is a summary of the Alternative Measure DD analysis for both Cumulative (2030) conditions without and with the South Tower. **Figure 3** summarizes the traffic volumes used for the LOS analysis presented in **Table 14**.

TABLE 14
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER
INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

| No. | Intersection | Traffic Control | Cumulative (2030) without Project Conditions (Alternative Measure DD) | | | | Cumulative (2030) plus South Tower Conditions (Alternative Measure DD) | | | |
|-----------------|---|-----------------|---|--------------------|--------------|--------------------|--|--------------------|--------------|--------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a | LOS | Delay ^a |
| Within Downtown | | | | | | | | | | |
| 24 | Harrison St. / 20th St. / Kaiser Ctr. Access Road | Signal | D | 39.8 | F | 107.4 | E | 69.0 | F | >120 |
| 25 | Kaiser Ctr. Access Rd. / 20th Street ^b | SSSC | B | 10.5 | B | 10.1 | -- | -- | -- | -- |

Bold indicates significant impact.

^a The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

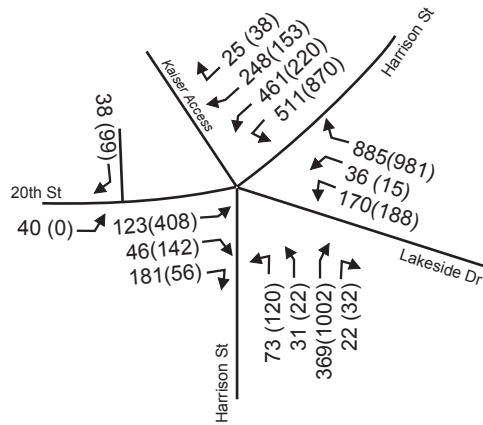
^b The Project would combine this intersection with Intersection #24.

SOURCE: AECOM, 2010.

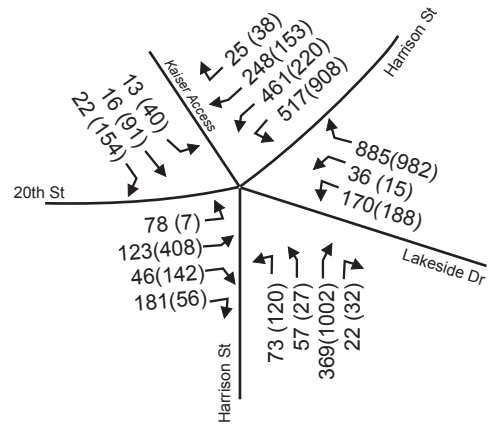
As shown in the table, the following intersection would operate at unacceptable conditions under Cumulative (2030) plus South Tower Conditions (Alternative Measure DD):

- Within Downtown (LOS F)
 - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

**Cumulative (2030) without
South Tower Conditions**



**Cumulative (2030) plus
South Tower Conditions**



Potential impacts at the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-4 Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus South Tower Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure ALT DD TRANS-4:

1. The Project applicant shall add an additional lane and reconfigure the northbound Harrison Street approach as a shared left-through lane (to westbound 20th Street and Kaiser Center Access Road) and two exclusive right-turn lanes (one lane to northbound Harrison Street, the other to northbound Harrison Street and eastbound 20th Street / Lakeside Drive). This would require curb setback of about 10 feet and a corresponding reduction in park space and removal of up to five on-street parking spaces along the west side of Snow Park.

In addition, the left turns from the Kaiser Center Access Road to eastbound 20th Street / Lakeside Drive would need to be prohibited in order to allow the northbound movement along Harrison Street to run concurrently with the Access Road phase.

2. Implement Mitigation Measure TRANS-13e.
3. Consider implementation of Recommendation TRANS 6:

Installation of a signalized mid-block pedestrian crossing across Harrison Street between 20th Street and 21st Street under the Alternative Measure DD Configuration would require signal coordination with adjacent traffic signals at Harrison Street / 21st Street, Harrison Street / 20th Street / Kaiser Center Access Road, and other signals in the same signal coordination group. Due to the coordination, the pedestrian phase could be timed to coincide with periods of low arriving traffic flow from upstream intersections such that no additional intersection delay would be created. Instead, the signalized mid-block crossing would potentially improve operations along this corridor by “metering” traffic entering the ultimate bottleneck intersections at Harrison Street / Grand Avenue and Harrison Street / 20th Street / Kaiser Center Access Road. As a result, the crossing itself would not result in secondary impacts to other modes.

To implement these measures, the Project Applicant shall submit to City of Oakland’s Transportation Services Division for review and approval a PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be

brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction.

The Project Applicant shall fund, prepare, and install the approved plans and improvements.

Significance after Implementation of Mitigation: If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable.

After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Cumulative (2030) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts.

If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project (Phase I) impacts at this location would be Significant and Unavoidable.

Microsimulation Analysis

A microsimulation analysis was conducted to better determine the operational performance of the Alternative Measure DD Configuration. Selected measures of effectiveness (MOEs) were then compared against the original Measure DD Configuration.

As shown in **Table 15**, which summarizes the movement delay for the original Measure DD Configuration and Alternative Measure DD Configuration, the northbound Harrison Street, eastbound 20th Street, and southbound Kaiser Center Access Road approaches to the intersection of Harrison Street / 20th Street / Kaiser Center Access Road would perform poorly (LOS F) under either configuration.

TABLE 15
CUMULATIVE (2030) PLUS SOUTH TOWER MICROSIMULATED MOVEMENT DELAY

| No. | Intersection | Mvmt. | Cumulative (2030) plus South Tower Conditions
(Original Measure DD) | | | | Cumulative (2030) plus South Tower Conditions
(Alternative Measure DD) | | | |
|-----|---|-------|--|----------------|--------------|----------------|---|------------------|--------------|----------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay |
| 24 | Harrison St. / 20th St. /
Kaiser Ctr. Access Road

<i>EB: EB 20th St.
WB: SWB Harrison St.
NB: NB Harrison St.
NW: WB 20th St.
SB: Kaiser Center Access Road</i> | EBL | D | 35.2 | C | 28.0 | F | >120.0 | E | 80.0 |
| | | EBT | C | 22.8 | F | >120 | D | 35.4 | E | 117.0 |
| | | EBR | B | 10.3 | F | >120 | B | 14.1 | C | 20.8 |
| | | EBR2 | E | 58.2 | D | 35.1 | B | 19.5 | B | 16.2 |
| | | WBL2 | B | 19.9 | A | 8.6 | D | 41.1 | E | 92.9 |
| | | WBL | A | 5.0 | A | 2.9 | D | 42.7 | C | 22.5 |
| | | WBT | C | 26.5 | F | >120 | E | 85.3 | D | 43.0 |
| | | WBR | C | 27.9 | F | >120 | E | 66.1 | C | 27.2 |
| | | NBL | A | 8.6 | F | >120 | F | >120.0 | F | >120 |
| | | NBT | C | 33.4 | D | 52.0 | E | 106.2 | F | >120 |
| | | NBR | A | 9.0 | C | 23.8 | F | >120.0 | F | >120 |
| | | NBR2 | C | 22.1 | F | >120 | F | >120.0 | F | >120 |
| | | NWL | D | 35.2 | C | 28.0 | E | 77.7 | F | >120 |
| | | NWT | C | 22.8 | F | >120 | E | 79.2 | F | >120 |
| | | NWR | B | 10.3 | F | >120 | A | 9.7 | B | 15.6 |
| | | SBL | E | 58.2 | D | 35.1 | E | 63.9 | F | >120 |
| | | SBT | B | 19.9 | A | 8.6 | E | 71.5 | F | >120 |
| | | SBR | A | 5.0 | A | 2.9 | B | 14.3 | F | >120 |
| | | All | C | 26.5 | F | >120 | E | 55.1 | F | >120 |
| 26 | Harrison Street /
Lakeside Drive ^a

<i>EB: NB Harrison St.
WB: SB Harrison St.
NB: NB Lakeside Dr.</i> | EBT | B | 15.4 | D | 37.9 | -- | -- | -- | -- |
| | | EBR | B | 10.7 | D | 35.7 | -- | -- | -- | -- |
| | | WBL | F | >120 | F | >120 | -- | -- | -- | -- |
| | | WBT | F | >120 | E | 83.3 | -- | -- | -- | -- |
| | | NBL | C | 29.8 | C | 23.7 | -- | -- | -- | -- |
| | | NBR | B | 12.4 | A | 9.8 | -- | -- | -- | -- |
| | | All | F | >120 | E | 59.1 | -- | -- | -- | -- |

Bold indicates movements operating at LOS F.

^a Intersection only present in Original Measure DD. SOURCE: AECOM 2010.

Queuing Conditions

As shown in **Table 16**, which summarize the 95th percentile queues by lane for the original Measure DD Configuration and Alternative Measure DD Configuration, queues on the northbound Harrison Street approach at Harrison Street / 20th Street / Kaiser Center Access Road exceed available storage capacity in the PM peak hour for all Cumulative scenarios, regardless of configuration. Under the original Measure DD Configuration, queues on the eastbound Harrison Street approach at Harrison Street / Lakeside Drive exceed or approach the available storage capacity. The lack of storage between the two key intersections in the original Measure DD Configuration causes spillback queuing along northbound Harrison Street and eastbound

TABLE 16
CUMULATIVE (2030) PLUS SOUTH TOWER MICROSIMULATED 95TH PERCENTILE QUEUES

| No. | Intersection | Cumulative (2030) plus South Tower Conditions
(Original Measure DD) | | | | Cumulative (2030) plus South Tower Conditions
(Alternative Measure DD) | | | |
|-----|--|--|---------|--------------------|--------------------|---|---------|--------------------|--------------------|
| | | Move-
ment | Storage | AM
Peak
Hour | PM
Peak
Hour | Move-
ment | Storage | AM
Peak
Hour | PM
Peak
Hour |
| 24 | Harrison St. / 20th St. /
Kaiser Ctr. Access
Road

<i>EB: EB 20th St.</i>
<i>WB: SWB Harrison St.</i>
<i>NB: NB Harrison St.</i>
<i>NW: WB 20th St.</i>
<i>SB: Kaiser Center
Access Road</i> | EBL | 100 | 75 | 25 | EBL | 100 | 150 | 50 |
| | | EBT | 375 | 50 | 150 | EBT | 375 | 275 | 375 |
| | | EBT | 375 | 50 | 375 | EBT | 375 | 125 | 375 |
| | | EBTR | 375 | 100 | 575 | EBR | 375 | 150 | 200 |
| | | WBL | 200 | 100 | 100 | WBL | 600 | 275 | 250 |
| | | WBT | 200 | 125 | 100 | WBL | 600 | 275 | 250 |
| | | WBT | 200 | 125 | 100 | WBL | 600 | 350 | 175 |
| | | WBR | 125 | 75 | 75 | WBTR | 200 | 275 | 225 |
| | | NBLTR | 575 | 175 | >1,000 | NBLTR | 575 | 575 | >1,000 |
| | | NBR | 575 | 100 | >1,000 | NBR | 575 | 575 | >1,000 |
| | | -- | -- | -- | -- | NWLR | 800 | 275 | 525 |
| | | -- | -- | -- | -- | NWR | 475 | 175 | 400 |
| | | -- | -- | -- | -- | NWR | 475 | 200 | 325 |
| | | SBT | 150 | 50 | 225 | SBLT | 150 | 75 | 250 |
| | | SBR | 50 | 50 | 100 | SBR | 50 | 50 | 100 |
| 26 | Harrison Street /
Lakeside Drive ^a

<i>EB: NB Harrison St.</i>
<i>WB: SWB Harrison St.</i>
<i>NB: NB Lakeside Dr.</i> | EBT | 150 | 100 | 150 | -- | -- | -- | -- |
| | | EBT | 150 | 125 | 175 | -- | -- | -- | -- |
| | | EBTR | 150 | 125 | 150 | -- | -- | -- | -- |
| | | WBL | 250 | 200 | 450 | -- | -- | -- | -- |
| | | WBL | 250 | 500 | 450 | -- | -- | -- | -- |
| | | WBT | 250 | 450 | 350 | -- | -- | -- | -- |
| | | WBT | 250 | 250 | 75 | -- | -- | -- | -- |
| | | WBT | 250 | 150 | 75 | -- | -- | -- | -- |
| | | NBL | 450 | 75 | 75 | -- | -- | -- | -- |
| | | NBLR | 450 | 250 | 175 | -- | -- | -- | -- |
| | | NBR | 800 | 200 | 150 | -- | -- | -- | -- |

Bold indicates movements operating at LOS F.

^a Intersection only present in Original Measure DD.

All storage capacities and queue lengths rounded to the nearest 25 feet

SOURCE: AECOM, 2010.

20th Street, hampering throughput on the northbound Harrison Street and eastbound 20th Street approaches at Harrison Street / 20th Street / Kaiser Center Access Road. These queues then stretch back to upstream intersections, affecting Harrison Street / 19th Street and Webster Street / 20th Street. Likewise, queues on the westbound Harrison Street approach to Harrison Street / Lakeside Drive also exceed the available storage capacity, causing spillback into the upstream intersection at Harrison Street / 21st Street.

Conclusions

The following is a summary of the 12 CEQA related mitigation measures that are expected due to the build-out of the South Tower under Existing Conditions (requiring measures at four intersections) and Cumulative (2030) Conditions (requiring measures at five intersections and three roadways). After implementation of these proposed measures, the South Tower impacts under Existing Conditions would be significant and unavoidable at two of the intersections and less than significant at the other two intersections. Under Cumulative Conditions, the implementation of the measures would result in the South Tower impacts being significant and unavoidable at one intersection; less than significant at the four other intersections and all three roadway segments.

Existing plus South Tower Conditions

- 1) Implement Intersection Mitigation Measure TRANS-12a at the **Oakland Avenue / Perry Place / I-580 Eastbound Ramps** intersection. However, even after implementation of the proposed measure, the South Tower impacts at this intersection would be significant and unavoidable.
- 2) Implement Intersection Mitigation Measure TRANS-12b at the **Harrison Street / 27th Street-Bay Place / 24th Street** intersection. However, even after implementation of the proposed measure, the South Tower impacts at this intersection would be significant and unavoidable.
- 3) Implement Intersection Mitigation Measure TRANS-12c at the **Grand Avenue / El Embarcadero** intersection and the South Tower impacts on this intersection are expected to be less than significant.
- 4) Implement Intersection Mitigation Measure TRANS-12d at the **Grand Avenue / MacArthur Boulevard** intersection and the South Tower impacts on this intersection are expected to be less than significant.

Cumulative (2030) plus South Tower Conditions

- 1) Intersection Mitigation Measure TRANS-13a: Implement Mitigation Measure TRANS-12a. This measure alone should be sufficient to completely mitigate the South Tower impacts at **Oakland Avenue / Perry Place / I-580 Eastbound Ramps**. Therefore, the South Tower impacts are less than significant.
- 2) Intersection Mitigation Measure TRANS-13b: Implement Mitigation Measure TRANS-12b at **Harrison Street / 27th Street-Bay Place / 24th Street**, and also prohibit westbound left turns from Bay Place during the AM peak hour (in addition to the PM peak hour). After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in both the AM and PM peak hours, mitigating the South Tower impacts at this intersection. Therefore, the South Tower impacts on this intersection are less than significant.
- 3) Intersection Mitigation Measure TRANS-13c: Implement Mitigation Measure TRANS-5d at **Telegraph Avenue / 27th Street**. After implementation of the mitigation measure, the intersection would operate at an unacceptable LOS E in the PM peak hour, but the average

delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the South Tower's impacts at this intersection. Therefore, the South Tower impacts on this intersection are less than significant.

- 4) Intersection Mitigation Measure TRANS-13d: Implement Mitigation Measure TRANS-3c at **Harrison Street / Grand Avenue**, and also prohibit southbound Harrison Street left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches. These measures alone would not be sufficient to completely mitigate the South Tower impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the South Tower impacts. Therefore, the South Tower impacts at this intersection are significant and unavoidable.
- 5) Intersection Mitigation Measure TRANS-13e: Implement Mitigation Measure TRANS-1c at **Harrison Street / 20th Street / Kaiser Center Access Road**:
 - Optimize the traffic signal for the PM peak period.
 - Coordinate the signal timing at this intersection with the adjacent intersections.

To implement this measure, the Project Applicant shall submit to TSD for review and approval PS&E to upgrade the intersection to both City standards and ADA standards at the time of construction. The Applicant shall also fund, prepare, and install the approved plans and improvements, which would make the South Tower impacts on this intersection less than significant.

- 6) Roadway Mitigation Measure TRANS-14a: There are no feasible measures to mitigate the South Tower impact on **I-880 from Oak Street to 5th Avenue**, given the existing alignment and constraints due to lack of right-of-way. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.
- 7) Roadway Mitigation Measure TRANS-14b: Implement Mitigation Measure TRANS-2a on **Eastbound Grand Avenue from Harrison Street to El Embarcadero**. After implementation of this measure, conditions would remain at an unacceptable LOS, and the South Tower impact would not be mitigated. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.
- 8) Roadway Mitigation Measure TRANS-14c: To completely mitigate the South Tower's impacts would require substantial capacity improvements such as an additional travel lane on **Northbound Harrison Street / Oakland Avenue from 27th Street to I-580**. Since there are no feasible measures to add such capacity, and the South Tower impacts on this roadway segment are significant and unavoidable.

APPENDIX I

Preliminary Greenhouse Gas Emissions Reduction Plan

GHG EMISSIONS INVENTORY AND REDUCTION ANALYSIS AND DATA

Preliminary Greenhouse Gas Emissions Reduction Plan

date August 20, 2010

to Eric Angstadt, Deputy Director, Oakland Community and Economic Development Agency

from Joan Douglas, AICP, Project Manager
Crescentia Brown, AICP, Project Director

subject Kaiser Center Office Project – Preliminary GHG Emissions Reduction Plan

This preliminary Greenhouse Gas (GHG) Emissions Reduction Plan (or “GHG Plan”) presents GHG emissions inventory estimates and identifies potential GHG emissions reduction measures available for the Kaiser Center Office Project (“Project” or “Proposed Project”). Emission inventories for two Project Alternatives are also presented. This GHG Plan is organized as follows:

Part A: GHG Emissions Inventory and Impacts

- a) Identifies and discusses the emission sources that are included in the inventory, as well as other sources that are not included.
- b) Identifies and discusses Project design features, applicable City Standard Conditions of Approval, regulatory requirements, and General Plan policies and programs that would reduce GHG emissions from the Project.
- c) Estimates the Project’s “unadjusted” (“business as usual”) GHG emissions inventory in carbon dioxide equivalents (CO₂e) for construction and operations, generally excluding the emissions reductions resulting from the considerations in “b,” above.
- d) Estimates the Project’s and the Alternatives’ “adjusted” baseline GHG emissions, which incorporate the emissions reductions resulting from the considerations in “b,” against the CEQA thresholds of significance for GHGs.

Part B: Additional GHG Reduction Measures that May be Considered

- e) Describes a comprehensive set of additional GHG reduction measures that may be implemented by the Project to further reduce GHG emission beyond “adjusted” emissions described in “c” above.

This GHG Plan is considered “preliminary” because it is anticipated that the Project Applicant will continue to develop this GHG Plan to further refine the list of additional GHG reduction measures (including preparation and implementation of an approved Transportation Demand Management [TDM] Plan), whereupon it shall fully satisfy Mitigation Measure AIR-3 and SCA GHG-1 identified in the EIR. The Final GHG Plan will be a document to be updated, refined and implemented throughout the Project.

The information and analysis presented herein has been prepared by Chris Sanchez, ESA Senior Technical Associate, Air Quality/GHG; and Jeff Caton, P.E., LEED AP, Director, ESA Renewable Resources.

Part A: GHG Emissions Inventory and Impacts

1.0 Background and CEQA Context

The analysis presented herein is prepared consistent with both statewide and local guidance on the estimation and evaluation of GHG emissions relative to CEQA. These specifically include amendments adopted on March 18, 2010 to the *CEQA Guidelines* regarding GHG emissions. No significance threshold is included in the amendments; the *CEQA Guidelines* afford the customary deference provided to lead agencies in their analysis and methodologies. The Governor’s Office of Planning and Research (OPR) emphasizes the need for a consistent threshold to analyze projects, specifies that the analyses should be performed based on the best available information, and that if a lead agency determines that a project may generate GHGs, the agency is responsible for quantifying estimated GHG emissions by type and source. The analysis in this GHG Plan is consistent with this guidance.

Local guidance includes the Air Quality CEQA Thresholds of Significance from the Bay Area Air Quality Management District (BAAQMD), adopted June, 2, 2010. These thresholds represent the only quantitative thresholds formally proposed by a regulatory agency with jurisdiction over the Project. In its June 2010 *CEQA Air Quality Guidelines*, BAAQMD is specific as to what sources of emissions should be considered relative to proposed CEQA GHG thresholds¹ (Table 4-2: Guidance for estimating a Project’s Operations GHG Emissions, page 4-6) and also provides the BAAQMD Bay Area Greenhouse Gas Emissions Model (BGM) to estimate GHG emissions from land development of projects. As such, the Project’s baseline GHG emissions inventory presented in this GHG Plan provides emissions data for the sources identified by BAAQMD in its updated Guidelines and applies the adopted significance thresholds. .

¹ Bay Area Air Quality Management District, *California Environmental Quality Act Air Quality Guidelines*, Table 4-3: GHG Quantification Guidance Standard, page 4-6.
http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

2.0 GHG Emission Sources

2.1 GHG Emission Sources Included in the Inventory

Emissions included in the updated BAAQMD Guidelines and therefore included in the baseline GHG emissions inventory for the Project, if applicable, are:

- Area Source Emissions. These are direct emissions from sources that include natural gas combustion for heating, cooking, fireplaces, or boilers, as well as emissions from landscape maintenance equipment.
- Transportation Emissions. These are direct emissions from mobile sources including automobiles, trucks, motorcycles, and busses.
- Operational Electricity Consumption. These are indirect emissions emitted off-site via non-renewable, non-nuclear electricity generators as a result of increased electrical demand.
- Solid Waste Disposal Emissions. These are indirect emissions associated with waste generation. The non-residential uses at the development would generate waste. A large percentage of this waste would be diverted from landfills by waste reduction, recycling, and composting. Oakland currently diverts a large portion of its waste and has goals to even further reduce the amount of waste sent to a landfill. The remainder of the waste not diverted would be disposed of at a landfill. Landfills emit anthropogenic methane from the anaerobic breakdown of material.
- Operational Fugitive (Direct) Emissions. These direct emissions are most commonly associated with a inadvertent emissions to the atmosphere due to leakage or inherent imperfections in a gas transport or collection system. Direct fugitive GHG emissions that may reasonably be expected to be generated by a commercial building like the Project would consist of GHG refrigerants emitted from leaks or other imperfections in refrigeration or air cooling equipment.
- Operational Water Emissions (embedded energy). These indirect emissions are associated with the electricity used to convey water, due to increased water demand from the Project.
- Operational Wastewater (non-biogenic). The updated Guidelines define indirect emissions from wastewater treatment as including the GHG emissions associated with the electricity use in wastewater treatment and not the biogenic CO₂ process emissions².

2.2 GHG Emission Sources Not Included in the Inventory

Emissions not included in the BAAQMD Guidelines, and therefore not included in the baseline GHG emissions inventory for the Project, are discussed below. These emissions may be considered in addition to those incorporated into the Project's baseline GHG emissions inventory discussed below in Sections 6.0 through 9.0.

² Bay Area Air Quality Management District, *California Environmental Quality Act Air Quality Guidelines*, page 4-7. http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

- Permitted Stationary Source Equipment. Per BAAQMD, GHG emissions from permitted stationary source equipment are not to be assessed as part of the operational emissions of a land development project, but are instead to be directly compared to BAAQMD's 10,000 metric ton per year threshold for such equipment for the purposes of impact assessment relative to CEQA. GHG emissions from permitted stationary source equipment are not to be included in the project inventory that is used for comparison to either the BAAQMD's proposed threshold of 1,100 metric tons (MT) of CO₂e per day or the efficiency-based threshold of 4.6 MT per year per service population (Tholen, 2010b). The GHG analysis for the Project does not include any permitted stationary source equipment.
- Vegetation Sequestration Change. This is the net change in CO₂ emissions resulting from vegetation change and its associated carbon sequestration. Given the urban location of the Proposed Project, a significant change in sequestration of CO₂ from vegetative sources is not expected.
- Fugitive Refrigeration Emissions. Refrigerant gases such as CFCs, HFCs, and HCFCs have a high global warming potential. Leaks of refrigeration gases were not quantified for the Project. At the entitlement stage of development, data necessary to estimate emissions (the pounds of charge of refrigerant for all air handling units) is not readily available.
- Life Cycle Emissions. Although there is no regulatory definition for "lifecycle emissions," the term is generally used to refer to all emissions associated with the creation and existence of a project, including emissions from the manufacture and transportation of component materials, and even emissions from the manufacture of the machines required to produce those materials. However, since it is impossible to accurately estimate the entire chain of emissions associated with any given project, lifecycle analyses are limited in effectiveness and meaning (relative to assessing or reducing Project-specific emissions for the CEQA analysis). The California Natural Resources Agency (CNRA) has stated that lifecycle analyses are not required under CEQA,³ and in December 2009 CNRA issued new energy conservation guidelines for EIR's that make no reference to lifecycle emissions.⁴ The CNRA's explained that: (1) There exists no standard regulatory definition for lifecycle emissions, and (2) Even if a standard definition for 'lifecycle' existed, the term might be interpreted to refer to emissions "beyond those that could be considered 'indirect effects'" as defined by CEQA Guidelines, and therefore beyond what project managers are required to estimate and mitigate.⁵
- Agricultural Emissions. These are emissions from livestock, from fuel combustion associated with agricultural equipment operation, electricity use and fertilizer application. These sources were assumed not to be generated by the Proposed Project.

³ California Natural Resources Agency, 2009. *Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97*, p. 71-72. http://ceres.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf (accessed February 4, 2010).

⁴ State CEQA Guidelines, Appendix F. These new guidelines were part of amendments issued pursuant to SB97.

⁵ California Natural Resources Agency, 2009. *Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97*, p. 71. http://ceres.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf (accessed February 4, 2010).

- Off Road Equipment Emissions. These are emissions from off-road equipment typically associated with equipment typically associated with industrial or large commercial land uses such as fork lifts, yard dogs and generators. These sources were assumed not to be generated by the proposed office tower project.

3.0 Project Design Features, City Standard Conditions of Approval, Regulatory Requirements, and General Plan Policies and Local Programs that Reduce GHG Emissions

There are many ways for a project to reduce its GHG emissions through its design, construction and operations. Local conditions of approval, policies, programs and regulatory requirements that apply to a project also combine to reduce project GHG emissions. Each of these components is considered part of the Proposed Project and is included in the estimate of the Project's baseline GHG emissions inventory as follows:

3.1 Project Design Features

- **CALGreen – Energy Performance Standard.** One of the objectives of the Project (presented in Chapter 3, Project Description) is to meet contemporary energy and design objectives by ensuring that the new towers meet mandatory CALGreen performance standard under CALGreen and provide the opportunity for the Project, as part of this GHG Plan, to exceed such standards where feasible. CALGreen is a newly enacted building code requirement pursuant to Title 24 of the CCR, which is effective January 2011 and will apply to construction of the Proposed Project. CALGreen will require that every new building constructed in California reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills and install low pollutant-emitting materials. It also requires separate water meters for nonresidential buildings' indoor and outdoor water use, with a requirement for moisture-sensing irrigation systems for larger landscape projects and mandatory inspections of energy systems (e.g., heat furnace, air conditioner and mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity and according to their design efficiencies. The effects of these energy and water saving features are incorporated into the baseline emission inventory for the Proposed Project.

3.2 City Standard Conditions of Approval

City Standard Conditions of Approval (also referred to as "SCAs") are incorporated and required as part of a Proposed Project and are adopted as conditions of approval and required of the project to help ensure less than significant impacts.

The following SCAs are required as part of a Proposed Project and adopted as conditions of approval to help reduce GHG emissions of the Project:

- SCA TRANS-1 – Parking and Transportation Demand Management Plan. SCA TRANS-1 requires the Project applicant to submit for review and approval by the City of Oakland Planning and Zoning Division a Transportation Demand Management (TDM) Plan containing strategies to reduce on-site parking demand and single occupancy vehicle (SOV) travel. Although a TDM Plan for the Project has not yet been prepared, generally, TDM could reduce SOV trips for a large office project near located near transit by about 10 to 20 percent. Calculations of GHG reductions attributable to the TDM Plan preliminarily (and conservatively) assume a 10 percent reduction in Project trip generation. This GHG Plan provides emissions estimates for the project both with and without the preliminary 10 percent projected TDM trip reduction. Once the TDM Plan is completed and approved (prior to certification of the EIR), the appropriate refinement to the Project trip generation and resulting GHG emissions will be calculated and reported in the EIR prior to certification.
- SCA UTIL-1 – Waste Reduction and Recycling. SCA UTIL-1 requires the Project applicant to submit a Construction & Demolition Waste Reduction and Recycling Plan (WRRP) and an Operational Diversion Plan (ODP) for review and approval by the Oakland Public Works Agency. Chapter 15.34 of the Oakland Municipal Code outlines requirements for reducing waste and optimizing construction and demolition (C&D) recycling. Affected projects include all new construction and all demolition. This SCA essentially addresses reduction in construction-related emissions, which the City combines with the Project's operational emissions to assess against the significance thresholds for operational emissions, even though construction emissions are not a component of BAAQMD's Guidelines. Therefore, this SCA will contribute to reducing total emissions of the Project.
- Landscape Requirements and Tree Replacement. SCAs address landscape requirements for frontages of commercial buildings and replacement of trees removed as part of a project. Projects are required to install one tree for every 25 feet of street frontage in cases sidewalks have adequate width. Additionally SCAs generally require the replacement of native trees removed as part of a project. Together, these SCAs that maintain and increase landscaping and trees effect cooler climate, reduce excessive solar gain, and absorb CO₂e emissions over the minimum 3.5 years to construct Phase 2 of the Project, but have no impact on the emissions inventory of the Proposed Project.
- SCA GHG-1- GHG Reduction Plan. SCA GHG-1 applies to certain projects that produce total GHG emissions that exceed the BAAQMD CEQA Thresholds, including commercial office buildings employing 1,000 persons or containing more than 250,000 square feet of total floor area, such as the Proposed Project. SCA GHG-1 requires the Project applicant to prepare a GHG Reduction Plan to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the BAAQMD CEQA Thresholds. The GHG Reduction Plan will include a comprehensive set of quantified GHG emissions reduction measures in addition to energy efficiencies included as part of the project (including the City's Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements. SCA GHG-1 is presented in the detailed Project GHG emissions impact analysis further below and will reduce the GHG emissions of the Project.

3.3 General Plan Policies and City Programs

- Oakland General Plan LUTE. The LUTE is aimed at promoting use of public transit, bicycles and pedestrian travel. Any reduction of transportation-related GHG emissions are captured in the trip reduction associated with the TDM Plan.
- Oakland General Plan Open Space, Conservation and Recreation (OSCAR) Element. The OSCAR contains policies that (a) encourage the provision of open space, which increases vegetation area (trees, grass, landscaping, etc.) to effect cooler climate, reduce excessive solar gain, and absorb CO₂; (b) encourage stormwater management, which relates to the maintenance of floodplains and infrastructure to accommodate potential increased storms and flooding; and (c) encourage energy efficiency and use of alternative energy sources. Policies that address vegetation area have no impact on the emissions inventory as vegetative sequestration is not a component of BAAQMD's Guidelines. Other policies regarding energy efficiency encourage and support energy efficiency but are not requirements under any implementation mechanism via the General Plan. They have resulted, however, in the implementation of the City of Oakland sustainability program discussed below.
- City of Oakland Sustainability Programs. The City has proactively adopted a number of sustainability programs in an effort to reduce the City's impact on climate change. Oakland's sustainability efforts are managed by the Oakland Sustainability Community Development Initiative and there are two main categories that relate to reducing GHG emissions from a development project: renewable energy and green building.

Renewable Energy. With regard to renewable energy, the City's Sustainability Program has set a priority of promoting renewable energy with a particular emphasis on solar generation. The Program's aggressive renewable energy goals include the following: 50 percent of city facilities entire electricity use from renewable sources by 2017; and 100 percent of the city's entire electricity use from renewable sources by 2030. The City has some control over renewable energy percentages for buildings it operates by contracting its energy needs directly with the local utility. However, private building operators generally receive a standard energy mix from PG&E, and would not be required to contract for a higher percentage of renewables under this program as it only targets City facilities. PG&E does have a 20 percent renewable energy mix goal for 2020 (compared to a 12 percent mix in 2007).

Green Building. With regard to green building strategies, the City of Oakland has implemented green building principles in City buildings through the following programs: Civic Green Building Ordinance (Ordinance No. 12658 C.M.S., 2005), requiring, for certain large civic projects, techniques that minimize the environmental and health impacts of the built environment through energy, water and material efficiencies and improved indoor air quality, while also reducing the waste associated with construction, maintenance and remodeling over the life of the building; Green Building Guidelines (Resolution No. 79871, 2006) which provides guidelines to Alameda County residents and developers regarding construction and remodeling; and Green Building Education Incentives for private developers. Green building requirements for private developers are anticipated for adoption in the fall of 2010, however, the baseline emissions inventory for the

Proposed Project assumes implementation of mandatory CALGreen standards as a Project design feature, as discussed above.

3.4 Regulatory Requirements

- *AB 1493 and Amended “Pavley” Regulations.* AB 1493 required the California Air Resources Board (CARB) to develop and adopt, by January 1, 2005, regulations that achieve “the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State. The CARB has adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments, approved by CARB on September 24, 2009, are part of California’s commitment toward a nation-wide program to reduce new passenger vehicle GHGs from 2012 through 2016. The model used to estimate the Proposed Project’s GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of Pavley standards.
- *Low Carbon Fuel Standards (LCFS).* On April 23, 2009 CARB approved the regulation to implement the LCFS. The LCFS will reduce GHG emissions from the transportation sector in California by about 16 million metric tons (MMT) in 2020. The model used to estimate the Proposed Project’s GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of LCFS.

Other Project characteristics that reduce GHG emissions and support the Project’s alignment with AB 32 GHG reduction goals include proposed pedestrian improvements. The Project final design is anticipated to include extensive streetscape improvements, including new and increased sidewalk, curb, and gutter; right-of-way landscaping; streetlights; street furniture; wayfinding signage; and/or art. These features, as outlined in the City’s Pedestrian Master Plan adopted in November 2002, are identified as design amenities that develop a pedestrian-oriented environment that facilitate walking and transit use. These features would help reduce transportation-related GHG emissions by encouraging additional pedestrian trips. Also, the Project’s combination of office and commercial/retail uses has the potential to reduce greenhouse gas emissions related to transportation for both the employees and the patrons of each of these uses. Multiple amenities and services an employee or patron might use would be located in this single development, which would reduce vehicle-miles-traveled.

4.0 Baseline GHG Emissions Inventory

4.1 Construction-Related GHGs

Assumptions

Estimated Total and Annualized Construction-generated GHG Emissions

The construction-generated GHG emissions of the Project are shown in **Table 1**, which summarizes the emissions estimates from the principal GHGs (CO₂, CH₄ and N₂O) in metric tons of CO₂e, by construction

year and Project phase. An estimated total 2,081 MT CO₂e emissions from Project construction equipment and vehicles would be emitted over the minimum 3.5 years to construct Phase 1 of the Project, and an estimated total 2,461 MT CO₂e emissions over the minimum 3.5 years to construct Phase 2 of the Project, for a total of approximately 4,542 MT CO₂e emissions over the minimum total construction period of seven years through Buildout. Approximately 46 percent of the total construction GHG emissions is associated with Phase 1 construction, with approximately 54 percent associated with Phase 2 construction.

**TABLE 1
CONSTRUCTION-GENERATED GHG EMISSIONS OF THE PROPOSED PROJECT**

| Construction Year | Annual CO ₂ e Emissions (metric tons per year) | | | |
|--|---|-----------------|------------------|-------------------------|
| | CO ₂ | CH ₄ | N ₂ O | Total CO ₂ e |
| Phase 1 | | | | |
| 2012 | 244 | 0.29 | 1.94 | 246 |
| 2013 | 733 | 0.88 | 5.82 | 740 |
| 2014 | 750 | 0.90 | 5.96 | 757 |
| 2015 (Phase 1) | 335 | 0.40 | 2.66 | 338 |
| Total Phase 1 | | | | 2,081 |
| Phase Construction Emissions per Year (annualized over 40 years) | | | | 52 |
| Phase 2 | | | | |
| 2015 (Phase 2) | 112 | 0.13 | 0.89 | 113 |
| 2016 | 953 | 1.14 | 7.57 | 962 |
| 2017 | 948 | 1.14 | 7.53 | 957 |
| 2018 | 426 | 0.51 | 3.39 | 430 |
| Total Phase 2 | | | | 2,461 |
| Total Construction Emissions – Project Buildout | | | | 4,542 |
| Total Construction Emissions per Year (annualized over 40 years) | | | | 114 |
| Total Construction Emissions per Year (annualized over approximately 7 years to construct the Project) | | | | 649 |

SOURCE: ESA, 2010

Construction emissions are annualized because the proposed operational GHG emissions thresholds are analyzed in terms of metric tons “per year.” Assuming a 40-year development life of the Project until it is demolished or remodeled for energy efficiency (which is the common standard currently used in practice), total construction emissions represent approximately 114 MT CO₂e annually, over 40 years. Annualized over the 3.5-year construction period for Phase 1, the one-time construction-related contribution to GHG emissions is approximately 52 MT CO₂e per year, and over the seven-year construction period of the Project Buildout the one-time construction-related contribution is approximately 649 MT CO₂e per year.

The BAAQMD Guidelines do not include a specific threshold or methodology for assessing construction-related GHG emissions for CEQA analysis. The City’s methodology adds the 40-year annualized construction-related GHG emissions to the Project’s total operational-related emissions, to assess construction-related GHG emissions against the BAAQMD thresholds and Project’s ability to meet AB 32 GHG reduction goals, as discussed below.

The Project includes characteristics that specifically contribute it being consistent with AB 32 GHG reduction goals during construction. The analysis of construction emissions only considers improvements in construction equipment exhaust emissions through manufacturer requirements and turnover. In addition to considering the CO₂e emission from construction activities, the Project would incorporate dust control measures recommended by BAAQMD (Oakland SCA AIR-1, Construction-Related Air Pollution Controls (Dust and Equipment Emissions [Dust Control])), and measures related to construction exhaust emissions (Oakland SCA AIR-2, Construction Emissions). Further, the SCAs that apply to the Project align with BAAQMD regulations that relate to portable equipment (e.g., concrete batch plants, and gasoline- or diesel-powered engines used for power generation, pumps, compressors, pile drivers, and cranes), architectural coatings, and paving materials. Equipment used during project construction would be subject to the requirements of BAAQMD Regulation 2 (Permits), Rule 1 (General Requirements) with respect to portable equipment unless exempt under Rule 2-1-105 (Exemption, Registered Statewide Portable Equipment); BAAQMD Regulation 8 (Organic Compounds), Rule 3 (Architectural Coatings); and BAAQMD Regulation 8 (Organic Compounds), Rule 15 (Emulsified and Liquid Asphalts).

In summary, the annualized GHG emissions from construction of the Project would not conflict with the goals of AB 32.

4.2 Construction and Long-Term Operational GHGs

As introduced above, long-term operational GHG emissions associated with the Project include indirect emissions from mobile sources (motor vehicle trips), emissions from natural gas combustion used in non-residential buildings, emissions from electricity use in non-residential buildings (grid electricity), emissions from water conveyance and waste water treatment and conveyance, and emissions from area sources. Emissions from each of these sources, in addition to the construction-related emissions discussed above, are reported in **Tables 2** and **3**, below.

Unadjusted Operational GHG Emissions

“Unadjusted Operational GHG Emissions” of the Project do not factor in the Project’s design features, applicable City SCAs (including TDM), and regulatory requirements that are considered part of the Project and that reduced the Project’s GHG emissions; it is essentially a “business as usual” approach. Unadjusted emissions do, however, assume the same Project assumptions and inputs used to estimate the Project’s baseline emissions, below. The unadjusted emissions are considered to demonstrate the emissions reductions that are attributable to measures incorporated as part of the Project. As shown in **Table 2**, the total unadjusted annual GHG emissions generated by the Project is approximately 8,197 MT CO₂e per year at Phase 1 and 15,772 MT CO₂e per year at Project Buildout.

TABLE 2
UNADJUSTED OPERATIONAL GHG EMISSIONS INVENTORY FROM THE PROPOSED PROJECT

| Emission Source | Total Annual CO ₂ e Emissions (metric tons per year) | |
|--|---|---|
| | Phase 1 Total CO ₂ e | Project Buildout ^a Total CO ₂ e |
| Motor vehicle trips (no TDM) | 4,570 | 9,143 |
| Natural gas | 734 | 1,749 |
| Grid Electricity | 2,538 | 3,966 |
| Water Conveyance | 11 | 20 |
| Wastewater Treatment & Conveyance | 12 | 22 |
| Solid Waste | 280 | 758 |
| Area Source (landscape maintenance) | 0.24 | 0.24 |
| Total Unadjusted Operational Project GHG Emissions without Construction Emissions | 8,145 | 15,658 |
| Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9) | 52 | 114 |
| Total Unadjusted Operational Project GHG Emissions with Construction Emissions | 8,197 | 15,772 |
| Total Unadjusted Operational Project GHG Emissions by Service Population | 5.7^b | 4.8^b |

^a Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components

^b Total emissions divided by service population of 1,423 net new employees for the Project at Phase 1, and 3,233 net new employees for the Project at Buildout.

SOURCE: ESA, 2010

Assumptions and Estimated Baseline Adjusted Operational GHG Emissions, by Source

- Mobile Source (Motor Vehicle) Emissions.** The Proposed Project consists of high-density commercial development located within walking distance of public transportation, designed to minimize the use and impacts of private automobiles. The Project mobile source emissions would result from the typical daily operation of motor vehicles by employees, customers and vendors. Vehicle trip generation from the Proposed Project is based on information from the transportation analysis in Table IV.L-9 of the DEIR. The Proposed Project would result in a net increase of 7,966 standard vehicle trips per day over existing conditions without the preliminary 10 percent TDM reduction, and 7,169 standard vehicle trips per day over existing conditions with the assumed preliminary 10 percent TDM trip reduction. Emissions for vehicle trips were calculated using the URBEMIS2007 computer model and the BGM of the BAAQMD. Trip generation rates of the BGM were adjusted to reflect the Project-specific vehicle trip generation presented in the DEIR. The calculation used the model default vehicle trip lengths specific to urban areas of Alameda County in the San Francisco Bay Area Air Basin.

BGM calculates the CO₂, CH₄ and N₂O emissions from motor vehicle trips based on trip generation and trip lengths and other data in the URBEMIS model. BGM uses CH₄ and N₂O emission factors from CCAR and multiplies them by their respective global warming potential (GWP) to convert them to CO₂e. BGM also takes into account emissions reductions that would result from the implementation of Pavley greenhouse gas standards and the LCFS. The resulting total Project mobile source emissions are estimated to be approximately **8,359 MT CO₂e per year** *without the preliminary 10 percent TDM reduction* and **7,515 MT CO₂e per year** *with the preliminary 10 percent TDM reduction*.

- Project Natural Gas Combustion Emissions. GHG emission estimates from natural gas were calculated using the BGM of BAAQMD. The Project-related natural gas GHG emissions are estimated to be 1,749 MT CO₂e per year. GHG emissions from existing buildings to be demolished represent 371 MT CO₂e per year. The net increase in GHG emissions from natural gas resulting from the Proposed Project are estimated to be **1,632 MT CO₂e per year**.
- Indirect Project Electrical GHG Emissions. Non-residential buildings require electricity for space and water heating, air conditioning, lighting, and plug-in outlets. The amount of energy used (and the amount of associated GHG emissions emitted) per dwelling unit would vary with the type of residential building.

GHGs are indirectly emitted as a result of electrical service required for a Proposed Project. GHGs are emitted during the generation of electricity from fossil fuels. When electricity is used in a building, a portion of the electricity is typically generated off site at a power plant, while the remaining percentages are generated by renewable resources such as hydroelectric dams. The relative percentages of renewable and non-renewable resources vary from year-to-year based on the magnitude of available water flows at hydroelectric dams and other source variables. Currently, electricity provided by the standard PG&E grid invariably represents indirect emissions of GHGs from the combustion of fossil fuels. PG&E maintains annual records on the percentage of electricity from renewable and non-renewable resources and, using this data, calculates an average annual emission factor (CO₂e emission rate per kilowatt of electricity generated) for its sources.

BGM was not used to calculate GHG emissions because it uses statewide composite emission factors that cannot be adjusted in the model. Because PG&E would be the electrical provider for the Proposed Project and because PG&E calculates its own emission factors based on its percentage of renewable energy within its portfolio.

For the Project inventory, all indirect electricity emission factors are drawn from the most recent PG&E's calculation of a 5-year rolling average and have been adjusted to incorporate its fluctuating Renewable Portfolio Standard. The PG&E emission factor is provided in terms of CO₂e and does not separate out the individual contribution of CH₄ and N₂O. While fossil fuel combustion generates CH₄ and N₂O, the emissions of these GHGs typically comprise less than one percent of total CO₂e emissions.

Project electrical GHG emissions were calculated based on energy demand estimates for commercial buildings contained in the California Energy Commission's latest *California Energy*

Demand Staff Report adopted in December 2009. The Proposed Project will construct the buildings to 2010 CALGreen standards that will become mandatory by 2011. To achieve CALGreen Tier I energy efficiency, buildings must achieve 15 percent beyond Title 24, part 6. For the inventory these standards were applied to the Proposed Project and a 15 percent reduction in energy demand was incorporated into the calculation of GHG emissions from grid electricity. The resulting energy demand was then converted to GHG emissions by using the appropriate emission factors discussed above. To determine the net increase resulting from the Project, the GHG emissions from existing structures to be demolished were subtracted from Project emissions. The resulting net Project-related electrical GHG emissions are estimated to **3,099 MT CO₂e per year**.

- Water and Wastewater Treatment and Conveyance. The Project GHG inventory includes emissions associated with drinking water and wastewater supply and treatment. In general, the majority of these emissions are indirect emissions associated with the energy used to convey, treat, and distribute water and wastewater. Additional emissions from wastewater treatment include CH₄ and N₂O, which are emitted directly from wastewater treatment processes.

The amount of electricity required to treat and supply water is a function of water use. According to Section 4.M, Utilities and Service Systems, of the DEIR, the Project would generate a net water demand of 119,000 gallons per day (gpd) after accounting for existing uses in the buildings to be demolished. Implementation of the proposed CALGreen standard would reduce water demand by an additional 20 percent (projected).

Three main processes are required to supply potable water to residential and commercial users: (1) supply and conveyance of the water from the source; (2) treatment of the water to potable standards; and (3) distribution of the water to individual users. Indirect emissions resulting from electricity use were determined by multiplying electricity use by California statewide CO₂, CH₄ and N₂O emission factors from CCAR's General Reporting Protocol. Statewide emission factors are used rather than local PG&E factors to reflect the fact that drinking water from the local water utility (EBMUD) is pumped from a variety of sources including primarily the Mokelumne River watershed in the eastern Sierras and therefore has the potential to be pumped through the jurisdictions of electricity providers other than PG&E.

Energy use for the various aspects of water treatment (e.g., source water pumping and conveyance, water treatment, distribution to users) was determined using the stated water demand and energy intensity values from the CEC that are also recommended for use by BAAQMD in its latest proposed Air Quality Guidelines.

Emissions associated with wastewater treatment include indirect emissions associated with powering the treatment process and direct emissions from degradation of organic material in the wastewater, which are biogenic in nature and not considered as part of the Project's GHG inventory. Wastewater discharge from the Proposed Project is estimated in Section 4.M, Utilities and Service Systems, of the EIR, to be 105,500 mgd. Implementation of the proposed CALGreen standard would reduce water demand by an additional 20 percent. In total, all municipal of water and wastewater treatment and conveyance for the Project is expected to produce **39 MT CO₂e**

annually: approximately **15 MT CO₂e per year** attributable to water conveyance and approximately **24 MT CO₂e per year** attributable to wastewater treatment and conveyance.

- Solid Waste. The updated BAAQMD Air Quality Guidelines now specifically identifies emissions from solid waste as an element to be included in a GHG inventory for comparison to their proposed GHG significance thresholds. For solid waste, BGM uses the emission factors compiled by CALrecycle to estimate GHG emissions. For office uses the factor used is one of the highest and is from an unverifiable source in a Ventura County EIR. This analysis used the user override function to apply an office land use waste generation use rate of 1.999 pounds per 1,000 square feet per year. This rate is consistent with what was in the EIR and is also from Cal recycle.

BGM uses a two step process. In the first step, BGM estimates the amount of solid waste that the project will generate based on solid waste generation rates compiled by Calrecycle (formerly the California Integrated Waste Management Board). In the second step, BGM estimates the GHG emissions associated with that solid waste.

The solid waste GHG emissions include two components: truck hauling emissions and emissions resulting from the decomposition of solid waste. Truck hauling emissions use the vehicle miles traveled (VMT) estimates described in Step 1 and multiply them by EMFAC2007 emission rates for heavy heavy-duty trucks. An EMFAC2007 modeling run was used to estimate CO₂ and CH₄ emissions in grams per mile for trucks traveling at an average speed of 35 mph. Truck emissions also account for the Low Carbon Fuels Rule. For this Project, BGM was adjusted to assume that solid waste was assumed to be disposed of at Altamont Landfill for a round trip distance of 75 miles.

BGM uses the U.S. EPA WARM Model emission rates for mixed solid waste decomposition. Those rates equal 3.1 metric tons of CO₂e per short ton of solid waste that is land filled, assuming no recovery, 0.64 tons CO₂e per short ton, assuming land filled waste with flaring, and 0.3 tons CO₂e per short ton, assuming land filled waste with energy recovery. For the Project, the scenario with landfill recovery was assumed, as Altamont landfill implements landfill gas (LFG) recovery and energy conversion, including running some of its vehicles on collected LFG. BGM calculates the net increase in GHG emissions from the increase in solid waste generation of the Proposed Project to be **462 MT CO₂e per year**.

- Area Sources. Area source emissions stem from hearths (including gas fireplaces, wood-burning fireplaces, and wood-burning stoves) and small mobile fuel combustion sources such as lawnmowers and other landscape maintenance equipment. For commercial development with no hearth facilities, such as the Proposed Project, area source emissions of GHG would be entirely due to landscape maintenance equipment.

For the Proposed Project, the URBEMIS model indicates practically no quantifiable change in GHG emissions from landscape equipment compared to the existing uses to be demolished. The net increase of area source emissions in the Project GHG inventory is approximately **0.24 MT CO₂e per year**.

Estimated Adjusted Total Baseline Operational GHG Emissions

“Baseline Operational GHG Emissions” of the Project factor in all the emissions reduction components described in Section 3.0, which are part of the Project: the Project design features, applicable City SCAs (including TDM, but excluding SCA GHG-1), and regulatory requirements. Although a TDM Plan for the Project (required by SCA TRANS-1) has not yet been prepared, generally, TDM could reduce SOV trips for a large office project near located near transit by about 10 to 20percent. Baseline emissions are reported with and without a preliminary (and conservative) 10 percent TDM trip reduction assumption.

**TABLE 3
BASELINE OPERATIONAL GHG EMISSIONS INVENTORY
FROM THE PROPOSED PROJECT**

| Emission Source | Annual CO ₂ e Emissions
(metric tons per year) | |
|--|--|--|
| | Phase 1 Total CO ₂ e | Project Buildout ^a
Total CO ₂ e |
| Motor vehicle trips without TDM / with TDM ^a | 4,190 / 3,771 | 8,359 / 7,515 |
| Natural gas | 682 | 1,632 |
| Grid Electricity | 1,995 | 3,099 |
| Water Conveyance | 8 | 15 |
| Wastewater Treatment & Conveyance | 13 | 24 |
| Solid Waste | 170 | 462 |
| Area Source (landscape maintenance) | 0.24 | 0.24 |
| Total Baseline Operational Project GHG Emissions without TDM / with TDM, without Construction Emissions | 7,058 / 6,639 | 13,591 / 12,747 |
| Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9) | 52 | 114 |
| Total Baseline Operational Project GHG Emissions without TDM / with TDM, with Construction Emissions | 7,110 / 6,691 | 13,705 / 12,861 |
| BAAQMD Threshold of Significance | 1,100 | 1,100 |
| <i>Exceeds Threshold?</i> | Yes | Yes |
| Total Operational Project GHG Emissions by Service Population without TDM / with TDM | 5.0 / 4.7^c | 4.2 / 3.9^d |
| BAAQMD Threshold of Significance | 4.6 | 4.6 |
| <i>Exceeds Threshold?</i> | Yes | No |
| Impact Determination | Significant | Less than Significant^e |

^a Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components

^b Assumes preliminary 10 percent TDM reduction of vehicle trips.

^c Total emissions divided by service population of 1,423 net new employees for Phase I of the Project.

^d Total emissions divided by service population of 3,233 net new employees for the Project at Buildout.

^e For projects that meet the City's definition of a "very large project," the City requires the Project applicant to prepare a GHG Reduction Plan as a Standard Condition of Approval, even though no CEQA impact is identified.

SOURCE: ESA, 2010

The total annual baseline GHG emissions generated by the Project not assuming the preliminary 10 percent TDM reduction is approximately 13,705 MT CO₂e per year, including

construction emissions. See Table 3, which shows emissions for Phase 1 and Buildout (Phase 1 and Phase 2). The table reveals that the majority of annual Project emissions results from vehicle use (62 percent), followed by electrical demand (23 percent). As a result, the Project would generate GHG emissions of approximately **4.2 MT CO₂e per year per capita of service population**, which is the total annual GHG emissions divided by the Project's estimated total service population of 3,233 net new employees.⁶

The total annual baseline GHG emissions generated by the Project *assuming the preliminary 10 percent TDM reduction* is approximately **12,861 MT CO₂e per year**, exclusive of one-time construction emissions for which BAAQMD has specifically not proposed a threshold of significance. See Table 3. The majority of the annual Project emissions would continue to result from vehicle use (59 percent), followed by electrical demand (24 percent). Total Project GHG emissions would be approximately **3.9 MT CO₂e per year per capita of service population**.

Comparison of Unadjusted and Baseline Emissions

The difference in the baseline and unadjusted GHG emissions of the Project generally demonstrate the extent of emissions reduction that is attributable to measures incorporated with the Project.

At Phase 1, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (7,110 MT CO₂e shown in Table IV.B-11), is approximately 1,087 MT CO₂e per year less than the Project's estimated unadjusted Phase 1 emissions (8,197 MT CO₂e shown in IV.B-10). This is a reduction of approximately 13 percent. The most substantial reductions are associated with motor vehicle emissions (approximately 380 MT CO₂e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 543 MT CO₂e per year less than the unadjusted emissions, which do not consider the Project's adherence to CALGreen standards, as discussed in the assumptions, above).

At Buildout, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (13,705 MT CO₂e shown in Table IV.B-11), is approximately 2,067 MT CO₂e per year less than the Project's estimated unadjusted emissions (15,772 MT CO₂e shown in IV.B-10). This is a reduction of approximately 13 percent (as with Phase 1). Again, the most substantial reductions are associated with motor vehicle emissions (approximately 784 MT CO₂e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 867 MT CO₂e per year less than the unadjusted emissions, which do not consider the Project's adherence to CALGreen standards).

⁶ Total Service Population is calculated as the sum of additional net new residents (zero) and 3,233 net new employees associated with the Project.

Impacts of Baseline Operational GHG Emissions

Based on the project-level significance thresholds, the Project would have a significant impact on the environment if it would produce total emissions of more than 1,100 metric tons of CO₂e annually *and* more than 4.6 metric tons of CO₂e per service population annually, or conflict with an applicable plan, policy, or regulation adopted for the purposes of reducing greenhouse gas emissions.

Impact at Phase 1

For Phase 1, as shown in Table IV. B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 7,110 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold. Also, the Project's 5.0 MT CO₂e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 6,691 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold, and the 4.7 MT CO₂e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Therefore, the Project would have a significant cumulative GHG impact in Phase 1 because its emissions would exceed both the 1,100 MT CO₂e per year threshold *and* the 4.6 MT CO₂e per year service population threshold.

Impact at Total Buildout

At Buildout, as shown in Table IV.B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 13,705 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold. However, the Project's 4.2 MT CO₂e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 12,861 MT CO₂e, which exceeds the 1,100 MT CO₂e per year threshold, but the 3.9 MT CO₂e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Therefore, at Buildout, the Project would not have a significant cumulative GHG impact because it would not exceed the 4.6 MT CO₂e per year service population threshold, even though it would exceed the 1,100 MT CO₂e per year threshold.

5.0 Alternatives GHG Emissions Inventory and Impacts

This section presents the relative operational GHG emissions and resulting impacts for Alternative 1 (South Tower Build Only) and Alternative 2 (Onsite Maximum Reduced Impacts). Table 4 summarizes the relative emissions and impacts of the two alternatives and the Proposed Project. The emissions inventory for Alternatives 1 and 2 are presented below in Tables 4 and 5, respectively.

TABLE 4
COMPARISON OF OPERATIONAL GHG EMISSIONS AND IMPACTS FOR THE
PROPOSED PROJECT AND ALTERNATIVES

| | Annual CO ₂ e Emissions (metric tons per year) | | |
|--|---|--|--|
| | Proposed Project | Alternative 1
(South Tower
Build Only) | Alternative 2
(Onsite Maximum
Reduced) |
| Total Operational GHG Emissions
(without TDM / with TDM) ^a | 13,591 / 12,747 | 7,110 / 6,691 | 2,554 / 2,304 |
| <i>Exceeds BAAQMD 1,100 MT CO₂e
threshold?</i> | Yes | Yes | Yes |
| Total Operational GHG Emissions by
Service Population (without TDM / with
TDM) | 4.2 / 3.9 ^b | 5.0 / 4.7 ^c | 3.9 / 3.5 ^d |
| <i>Exceeds 4.6 MT CO₂e per Service
Population threshold?</i> | No | Yes | No |
| IMPACT DETERMINATION | Less than
Significant | Significant | Less than
Significant |
| Total Construction GHG Emissions | 4,542 | 2,081 | 2,081 |
| Annualized Construction Emissions | 114 over 40 years | 52 over 40 years | 52 over 40 years |
| ^a Assumes preliminary 10 percent TDM reduction of vehicle trips and annualized construction emissions.
^b Total emissions divided by service population of 3,233 net new employees for the Project at Buildout.
^c Total emissions divided by service population 1,423 net new employees for Phase I of the Project.
^d Total emissions divided by service population 647 net new employees for the reduced Project. | | | |

5.1 Alternative 1 (South Tower Build Only)

GHG Emissions for Alternative 1 were calculated similarly to those for the Proposed Project, with a few differences:

- Emissions from increased electricity demand for water and wastewater treatment and conveyance were calculated based on the prorated reduction of square feet of development (approximately 56 percent) compared to the Proposed Project. Existing uses to be demolished under this alternative would be 22,000 square feet, reduced from 280,000 square feet to be demolished under the Project.
- Since this Alternative would be completed earlier (2015) than the Proposed Project (2019), the effect of the Pavley GHG Standards (AB 1493) on mobile emissions would not be as great since fewer Pavley-compliant models would part of the vehicle fleet.

The detailed emissions inventory for Alternative 1 (which is the same as Phase 1 of the Proposed Project) is shown in Table 3. As shown in Tables 3 and 4, the total annual GHG emissions generated from Alternative 1, including the design features related to energy use and transit, is approximately **7,110 MT CO₂e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 13,705 MT CO₂e

for the Proposed Project). The majority of estimated GHG emissions for Alternative 1 results from vehicle use (59 percent), followed by electrical demand (28 percent), similar to sources for the Proposed Project. The total operational emissions for Alternative 1 exceeds the 1,100 MT CO₂e per year threshold. Alternative 1 emissions *assuming the preliminary 10 percent TDM reduction* would total approximately 6,694 MT CO₂e per year, which would still exceed the 1,100 MT CO₂e per year threshold.

As also shown in Tables 3 and 4, the resulting emissions estimate for the proposed Alternative 1 on an annual per capita service population basis is **5.0 MT CO₂e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 4.2 MT CO₂e for the Proposed Project). This was calculated by dividing total emissions (7,110 MT CO₂e) by the service population associated with this Alternative 1, which would only build the South Tower (1,423 net new employees).⁷ This service population-based estimate for Alternative 1 exceeds the 4.6 MT CO₂e per year service population threshold, which is not exceed under the Proposed Project. Alternative 1 emissions *assuming the preliminary 10 percent TDM reduction* on an annual per capita service population basis would be **4.7 MT CO₂e per year**, which would still exceed the 4.6 MT CO₂e per year service population.

A project that exceeds **both** thresholds is considered a significant impact. Thus, Alternative 1 would result in a significant cumulative GHG impact under the BAAQMD thresholds.

5.2 Alternative 2 (On-Site Maximum Reduced Impacts)

- GHG Emissions for Alternative 2 were calculated similarly to those for the Proposed Project, with the following differences: Emissions from increased electricity demand for water and wastewater treatment and conveyance were calculated based on the prorated reduction of square feet of development (approximately 80 percent) compared to the Proposed Project.
- Existing uses would be demolished.

As shown in Tables 4 and 5, the total annual GHG emissions generated from Alternative 2 including the design features related to energy use and transit is approximately **2,554 MT CO₂e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 13,705 MT CO₂e for the Proposed Project). The majority of GHG emissions for Alternative 2 results from vehicle use (83 percent), followed by natural gas demand (11 percent), which is a notably higher portion from vehicle use and a lower portion from natural gas, compared to the Proposed Project and to Alternative 1. The total operational emissions for Alternative 2 exceed the proposed bright-line 1,100 MT CO₂e per year threshold. Alternative 2 emissions *assuming the preliminary 10 percent TDM reduction* would total approximately **2,304 MT CO₂e per year**, which would still exceed the 1,100 MT CO₂e per year threshold.

As also shown in Table 5, the resulting emissions estimate for the proposed Alternative 2 on an annual service population basis is **3.9 MT CO₂e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 4.2 MT CO₂e for the Proposed Project). This was calculated by dividing total emissions (2,554 MT CO₂e) by the service population associated with this Alternative (647 net new employees). This service population-based estimate for Alternative 2 is below the 3.9 MT CO₂e per year service population threshold. Alternative 2 emissions *assuming the preliminary 10 percent TDM*

⁷ Alternative 1 results in a greater service population than the Proposed Project given the relatively lower ratio of employees to total emissions.

reduction on an annual per capita service population basis would be **3.5 MT CO₂e per year**, which is further below the 4.6 MT CO₂e per year service population.

Like the Proposed Project (and Alternative 1), Alternative 2 exceeds the 1,100 MT CO₂e per year threshold, and like the Proposed Project (at Buildout) it is below the service population threshold. Therefore, Alternative 2 would result in a less-than-significant cumulative GHG impact under the BAAQMD thresholds.

TABLE 5
OPERATIONAL GHG EMISSIONS INVENTORY FROM
ALTERNATIVE 2 (ON-SITE MAXIMUM REDUCED IMPACTS)

| Emission Source | Annual CO ₂ e Emissions
(metric tons per year) |
|--|--|
| | Total CO ₂ e |
| Motor vehicle trips without TDM / with TDM ^a | 2,078 / 1,870 |
| Natural gas | 274 |
| Grid Electricity | 71 |
| Water Conveyance | 4 |
| Wastewater Treatment & Conveyance | 6 |
| Solid Waste | 69 |
| Area Source (landscape maintenance) | 0.24 |
| Total Baseline Operational Project GHG Emissions
without TDM / with TDM (no Construction Emissions_ | 2,502 / 2,252 |
| Construction Emissions per Year Annualized over 40
years | 52 |
| Total Baseline Operational Project GHG Emissions
without TDM / with TDM | 2,554 / 2,304 |
| BAAQMD Threshold of Significance | 1,100 |
| <i>Exceeds Threshold?</i> | Yes |
| Total Operational Project GHG Emissions by Service
Population without TDM / with TDM | 3.9 / 3.5 ^b |
| BAAQMD Threshold of Significance | 4.6 |
| <i>Exceeds Threshold?</i> | No |
| <i>Does Project Meet "Very Large Project" Definition?</i> | No |
| IMPACT DETERMINATION | Less than Significant |

^a Assumes preliminary 10 percent TDM reduction of vehicle trips and annualized construction emissions.

^b Total emissions divided by service population 647 net new employees for the reduced Project.

SOURCE: ESA, 2010

PART B: Available GHG Reduction Measures

In preparing this preliminary GHG Reduction Plan, ESA consulted multiple sources including the State of California's Climate Change Scoping Plan (December 2008), the State Attorney General's web site, the California Air Pollution Control Officer Association's (CAPCOA) white paper on CEQA and Climate Change (January 2008), Reference Guides on Leadership in Energy and Environmental Design (LEED) published by the US Green Building Council, and BAAQMD's CEQA Air Quality Guidelines. ESA identified and assessed the feasibility of emission reduction measures from these various sources to identify "additional" measures for potential implementation during development and operation of the Project. This analysis presents a best-professional effort to identify available reduction strategies and does not assume to be exhaustive in its scope.

6.0 GHG Reduction Measures Identified in the Climate Change Scoping Plan of the California Air Resources Board

Table IV.B-8 of the DEIR presented the 39 Recommended Actions (qualitative measures) identified to date by CARB's Scoping Plan. Of the 39 measures identified, those considered to have potential application to the Proposed Project are primarily related to transportation, electricity and natural gas use and green building design. Each of these measures is evaluated below, by source-type, for its applicability to the Proposed Project, its emission reduction potential, and for its inclusion in the Proposed Project as currently designed.

6.1 Transportation

CARB's Scoping Plan identifies nine transportation-related recommended actions. **Action T-1** concerns improvements to light-duty vehicle technology for the purposes of reducing GHG emissions (Pavley Standards). This action focuses on legislating improved controls for vehicle manufacturers and would not generally be considered applicable to the Proposed Project. However, it is reasonably anticipated that vehicles utilized by the Proposed Project would be subject to the new Pavley regulation. BGM took into account emissions reductions that would result from the implementation of the Pavley Standards, therefore this action does not represent additional mitigation available to the City and Project applicant.

Action T-2 concerns implementation of a LCFS. To reduce the carbon intensity of transportation fuels, CARB is developing a LCFS, which would reduce the carbon intensity of California's transportation fuels by at least ten percent by 2020 as called for by Governor Schwarzenegger in Executive Order S-01-07. LCFS will incorporate compliance mechanisms that provide flexibility to fuel providers in how they meet the requirements to reduce GHG emissions. Implementation of such a standard is not within the purview of a development project and this action does not represent additional mitigation available to the City and Project applicant. BGM took into account emissions reductions that would result from the implementation of the LCFS.

Action T-3 addresses regional transportation targets for reducing GHG emissions. SB 375 requires CARB to develop, in consultation with MPOs, passenger vehicle GHG emissions reduction targets for

2020 and 2035 by September 30, 2010. It sets forth a collaborative process to establish these targets, including the appointment by CARB of a Regional Targets Advisory Committee to recommend factors to be considered and methodologies for setting GHG emissions reduction targets. SB 375 also provides incentives – relief from certain CEQA requirements for development projects that are consistent with regional plans that achieve the targets. While no targets have been set pursuant to SB 375 and the Sustainable Community Strategy for the region will likely not be adopted prior to 2012, the Proposed Project will be required to implement TDM measures which reduce VMT as a Standard Condition of Approval. Although there are presently no details as to what specific measures would and what would not be included in the TDM Plan, a preliminary estimated 10 percent vehicle trip reduction was accounted for in the Project inventory reported in Table 3. As such, TDM measures represent a potential available means of further reducing GHG emissions from the Project.

Action T-4 is concerned with vehicle efficiency measures. The California Integrated Waste Management Board (CIWMB) with various partners continues to conduct a public awareness campaign to promote sustainable tire practices. CARB is pursuing a regulation to ensure that tires are properly inflated when vehicles are serviced. Because the Proposed Project would not involve the operation of fleet vehicles, this action does not represent additional mitigation available to the City and Project applicant.

Actions T-5 and T-6 addresses electrification of ships at ports and port operations and is not applicable to the Proposed Project. Therefore, this action does not represent additional mitigation available to the City and Project applicant.

Action T-7 requires addresses existing trucks/trailers to be retrofitted with the best available technology and/or CARB-approved technology. This action does not represent additional mitigation available to the City and Project applicant.

Action T-8 focuses on hybridization of medium- and heavy-duty vehicles. The implementation approach to Action T-8 is to adopt a regulation and/or incentive program that reduces GHG emissions by encouraging hybrid technology as applied to vocational applications that have significant urban, stop-and-go driving, idling, and power take-off operations in their duty cycle. Such applications include parcel delivery trucks and vans. This action does not represent additional mitigation available to the City and Project applicant.

Action T-9 concerns implementation of a high speed rail (HSR) system. This action does not represent additional mitigation available to the City and Project applicant.

6.2 Electricity and Natural Gas

Action E-1, together with **Action GB-1** (Green Building), aims to reduce electricity demand by increased efficiency of Utility Energy Programs and adoption of more stringent building and appliance standards. Elements of this action include encouraging construction of zero net energy (ZNE) buildings and implementation of passive solar design. In addition to employing on-site electricity generation, a ZNE building must either replace natural gas with renewable energy for space and water heating, or compensate for natural gas use by generating surplus electricity for sale on the state's electricity grid. The Project proposes to construct the proposed towers consistent with the updated CALGreen building code standards which will become effective in January 2011. Compliance with CALGreen standards was

accounted for in the inventory presented in Table 3. The intent of compliance with CALGreen standards is generally consistent with the objectives of Action E-1 and GB-1. However, the Proposed Project does not currently include any form of on-site electricity generation. Consequently, on-site power generation represents a potential additional mitigation measure .

Action E-2 encourages an increase in the use of combined heat and power (CHP) use, or co-generation, facilities. California has supported CHP for many years, but market and other barriers continue to keep CHP from reaching its full market potential. Increasing the deployment of efficient CHP will require a multi-pronged approach that includes addressing significant barriers and instituting incentives or mandates where appropriate. Co-generation would not be applicable to the Project site as it would require a constant need for steam that is absent. This action does not represent additional mitigation available to the City and Project applicant.

Action E-3 concerns Renewable Portfolio Standards for utilities and does not apply to development projects. Therefore, the Proposed Project would not conflict with the recommended measure.

Action E-4 strives to promote solar generated electricity. As discussed with respect to Action E-1, the proposed Project does not currently include any form of on-site electricity generation. Consequently, on-site power generation represents a potential additional mitigation measure.

7.0 GHG Reduction Measures Identified in the California Air Pollution Control Officers Association (CAPCOA) CEQA and Climate Change Guidance Document

Proposed project design elements and mitigation measures may be compared to the list of 64 project-specific mitigation measures developed by the CAPCOA in their document *CEQA and Climate Change*.⁸ **Table 7** presents an itemized list of each of the project-specific mitigation measures identified in the CAPCOA document and correlates them to any existing or Proposed Project elements. Mitigation measures which are not proposed by the project or identified as a Standard Condition of Approval or Mitigation Measure in the DEIR are then identified as potential GHG reduction measures if they are deemed applicable to the type of project proposed. The State Attorney General has also published a list of various “measures that may reduce the global warming related impacts of a project.”⁹ These measures are generally included in CAPCOA’s more extensive listing of GHG mitigations and are not repeated.

⁸ California Air Pollution Control Officers Association, *CAPCOA White Paper - CEQA and Climate Change*. CAPCOA, 2008, <http://www.capcoa.org/ceqa/CAPCOA%20White%20Paper%20-%20CEQA%20and%20Climate%20Change.pdf>, accessed on October 23, 2008.

⁹ California Department of Justice, Attorney General Edmund G. Brown Jr., *The California Environmental Quality Act Addressing Global Warming Impacts at the Local Agency Level*, December 9, 2008, http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf, accessed on July 1, 2009.

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|--------------------|---|--|--|
| MM T-1 | Bike parking | 1-5 percent for MM T-1, MM T-2, and MM T-3 | Yes Municipal Code Chapter 17.117 requires new development to provide both short-term (i.e., bicycle racks) and long-term bicycle parking (i.e., lockers or indoor storage) for bicycles per SCA TRANS 2 the applicant shall submit for review and approval of the Planning and Zoning Division, plans that show bicycle storage and parking facilities to accommodate 75 short-term bicycle parking spaces onsite or on public sidewalk, and 136 long-term bicycle parking spaces |
| MM T-2 | End of trip facilities (i.e., showers and lockers) | | Yes – Showers (20) and lockers (80) to be installed for office uses per Table 4.L-18 of the DEIR. |
| MM T-3 | Bike parking (residential) | | Not Applicable –No Residential component. |
| MM T-4 | Proximity to bike path/bike lanes | | Yes – per DEIR Transportation Section, Class I, II and III bike routes exist in the area. |
| MM T-5 | Pedestrian network | 1 percent – 10 percent | Yes – per DEIR Transportation Section, Pedestrian facilities include sidewalks, crosswalks, and pedestrian signals. Sidewalks are provided on all of the existing roadways in the study area. |
| MM T-6 | Pedestrian barriers minimized | | |
| MM T-7 | Bus Shelter for Existing/Planned Transit Service | 1 percent – 2 percent | Yes – per DEIR Transportation Section, the Project would install AC Transit shelters at two relocated stops on 20 th Street. |
| MM T-8 | Traffic Calming | 1 percent - 10 percent | Not applicable to commercial office building located in an urban area. |
| MM T-9 | Paid Parking | 1 percent – 30 percent | This could be a consideration of the TDM Plan and as such represents a potential additional mitigation measure. |
| MM T-10 | Minimum Parking | 1 percent – 30 percent | Yes -The Proposed Project would have a parking demand deficit of 238 spaces per the Transportation Section of the DEIR. |
| MM T-11 | Parking Reduction beyond Code/Shared Parking | 1 percent – 3- percent | Not Applicable -The Municipal Code specifies the Project is not required to provide any off-street parking because of its location in a C-55 / S-17 zoning district. However, the Proposed Project would have a parking demand deficit of 238 spaces per the Transportation Section of the DEIR. |
| MM T-12 | Pedestrian pathway through parking | 1 percent - 4 percent | Not Applicable. The project includes subterranean parking levels which would not be an impediment to pedestrian travel. |
| MM T-13 | Off Street Parking | 1 percent – 4 percent | Yes - Design of the Proposed Project provides for off street parking. |
| MM T-14 | Parking Area Tree Cover (50 percent cover in ten years) | 3.1 kg/m ³ of canopy | Not Applicable. The project includes subterranean parking levels which would not be exposed to sunlight. |
| MM T-15 | Valet Bicycle Parking | Low | Not Applicable – project is not an event center. |
| MM T-16 | Garage Bicycle Storage | Low | Not Applicable – Project is not residential. |
| MM T-17 | Preferential Parking for EVs/CNG Vehicles | Low | Yes – This required by CALGreen section 5.106.5.2. |

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|---------------------------|--|---------------------------|---|
| MM T-18 | Reduced/No Parking Fee for EVs/CNG Vehicles | Low | No –This measure represents a potential additional mitigation measure. |
| MM T-19 | TMA Membership | 1 percent – 28 percent | Yes - Project will prepare aTDM implementation as SCA TRANS-1, however, details of the TDM Plan are not established and no GHG reduction estimate from implementation of the TDM Plan was considered in the inventory. Consequently, this measure represents a means by which further GHG emission reductions may be realized. |
| MM T-20 | Use or provide ULEV | Low | Not Applicable – No applicant vehicle fleet that can feasibly operate on hybrid or electric power. |
| MM T-21 | Flex Fuel Vehicles | Low | Not Applicable – No applicant vehicle fleet. |
| MM D-1 | Office/ Mixed Use Density | 0.05 percent – 2 percent | Yes – Project provides office and retail use proximate to transit with bicycle and pedestrian access. |
| MM D-2 | Orientation to Existing/Planned Mass Transit | 0.4 percent – 1 percent | Yes – DEIR Transportation Section states that the site is located approximately 0.25 mile of the 19 th Street BART station. AC Transit provides bus service to the project site. |
| MM D-3 | Services Operational – for Employees | 0.5 percent – 5 percent | Yes - Operational features include retail space restaurants and a fitness center. |
| MM D-4 | Residential Density | 1 percent – 40 percent | Not Applicable – Project is not residential. |
| MM D-5 | Street Grid | 1 percent | Not Applicable to non-residential projects. |
| MM D-6 | Neighborhood Electric Vehicle Access | 0.5 percent – 1.5 percent | Not Applicable to non-residential project. |
| MM D-7 | Affordable Housing Component | 0.4 percent – 6 percent | Not Applicable – Project is not residential. |
| MM D-8 | Recharging Area | Low | Not Applicable – Project is not residential. |
| MM D-9 | Urban Mixed Use Development | 3 percent - 9 percent | Yes - Development predominantly characterized office and retail uses that are combined in two buildings on a single site in an integrated development project with functional interrelationships. |
| MM D-10 | Suburban Mixed Use Development | 3 percent | Not Applicable – Project is urban not suburban (see MM D-9) |
| MM D-11 | Other Mixed Use Development | 1 percent | Not Applicable to non-residential project. |
| MM D-12 | Infill Development | 3 percent - 30 percent | Not Applicable – Project is not located on a vacant infill site, brownfield or greyfield. |
| MM D-13 | Electric Lawnmower Provided to Residents | 1 percent | Not Applicable – Project is not Residential. |
| MM D-14 | Enhanced Recycling | Low | Construction : Yes – DEIR Project Description states that the Project Applicant proposes to establish a construction debris recycling program throughout demolition and construction of the project which would assume 50 percent materials recycled or reused. Concrete materials, in particular, not needed for the Proposed Project would be hauled from the site for recycled material reuse. |

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|--------------------|--|-------------------------|--|
| | | | Operation: -No. In terms of operational elements, while the City has adopted a zero-waste resolution there are no operational project recycling goals. Operational recycling goals represent a potential additional mitigation measure |
| MM D-15 | LEED Certification | Moderate | Partially – The Proposed Project will be designed to CALGreen standards. These standards require a reduction over existing Title 24 energy standards as well as water demand reductions. CALGreen standards do not contain specificity with regard to measures or building techniques to be implemented. Therefore, LEED certification and its corresponding measures represent a potential for further GHG reductions. |
| MM D-16 | Retro-Commissioning: Building systems perform interactively to optimize energy performance | 8 percent – 10 percent | No –This measure represents a potential additional mitigation measure. However it may be a technique to achieve CALGreen standards proposed by the Project. |
| MM D-17 | Drought tolerant Landscaping and shade trees | Low | Partially – shade trees are proposed for 20 th , 21 st and Webster Streets. There is no specificity regarding landscaping. Consequently drought-tolerant landscaping represents potential additional mitigation measure. |
| MM D-18 | Local Farmers Market | Low | Not Applicable to retail/office project. |
| MM D-19 | Community Gardens | Low | Not Applicable to retail/office project. |
| MM E-1 | High-Efficiency Pumps | Low | No –This measure represents a potential additional mitigation measure. |
| MM E-2 | Wood Burning Fireplaces/Stoves | Low | Not Applicable to retail/office project. |
| MM E-3 | Natural Gas Stove | Low | Not Applicable to retail/office project. |
| MM E-4 | Energy Star Roof | 0.5 percent – 1 percent | No –This measure represents a potential additional mitigation measure. |
| MM E-5 | On-Site Renewable Energy System | 1 percent – 3 percent | No –This measure represents a potential additional mitigation measure. |
| MM E-6 | Exceed Title 24 | 1 percent | Yes – CALGreen standards require exceeding existing Title 24 requirements by 15%. |
| MM E-7 | Solar Orientation | Low | Not feasible for high rise towers – This measure cannot be implemented for high rise towers because by design they require exposure from all directions to maximize natural light and view shed. |
| MM E-8 | Non-roof Surfaces - Provide light-colored pavement for at least 30 percent of the site's non-roof impervious surfaces, including parking lots, walkways, plazas, OR place a minimum of 50 percent of parking spaces underground or covered by structured parking | Low | Yes – Non-roof surfaces would be landscaped gardens. Parking areas would be subterranean. |

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|---------------------------|---|---------------------------|--|
| MM E-9 | Low-energy Cooling (Separate ventilation and Cooling systems) | 1 percent – 10 percent | No –This measure represents a potential additional mitigation measure. |
| MM E-10 | Install Vegetated Green Roof | 1 percent | No –However, this measure would compete for roof space with Measures E-4 and E-5 and would be unrealistic for a high-rise building and is not suggested as an additional mitigation measure. |
| MM E-11 | Charging Facilities | Low | No –This measure represents a potential additional mitigation measure. |
| MM E-12 | Light-colored Paving | Low | Not applicable to a high rise commercial building with subterranean parking. |
| MM E-13 | Cool Roof | Low | No –However, MM E-4 requires Energy Star roofs which are low emissivity materials¹⁰. This measure does not represent an additional mitigation measure with implementation of MM E-4. |
| MM E-14 | Solar Water Heaters | 20 percent – 70 percent | Not applicable for institutional complex with central boiler. |
| MM E-15 | Electric Yard Equipment Compatibility | Low | No –This measure represents a potential additional mitigation measure. |
| MM E-16 | Energy Efficient Appliance Standards | Low | Not Applicable to retail/office project. |
| MM E-17 | Green Building Materials | Low | No –This measure represents a potential additional mitigation measure. |
| MM E-18 | Shading Mechanisms for windows, patio and walkway overhangs | Low | No –This measure represents a potential additional mitigation measure. |
| MM E-19 | Ceiling/whole-house fans | Low | Not Applicable to retail/office project. |
| MM E-20 | Programmable Thermostats | Low | No –This measure represents a potential additional mitigation measure. |
| MM E-21 | Passive Heating and Cooling Systems | Low | Not applicable for high rise towers. High rise towers would be exposed to summer sunlight in all directions and would require more than just a passive cooling system. Similar considerations or winter heating based on concrete and steel substructure necessary for high-rise towers. |
| MM E-22 | Day Lighting Systems | Low | Not applicable – High rise towers are designed to receive sunlight from all directions. CAPCOA indicates that this measure has “little benefit in multi-floor buildings”. |
| MM E-23 | Low- Water Use Appliances | Low | Yes – This measure would be a requirement of CALGreen Standards. |
| MM E-24 | Goods Transport by Rail | Moderate | Not Applicable to retail/office project. |
| MM S-1 | Emissions Reduction Education | Low | No –This measure represents a potential additional mitigation measure. |
| MM S-2 | School Curriculum | Low | Not Applicable to retail/office project. |

¹⁰ http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_emissivity

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|--------------------|---------------------------------|--------------------|---|
| MM M-1 | Off-Site Mitigation Fee Program | Moderate | The BAAQMD does not have a fee mitigation program for GHG. CARB's cap and trade program is not scheduled for launch until 2012. CAPCOA identifies this measure as not logistically feasible at present. |
| MM M-2 | Offset Purchase | Low | Not Applicable (As noted above, CARB is developing a cap and trade program but it is not scheduled for launch until 2012). CAPCOA identifies this measure as not logistically feasible at present. |

SOURCE: CAPCOA, 2009.

8.0 GHG Reduction Measures Identified in the Bay Area Air Quality Management District (BAAQMD) Proposed CEQA Air Quality Guidelines

The BAAQMD's CEQA Air Quality Guidelines contains tables of mitigation measures to reduce operational-related emissions of GHG's from mobile, area and stationary sources in Section 4.3 of the document. These measures include reduction estimates applicable to each measure. **Table 8** presents an itemized list of each of the project-specific mitigation measures identified in by BAAQMD and correlates them to any existing or Proposed Project elements. Mitigation measures which are not proposed by the project or identified as a Standard Condition of Approval or Mitigation Measure in the DEIR are then identified as potential GHG reduction measures if they are deemed applicable to the type of project proposed.

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|--------------------|---|------------------------|---|
| 1 | Mix of Uses | -3 percent – 9 percent | Yes, residential within ½ mile |
| 2 | Local Serving Retail within ½ mile of Project | 2 percent | Yes |
| 3 | Transit Service | 0 percent – 15 percent | Yes – DEIR Transportation Section states that the site is located approximately 0.25 mile of the 19 th Street BART station. AC Transit provides bus service to the project site. |
| 4 | Bike & Pedestrian | 0 percent - 9 percent | Yes – per DEIR Transportation Section, Class I, II and III bike routes exist in the area. |
| 5 | Affordable Housing | 0 percent – 4 percent | Not Applicable to retail/office project. |

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|--------------------|--|--|--|
| 6 | Daily Parking Charge | 0 percent – 25 percent | This could be a consideration of the TDM Plan and as such represents a potential additional mitigation measure. |
| 7 | Parking Cash-out. California law requires certain employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space | 0 percent – 12.5 percent | No –This measure represents a potential additional mitigation measure. |
| 8 | Free Transit Passes | 25 percent of transit service reduction | No –This measure represents a potential additional mitigation measure. |
| 9 | Employee Telecommuting Program | 1 percent – 100 percent | Not feasible for a commercial building where tenants are not yet identified. |
| 10-12 | Compressed Work Schedule | 1 percent – 40 percent | Not feasible for a commercial building with multiple tenants that are not yet identified. |
| 13 | Secure Bike Parking | 3 or more elements = 1percent; 5 or more = 2 percent reduction | Yes bicycles per SCA TRANS 2 the applicant shall submit for review and approval of the Planning and Zoning Division, plans that show bicycle storage and parking facilities to accommodate 75 short-term bicycle parking spaces onsite or on public sidewalk, and 136 long-term bicycle parking spaces |
| 14 | Showers/Changing facilities provided | | Yes – Showers (20) and lockers (80) to be installed for office uses per Table 4.L-18 of the DEIR. |
| 15 | Guaranteed Ride Home Program provided | | Yes – Alameda County has this program available to all employers and employees in the County |
| 16 | Car sharing services provided | | No –This measure represents a potential additional mitigation measure. |
| 17 | Information provided on transportation alternatives | | No –This measure represents a potential additional mitigation measure. |
| 18 | Dedicated employee transportation coordinator | | No –This measure represents a potential additional mitigation measure. |
| 19 | Carpool matching program | | No –This measure represents a potential additional mitigation measure. |
| 20 | Preferential carpool/vanpool parking | | No –This measure represents a potential additional mitigation measure. |
| 21 | Parking supply | 0-50 percent | Yes -The Proposed Project would have a parking deficit of 416 spaces per the Transportation Section of the DEIR. |
| 22 | On Road trucks | URBEMIS determination | Not Applicable to retail/office project |
| 23 | Increase energy efficiency beyond Title 24 | Equal to percentage increase beyond Title 24 | Yes – CALGreen standards require exceeding existing Title 24 requirements by 15%. |
| 24 | Electrically powered landscape equipment and electrical outlets | Equivalent to URBEMIS estimated emissions | No –This measure represents a potential additional mitigation measure. |

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|--------------------|---|--|--|
| 26 | Plant shade trees within 40 feet of the south side or within 60 feet of the west sides of properties | 30 percent | Yes – shade trees are proposed for 20 th , 21 st and Webster Streets. |
| 27 | Require cool roof materials | 34 percent | No –However, MM E-4 requires Energy Star roofs which are low emissivity materials¹¹. This measure does not represent an additional mitigation measure with implementation of MM E-4. |
| 28 | Install green roofs | 1 percent | No –However, this measure would compete for roof space with Measures E-4 and E-5 and would be unrealistic for a high-rise building and is not suggested as an additional mitigation measure. |
| 29 | Require smart meters and programmable thermostats | 10 percent | Installation of Smart Meters would not reduce GHG emissions. Installation of programmable thermostats is addressed in CAPCOA Measure E-20. |
| 30 | Meet GBC standards in all new construction | 3 percent – 17 percent | Yes. Buildings will be built to CALGreen standards. |
| 32 | Install solar water heaters | 70 percent | Not Applicable to retail/office project.` |
| 33 | Install tankless water heaters | 35 percent | Not Applicable to retail/office project.` |
| 34 | Install solar panels on residential and commercial buildings | 100 percent | No –However, CAPCOA MM E-5 discusses solar energy systems. This measure does not represent an additional mitigation measure with implementation of MM E-5. |
| 35 | 100% increase in diversity of land use mix | 5 percent | Not Applicable to retail/office project.` |
| 36 | Jobs/housing balance | Trip reduction as determined by traffic consultant | Trip generation estimates considered households and employment for the Study area. Not a true mitigation measure, given the project location is not changeable. |
| 37 | 100% increase in design (i.e., presence of design guidelines for transit oriented development, complete street standards | 3 percent | Yes – per DEIR Transportation Section, the Project would relocate two AC Transit stops on 20 th Street and add shelter. The site is located approximately 0.5 mile of the 19 th Street BART station. AC Transit provides bus service to the project site |
| 38 | 100% increase in density | 5 percent | Yes – Per DEIR Project Description, project will increase total useable floor area on the project site by 92 percent. |
| 39 | HVAC duct sealing | 30 percent | Yes -this measure is required by section 5.504.3 of the CALGreen mandatory standards for commercial buildings. |
| 40 | Provide necessary infrastructure and treatment to allow use of 50% greywater/recycled water in residential and commercial uses for outdoor irrigation | 6 percent | No – However, per DEIR Utilities section pp. IV.M-10, , EBMUD has stated that recycled water service is not recommended for the type of project proposed . |

¹¹ http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_emissivity

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

| Mitigation Measure | Description | Reduction Estimate | Existing or proposed by the project? |
|--------------------|---|----------------------|--|
| 41 | Complete streets | 1percent – 5 percent | Not Applicable to retail/office project |
| 42 | Maximize interior daylight | None Given | Not applicable – High rise towers are designed to receive sunlight from all directions. CAPCOA indicates that this measure has “little benefit in multi-floor buildings” . . |
| 43 | Increase roof/ceiling insulation | None Given | No –This measure represents a potential additional mitigation measure. However it may be a technique to achieve CALGreen standards proposed by the Project. |
| 45 | Install rainwater collection systems in commercial buildings | None Given | No –This measure represents a potential additional mitigation measure. |
| 46 | Install low-water use appliances and fixtures | None Given | Yes –CALGreen standards would require low flow, water efficient fixtures |
| 47 | Restrict the use of water for cleaning outdoor surfaces/prohibit systems that apply water to non-vegetated surfaces | None Given | No –This measure represents a potential additional mitigation measure. |
| 48 | Implement water-sensitive urban design practices in new construction | None Given | No –This measure represents a potential additional mitigation measure. However it may be a technique to achieve CALGreen standards proposed by the Project. |
| 50 | Create food waste and green waste curb-side collection service | None Given | Not Applicable to retail/office project |
| 51 | Require provision of storage areas for recyclables and green waste in new construction | None Given | No –This measure represents a potential additional mitigation measure. |

9.0 Summary of Additional GHG Reduction Measures Considered for the Proposed Project

The following Table 9 summarizes the available additional GHG reduction measures identified in Sections 6.0 through 8.0 above. These listed were identified as those not already assumed as part of the Project and that could be considered for implementation development and operation of the Project to further increase energy efficiency and reduce GHG emissions from the Project to the greatest extent practical and feasible. As previously indicated, available and feasible reduction measures would not be limited to those listed in Table 9; given the evolving nature of GHG emissions reduction strategies and technologies, there is some uncertainty involved with the identification and effectiveness of available GHG reduction measures. Further, additional measures may be feasible (or less so) as the Project is developed in greater detail. Overall, a “comprehensive set of quantified additional GHG reduction

measures available to further reduce GHG emissions beyond the adjusted GHG emissions” that may include but not be limited to a combination of the available measures in Table 9 would constitute a GHG Emissions Reduction Plan for the Project.

A preliminary estimate of emissions reductions is presented for some measures. For others a quantifiable emission reduction cannot be reasonably estimated given the available details of the Project or are insubstantial because the emissions would be minimal. However, these measures are still identified for possible implementation by the Project (as the GHG Emissions Reduction Plan) to ensure emissions reduction to the greatest extent feasible below the BAAQMD CEQA Thresholds of Significance (1,100 metric tons of CO₂e per year and 4.6 metric tons of CO₂e per year per service population), pursuant to Mitigation Measure AIR-3 and Standard Condition of Approval GHG-1 identified in the EIR for the Project..

Following Table 9 is an individual assessment of the feasibility, applicability and GHG emissions reduction potential of each of these additional reduction measures identified.

TABLE 9
ADDITIONAL GHG REDUCTION MEASURES IDENTIFIED FOR POTENTIAL IMPLEMENTATION BY THE PROPOSED PROJECT

| Mitigation Measure | Description | CO ₂ e Emissions Reduction Estimate Range |
|--------------------|---|--|
| CAPCOA MM T-9 | Paid Parking ^a | 1 percent – 30 percent |
| CAPCOA MM T-18 | Reduced/No Parking Fee for EVs/CNG Vehicles | Low |
| CAPCOA MM T-19 | TMA Membership ^a | 1 percent – 28 percent |
| CAPCOA MM D-14 | Enhanced Recycling | Low |
| CAPCOA MM D-15 | LEED Certification ^b | Moderate |
| CAPCOA MM D-16 | Retro-Commissioning | 8 percent – 10 percent |
| CAPCOA MM D-17 | Drought-tolerant Landscaping | Low |
| CAPCOA MM E-1 | High-Efficiency Pumps | Low |
| CAPCOA MM E-4 | Energy Star Roof | 0.5 percent – 1 percent |
| CAPCOA MM E-5 | On-Site Renewable Energy System | 1 percent – 3 percent |
| CAPCOA MM E-9 | Low energy Cooling | 1 percent – 10 percent |
| CAPCOA MM E-11 | Charging Facilities | Low |
| CAPCOA MM E-15 | Electric Yard Equipment Compatibility | Low |
| CAPCOA MM E-17 | Green Building Materials | Low |
| CAPCOA MM E-18 | Shading Mechanisms for windows, patio and walkway overhangs | Low |
| CAPCOA MM E-20 | Programmable Thermostats | Low |
| CAPCOA MM S-1 | Emissions Reduction Education | Low |
| CAPCOA MM M-2 | Offset Purchase | Up to 100 percent |
| BAAQMD MM 6 | Daily Parking Charge ^{a,c} | 0 percent - 25 percent |
| BAAQMD MM 7 | Parking Cash-out. California law requires certain employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space ^a | 0 percent – 12.5 percent |
| BAAQMD MM 8 | Free Transit Passes ^a | 25 percent of transit service reduction |
| BAAQMD MM 16 | Car sharing services provided ^a | 1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together |
| BAAQMD MM 17 | Information Provided on Transportation Alternatives ^a | 1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together |
| BAAQMD MM 18 | Dedicated Employee Transportation Coordinator ^a | |
| BAAQMD MM 19 | Carpool Matching Program ^a | |
| BAAQMD MM 20 | Preferential Carpool/Vanpool Parking ^a | |
| BAAQMD MM 24 | Electrically powered landscape equipment and electrical outlets | Equivalent to URBEMIS estimated emissions |

| Mitigation Measure | Description | CO ₂ e Emissions Reduction Estimate Range |
|--------------------|---|--|
| BAAQMD MM 43 | Increase Roof/Ceiling Insulation | BAAQMD provides no emissions reduction range |
| BAAQMD MM 45 | Install rainwater collection systems in commercial buildings | BAAQMD provides no emissions reduction range |
| BAAQMD MM 47 | Restrict the use of water for cleaning outdoor surfaces/prohibit systems that apply water to non-vegetated surfaces | BAAQMD provides no emissions reduction range |
| BAAQMD MM 48 | Implement water-sensitive Urban Design Practices in New Construction | BAAQMD provides no emissions reduction range |
| BAAQMD MM 51 | Require the Provision of storage areas for recyclables and green waste in new construction | BAAQMD provides no emissions reduction range |

^a To be estimated with SCA TRANS-1, which requires preparation of a TDM incorporating a variety of measures aimed at reducing SOV trips generated by the Project.

^b While LEED certification is not being proposed for the Project, Voluntary Tier CALGreen standards may be identified.

^c Addressed In CAPCOA Measure T-9.

SOURCE: ESA, 2010

- 9.1 CAPCOA Mitigation Measure T-9: Paid Parking.** This measure would provide an employee and/or customer paid parking system. Project must have a permanent and enforceable method of maintaining user fees for all parking facilities. The facility may not provide customer or employee validations. Daily charge for parking must be equal to or greater than the cost of a transit pass plus 20 percent. This measure would reduce trip generation and could be a component of the required TDM Plan. The estimated reduction of trip generation (and associated GHG emissions) is best determined by the traffic consultant preparing the TDM Plan. BAAQMD estimates an employee trip reduction benefit of 0 to 25 percent with this measure.
- 9.2 CAPCOA Mitigation Measure T-18: Reduced Parking Fee for EV/CNG Vehicles.** This measure would reward and encourage the use of low GHG emission vehicles. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in transportation-related emissions can reliably be estimated.
- 9.3 CAPCOA Mitigation Measure T-19: TDM Membership.** This measure would require permanent TMA membership and funding requirement. Funding to be provided by Community Facilities District or County Service Area or other non-revocable funding mechanism. TDMs have been shown to reduce employee vehicle trips up to 28 percent with the largest reductions achieved through parking pricing and transit passes. The impact depends on the

travel alternatives. These trip reductions will be detailed in the TDM Plan to be prepared for the Project (pursuant to SCA TRANS-1), and the resulting vehicle trip and related GHG emissions reductions will be calculated.

9.4 CAPCOA Mitigation Measure D-14: Enhanced Recycling. This measure would provide infrastructure/education that promotes the avoidance of products with excessive packaging, recycle, buying of refills, separating of food and yard waste for composting, and using rechargeable batteries. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.

9.5 CAPCOA Mitigation Measure D-15: LEED Certification. The Proposed Project will be designed to the CALGreen building standards which when adopted on January of 2011. While LEED certification is not being proposed for the Project towers, they nonetheless are proposed to be built to CALGreen standards. For the purpose of meaningful GHG emissions reduction calculations, CALGreen standards for commercial buildings would result in 15 percent less energy demand and 20 percent reduced water demand than a standard building built to 2008 Title 24 standards. Therefore, for the purpose of estimating an emissions inventory, CALGreen is equivalent to a LEED “silver” rating in terms of meaningful emissions reductions. CALGreen is assumed in the adjusted baseline emissions for the Project reported in the Project’s baseline emissions discussed previously. More aggressive LEED certification (“gold” or “platinum”) would further increase efficiency and further reduce GHG emissions.

9.6 CAPCOA Mitigation Measure E-5: On-site Renewable Energy System. This measure would provide onsite renewable energy system(s). Nonpolluting and renewable energy potential includes solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, projects may take advantage of net metering with the local utility. Of these strategies, the most common for commercial building applications in an urban environment would be solar. The effectiveness of a solar energy system for the Proposed Project would be restricted by the available roof space and the need for other ancillary equipment on the rooftop.

With regard to feasibility of this measure, it should be noted that in a March 30, 2010 press release, Kaiser Permanente announced its intention to install 15 megawatts of solar power systems¹² on its hospitals, medical offices and other buildings at 15 locations in California. Kaiser estimates that installation of solar power systems will provide for 10 percent of electricity demand for its buildings at each location. Lowering this reduction goal to 5 percent to account for rooftop space limits the estimate of the potential GHG reductions resulting if such a measure was implemented for the Proposed Project, a potential reduction of 176 MT/year of CO₂e would be possible.

9.7 CAPCOA Mitigation Measure E-9: Low Energy Cooling. This measure would require the Project to optimize the buildings thermal distribution by separating ventilation and

¹² <http://xnet.kp.org/newscenter/pressreleases/nat/2010/033010solarpower.html>

thermal conditioning systems. CAPCOA estimates a 1 to 10 percent reduction in energy demand through implementation of this measure. Applying the lower end of this estimated reduction goal as an estimate of the potential GHG reductions if such a measure was to be implemented for the proposed Project, a potential reduction of 35.3 MT/year of CO₂e would be possible

- 9.8 CAPCOA Mitigation Measure E-11: Charging Facilities.** This measure would require the Project to install electric vehicle charging facilities. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.
- 9.9 CAPCOA Mitigation Measure E-15: Electric Yard Equipment Compatibility.** This measure would require provision of electrical outlets at building exterior areas. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.
- 9.10 CAPCOA Mitigation Measure E-17: Green Building Materials.** This measure would require the Project to use materials which are resource efficient, recycled, with long life-cycles and manufactured in an environmentally friendly way. This measure addresses lifecycle GHG emissions which are not a consideration relative to CEQA. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions would be applicable to the Project inventory.
- 9.11 CAPCOA Mitigation Measure E-18: Shading Mechanisms for Windows, Patios and Walkway Overhangs.** This measure would require installation of energy-reducing shading mechanisms for windows, porch, patio and walkway overhangs. CAPCOA cites an estimate the savings of this measure to be \$450 per year. Based on a commercial electrical rate of 0.18 dollars per kw-hr represents approximately 2,500 kw-hr per year or about 0.6 MT/year of CO₂e.
- 9.12 CAPCOA Mitigation Measure E-20 Programmable Thermostats.** This measure would require the Project to install energy-reducing programmable thermostats that automatically adjust temperature settings. CAPCOA cites an estimate the savings of this measure to be \$100 per year. Based on a commercial electrical rate of 0.18 dollars per kw-hr represents approximately 556 kw-hr per year or about 0.13 MT/year of CO₂e.
- 9.13 CAPCOA Mitigation Measure S-1: Emission reductions Education.** This measure would require the Project to provide businesses with guidance/protocols/information on how to reduce GHG emissions. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.
- 9.14 CAPCOA Mitigation Measure M-2: Offset Purchase.** This analysis considers Offset Purchase (CAPCOA Mitigation Measures M-2) to be a potentially feasible measure,

despite CAPCOA's indication that it is "logistically feasible at present", given that Phase 1 of the Project would not be operational until approximately 2016, and Phase 2 or Project Buildout could be up to an additional several years after that (approximately 2-3 years assumed in this analysis), and given the potential for implementation of this measure to have a "Moderate/High" reduction estimate.

There is recognized uncertain in the current state of carbon markets (including the availability and pricing of offsets) in the U.S. With a federal climate bill languishing in the Senate, and emerging political challenges to AB 32 it is difficult at best to characterize supply and demand in yet-to-be-created carbon market, and even more difficult to predict the price of emissions allocations or offsets. A national cap and trade system, where buyers and sellers determine a market price for allocations and offsets, is still a possibility at the national level, and has a strong likelihood of developing in California (through AB 32) and other Western states (through the Western Climate Initiative). Currently in California, buyers purchase offsets either to reduce their carbon footprint voluntarily, or as a "pre-compliance" strategy with the hope that they can use them in a future cap-and-trade system. Prices have remained relatively low over the past year or two due to the sluggish economy and the policy uncertainty. They are certain to rise significantly if and when federal, regional, and/or state cap-and-trade becomes a reality.

The AB 32 Scoping Plan identifies cap-and-trade as a key strategy for helping California reduce its GHG emissions, but ARB still has not yet indicated how the system will work. Consistent with AB 32, ARB must adopt the cap-and-trade regulation by January 1, 2011, and the program itself must begin in 2012. At the time of this writing it is not known how such a system would distribute allocations to those who fall under the cap, and how offsets could be used to reduce emissions against the cap. It is also unclear whether ARB will operate their own cap-and-trade program or contract the program to a third party, and if the program will link to external registries of approved carbon offset credits.

Despite the various uncertainties, several registries of carbon reduction projects (representing carbon credits) have emerged in the United States in recent years. These registries facilitate and give legitimacy to carbon credit tracking and trading. One of the leading registries, the Climate Action Reserve (CAR), is expected to serve as a source of regulatory offsets under the future California program. CAR is a spin-off program of the California Climate Action Registry (CCAR) which was created by California state legislation in 2001 and has been closely involved with ARB throughout the AB 32 implementation process, including the development of its reporting rule, verification scheme, and many sector accounting protocols. CAR is also recognized in the Kerry-Boxer and Waxman-Markey climate bills as eligible for providing offset credits to the federal cap-and-trade system. CAR is respected as a national project registry that sets standards, accredits verifiers, and registers and tracks projects using sophisticated software to serialize and transfer emission reduction credits. In 2009, CAR transactions accounted for the majority of the US offset market value, and CAR Climate Reserve Tons (CRTs) usually command a premium over the general voluntary offset market.

Newly enacted CEQA Guidelines Section 15126.4 (c), adopted March 18, 2010 expressly provides for this as mitigation to reduce GHG emissions.

9.15 BAAQMD Mitigation Measure 6: Daily Parking Charge. This measure would require parking fees for all employees to discourage daily vehicle trips and promote use of transit. These will be detailed in the TDM Plan for the Project., and the resulting vehicle trip and related GHG emissions reductions will be calculated. Employee trips represent 35 percent of trip generation based on URBEMIS2007 data for office buildings.

9.16 BAAQMD Mitigation Measure 7: Parking Cash-out. This measure would require employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space. This measure would reduce employee trips only, not visitor trips. BAAQMD estimates an employee trip reduction benefit of 0 to 12.5 percent with this measure. Employee trips represent 35 percent of trip generation based on URBEMIS2007 data for office building. Assuming an average of 6 percent reduction in employee trips, implementation of this measure would reduce Phase 1 emissions by 192 MT/year of CO₂e .

Employee trips represent 7 percent of MOB trip generation based on URBEMIS2007 data for medical office buildings. Assuming an average of 6 percent reduction in employee trips, implementation of this measure would reduce remaining future phase emissions by 21.1 MT/year of CO₂e .

9.17 BAAQMD Mitigation Measure 8: Free Transit Passes. This measure would require employers to provide free transit passes to employees. BAAQMD estimates that this measure would result in a further 25 percent of the existing transit service reduction. Thirty percent of employees take BART or buses to the Project site, according to the DEIR Transportation section. A 25 percent increase in this rate would result in 37.5 percent of employees taking transit. Given the Proposed Project results in 3,233 total employees with the Project. The additional 7.5 percent increase in employee transit ridership resulting from this measure would remove approximately 242 employees from daily vehicle trips to work. Assuming each employee who drives to work generates 2.5 vehicle trips per day, this measure would remove approximately 605 vehicle trips per day. Based on URBEMIS2007 emission rates, this trip reduction would reduce GHG emissions by 695 MT/year of CO₂e.

9.18 BAAQMD Mitigation Measure 16: Car Sharing Services Provided. BAAQMD identifies this measure along with a menu of seven other TDM measures as reducing GHG emissions synergistically as a group. The degree of benefit estimated, depends on the number of TDM measures included from the menu. As this measure and the following four measures (BAAQMD 17 -20) of the of the total eight TDM measures on the menu that are not already identified as in operation, the potential GHG reduction benefits for these measures are considered together. Together, these five additional TDM measures were assumed to result in an additional 1 percent reduction, or about 91.4 MT/year of CO₂e.

9.19 BAAQMD Mitigation Measure 17: Information Provided on Transportation Alternatives. See BAAQMD Measure 16 for discussion on reductions from this TDM measure.

- 9.20 BAAQMD Mitigation Measure 18: Dedicated Employee Transportation Coordinator.** See BAAQMD Measure 16 for discussion on reductions from this TDM measure.
- 9.21 BAAQMD Mitigation Measure 19: Carpool Matching Program.** See BAAQMD Measure 16 for discussion on reductions from this TDM measure.
- 9.22 BAAQMD Mitigation Measure 20: Preferential Carpool/Vanpool Parking.** See BAAQMD Measure 16 for discussion on reductions from this TDM measure.
- 9.23 BAAQMD Mitigation Measure 24: Electrically Powered Landscape Equipment.** BAAQMD identifies this measure as reducing GHG emissions associated with operation of landscape maintenance equipment. This measure is similar to CAPCOA measure E-15 above. If we assume that this measure results in no landscape equipment emissions as calculated in the Projects emissions inventory in Table 3, then implementation of this measure would reduce emissions by 0.24 MT/year of CO₂e.
- 9.24 BAAQMD Mitigation Measure 34: Install Solar Panels on Residential and Commercial Buildings.** This measure is addressed relative to CAPCOA Mitigation Measure E-5 above.
- 9.25 BAAQMD Mitigation Measure 44: Increase Roof/Ceiling Insulation.** This measure is likely to be implemented to achieve the 15 percent energy reduction target recommended by CALGreen standards. BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.
- 9.26 BAAQMD Mitigation Measure 45: Rainwater Collection Systems in Commercial Buildings.** BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.
- 9.27 BAAQMD Mitigation Measure 47: Restrict Use of Water for Cleaning Outdoor Surfaces.** BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.
- 9.28 BAAQMD Mitigation Measure 48: Implement Water-sensitive Urban Design Practices in New Construction.** This measure is likely to be implemented by as a required element of CALGreen commercial building standards. BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.
- 9.29 BAAQMD Mitigation Measure 51: Require Provision of Storage Areas for Recyclables and Green Waste in New Construction.** BAAQMD does not

cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.

References

BAAQMD, *CEQA Air Quality Thresholds and Guidelines*, June 2010

California Air Pollution Control Officers Association (CAPCOA), *CEQA & Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*, January 2008.

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California Air Resources Board, *Climate Change Scoping Plan, A Framework for Change*, December 2008.

Governor's Office of Planning and Research, *CEQA and climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*, 2008.
<http://opr.ca.gov/index.php?a=ceqa/index.html>.

International Code Council, *Draft 2010 California Green Building Standards Code*,
<http://www.documents.dgs.ca.gov/bsc/documents/2010/Draft-2010-CALGreenCode.pdf>, accessed August 18, 2010 (ICC, 2010)

GHG EMISSIONS DATA

PROJECT CONSTRUCTION EMISSIONS PHASE 1

| 2012 Construction Emissions | | EMISSIONS in tons | | | |
|-----------------------------|-----------------|-----------------------------------|-----|-----|------|
| | | CO2 | CH4 | N2O | |
| | | 269 (from URBEMIS) | | | 1051 |
| From CCAR GPR 3.1 (2009) | Table C-6 | | | | |
| Diesel emission of CO2 | | 10.15 kg CO2/gal | | | |
| | | 0.00058 kg CH4/gal | | | |
| | | 0.00026 kg N2O/gal | | | |
| So for Mobile sources... | CH4 emission = | 5.71E-05 percent of CO2 Emissions | | | |
| | N2O emissions = | 2.56E-05 percent of CO2 Emissions | | | |

| | | | | |
|---|--------|------|------|-----------|
| Total Construction emissions in tons = | | | | |
| | CO2 | CH4 | N2O | Total GHG |
| | 269.00 | 0.02 | 0.01 | 269.02 |
| Total construction emissions as eCO2 in tons = | | | | |
| | 269.00 | 0.32 | 2.14 | 271.46 |
| Total construction Emissions as eCO2 on Metric tons = | 244.03 | 0.29 | 1.94 | 246.26 |

EMISSIONS in tons

| 2013 Construction Emissions | | CO2 | CH4 | N2O | |
|---|-----------|--|-----------------------------------|------|-----------|
| | | 808 (from URBEMIS) | | | |
| From CCAR GPR 3.1 (2009) | Table C-6 | | | | |
| Diesel emission of CO2 | | 10.15 kg CO2/gal
0.00058 kg CH4/gal
0.00026 kg N2O/gal | | | |
| So for Mobile sources... | | CH4 emission = | 5.71E-05 percent of CO2 Emissions | | |
| | | N2O emissions = | 2.56E-05 percent of CO2 Emissions | | |
| | | | | | |
| Total Construction emissions in tons = | | | | | |
| | | CO2 | CH4 | N2O | Total GHG |
| | | 808.00 | 0.05 | 0.02 | 808.07 |
| | | | | | |
| Total construction emissions as eCO2 in tons = | | | | | |
| | | 808.00 | 0.97 | 6.42 | 815.39 |
| Total construction Emissions as eCO2 on Metric tons = | | 733.00 | 0.88 | 5.82 | 739.70 |
| | | | | | |
| 2014 Construction Emissions | | EMISSIONS in tons | | | |
| | | CO2 | CH4 | N2O | |
| | | 827 (from URBEMIS) | | | |
| From CCAR GPR 3.1 (2009) | Table C-6 | | | | |
| Diesel emission of CO2 | | 10.15 kg CO2/gal
0.00058 kg CH4/gal | | | |

0.00026 kg N2O/gal

So for Mobile sources... CH4 emission = 5.71E-05 percent of CO2 Emissions
N2O emissions = 2.56E-05 percent of CO2 Emissions

Total Construction emissions in tons =

| CO2 | CH4 | N2O | Total GHG |
|--------|------|------|-----------|
| 827.00 | 0.05 | 0.02 | 827.07 |

Total construction emissions as eCO2 in tons =

| | | | |
|---------------|-------------|-------------|---------------|
| 827.00 | 0.99 | 6.57 | 834.56 |
| 750.24 | 0.90 | 5.96 | 757.10 |

| 2015 Construction Emissions | EMISSIONS in tons | | |
|-----------------------------|--------------------|-----|-----|
| | CO2 | CH4 | N2O |
| | 369 (from URBEMIS) | | |

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO2 10.15 kg CO2/gal
0.00058 kg CH4/gal
0.00026 kg N2O/gal

So for Mobile sources... CH4 emission = 5.71E-05 percent of CO2 Emissions
N2O emissions = 2.56E-05 percent of CO2 Emissions

Total Construction emissions in tons =

| CO2 | CH4 | N2O | Total GHG |
|--------|------|------|-----------|
| 369.00 | 0.02 | 0.01 | 369.03 |

Total construction emissions as eCO2 in tons =

| | | | |
|--|-------------|-------------|---------------|
| 369.00 | 0.44 | 2.93 | 372.37 |
| Total construction Emissions as eCO2 on Metric tons =
334.75 | 0.40 | 2.66 | 337.81 |

PROJECT CONSTRUCTION EMISSIONS PHASE 2

| 2015 Construction Emissions | | EMISSIONS in tons | | CH4 | N2O | |
|---|-----------------|-----------------------------------|--------------------|------|-----------|------|
| | | CO2 | 123 (from URBEMIS) | | | 1051 |
| From CCAR GPR 3.1 (2009) | Table C-6 | | | | | |
| Diesel emission of CO2 | | 10.15 kg CO2/gal | | | | |
| | | 0.00058 kg CH4/gal | | | | |
| | | 0.00026 kg N2O/gal | | | | |
| So for Mobile sources... | CH4 emission = | 5.71E-05 percent of CO2 Emissions | | | | |
| | N2O emissions = | 2.56E-05 percent of CO2 Emissions | | | | |
| | | | | | | |
| Total Construction emissions in tons = | | | | | | |
| | | CO2 | CH4 | N2O | Total GHG | |
| | | 123.00 | 0.01 | 0.00 | 123.01 | |
| | | | | | | |
| Total construction emissions as eCO2 in tons = | | | | | | |
| | | | | | | |
| | | 123.00 | 0.15 | 0.98 | 124.12 | |
| Total construction Emissions as eCO2 on Metric tons = | | | | | | |
| | | 111.58 | 0.13 | 0.89 | 112.60 | |

EMISSIONS in tons

| 2016 Construction Emissions | | CO2 | CH4 | N2O | |
|---|-----------|--|--|------|-----------|
| | | 1051 (from URBEMIS) | | | |
| From CCAR GPR 3.1 (2009) | Table C-6 | | | | |
| Diesel emission of CO2 | | 10.15 kg CO2/gal
0.00058 kg CH4/gal
0.00026 kg N2O/gal | | | |
| So for Mobile sources... | | CH4 emission =
N2O emissions = | 5.71E-05 percent of CO2 Emissions
2.56E-05 percent of CO2 Emissions | | |
| Total Construction emissions in tons = | | | | | |
| | | CO2 | CH4 | N2O | Total GHG |
| | | 1051.00 | 0.06 | 0.03 | 1051.09 |
| Total construction emissions as eCO2 in tons = | | | | | |
| | | 1051.00 | 1.26 | 8.35 | 1060.61 |
| Total construction Emissions as eCO2 on Metric tons = | | 953.45 | 1.14 | 7.57 | 962.16 |
| EMISSIONS in tons | | | | | |
| 2017 Construction Emissions | | CO2 | CH4 | N2O | |
| | | 1045 (from URBEMIS) | | | |
| From CCAR GPR 3.1 (2009) | Table C-6 | | | | |
| Diesel emission of CO2 | | 10.15 kg CO2/gal
0.00058 kg CH4/gal | | | |

0.00026 kg N2O/gal

So for Mobile sources... CH4 emission = 5.71E-05 percent of CO2 Emissions
N2O emissions = 2.56E-05 percent of CO2 Emissions

Total Construction emissions in tons =

| CO2 | CH4 | N2O | Total GHG |
|---------|------|------|-----------|
| 1045.00 | 0.06 | 0.03 | 1045.09 |

Total construction emissions as eCO2 in tons =

| | | | |
|---------------|-------------|-------------|---------------|
| 1045.00 | 1.25 | 8.30 | 1054.55 |
| 948.00 | 1.14 | 7.53 | 956.67 |

2018 Construction Emissions

EMISSIONS in tons

| CO2 | CH4 | N2O |
|--------------------|-----|-----|
| 470 (from URBEMIS) | | |

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO2

10.15 kg CO2/gal
0.00058 kg CH4/gal
0.00026 kg N2O/gal

So for Mobile sources... CH4 emission = 5.71E-05 percent of CO2 Emissions
N2O emissions = 2.56E-05 percent of CO2 Emissions

Total Construction emissions in tons =

| CO2 | CH4 | N2O | Total GHG |
|--------|------|------|-----------|
| 470.00 | 0.03 | 0.01 | 470.04 |

Total construction emissions as eCO2 in tons =

| | | | |
|---|-------------|-------------|---------------|
| 470.00 | 0.56 | 3.73 | 474.30 |
| Total construction Emissions as eCO2 on Metric tons = | | | |
| 426.37 | 0.51 | 3.39 | 430.27 |

Total Project Construction = 4635.04
2012-2018

PROJECT MOBILE WITHOUT TDM EMISSIONS

| | | Target Year: | 2020 | 2011 | |
|--|--|--------------|----------|------------------|--|
| Mitigated Transportation | | | | | |
| | | Project | Baseline | Project-Baseline | |
| Operational Vehicles from URBEMIS (CO2 tons/year): | | 11,045.74 | 0.00 | | |
| Metric Ton Adjustment (CO2 metric tons/year): | | 10,023.36 | 0.00 | | |
| Pavley Regulation Adjustment (CO2 metric tons/year): | | 8,557.04 | 0.00 | | |
| US EPA Adjustment (CO2e metric tons/year): | | 9,007.41 | 0.00 | | |
| Low Carbon Fuels Adjustment (CO2e metric tons/year): | | 8,358.87 | 0.00 | | |
| Total (CO2e metric tons/year): | | | | 8,358.87 | |

PROJECT MOBILE WITH TDM

| Target Year: | | | |
|--|----------|----------|------------------|
| | | 2020 | 2011 |
| Mitigated Transportation | | | |
| | Project | Baseline | Project-Baseline |
| Operational Vehicles from URBEMIS (CO2 tons/year): | 9,930.20 | 0.00 | |
| Metric Ton Adjustment (CO2 metric tons/year): | 9,011.07 | 0.00 | |
| Pavley Regulation Adjustment (CO2 metric tons/year): | 7,692.84 | 0.00 | |
| US EPA Adjustment (CO2e metric tons/year): | 8,097.72 | 0.00 | |
| Low Carbon Fuels Adjustment (CO2e metric tons/year): | 7,514.69 | 0.00 | |
| Total (CO2e metric tons/year): | | | 7,514.69 |

| Mitigated Natural Gas | | | |
|------------------------|---------|----------|------------------|
| | Project | Baseline | Project-Baseline |
| CO2 metric tons/year: | 680.702 | 0.000 | |
| CH4 metric tons/year: | 0.064 | 0.000 | |
| N2O metric tons/year: | 0.001 | 0.000 | |
| CO2e metric tons/year: | 682.446 | 0.000 | |
| CO2e metric tons/year: | | | 682.45 |

NINE COUNTY JURISDICTION OF THE BAAQMD



Project Climate Zone Location:



Zone 4



Zone 5

| Mitigated Area Source | | | Project-Baseline |
|--|---------|----------|------------------|
| | Project | Baseline | |
| Landscaping Emissions from URBEMIS (CO2 metric tons/year): | 0.227 | 0.000 | |
| Hearth Emissions from URBEMIS (CO2 metric tons/year): | 0.000 | 0.000 | |
| Wood Burning Fireplaces (N2O metric tons/year): | 0.000 | 0.000 | |
| Natural Gas Fireplaces (N2O metric tons/year): | 0.000 | 0.000 | |
| Wood Burning Stoves (CH4 metric tons/year): | 0.000 | 0.000 | |
| Natural Gas Fireplaces (CH4 metric tons/year): | 0.000 | 0.000 | |
| Total (CO2e metric tons/year): | 0.227 | 0.000 | 0.227 |
| Total (CO2e metric tons/year): | | | |

| | | Mitigated Solid Waste | |
|---|---------|-----------------------|--------------------|
| | Project | Baseline | Project - Baseline |
| Truck Haul CO2 (metric tons/year): | 11.03 | 0.00 | |
| Truck Haul CH4 (metric tons/year): | 0.0001 | 0.0000 | |
| Truck Haul CO2e (metric tons/year): | 11.04 | 0.00 | |
| Landfill Offgasing (CO2e metric tons/year): | 395.80 | 0.00 | |
| Total Solid Waste (CO2e metric tons/year): | 406.84 | 0.00 | |
| Total Solid Waste (CO2e metric tons/year): | | | 406.84 |

*** Select Mitigation Measures on the Mitigation Tab ==>

[Mitigation](#)

Baseline Landfill disposal option:

Select 1 of 3 options

- ☐ Landfilling only
 ☒ Landfilling with Flaring to Burn Methane
 ☐ Landfilling with Energy Recovery

Greenhouse Gas (GHG) Emissions

Indirect Greenhouse Gas (GHG) Emissions from Proposed Plan Electricity (Power Plant Emissions)

Estimated Proposed Plan Annual Electrical Use: 18,429,894 kWh (kilowatt hours)/year
18,430 mWh (megawatt hours)/year

| Indirect GHG gases | Emission Factor
lb/mWh | Annual | | CO2
Equivalent
Factor | Annual |
|---|---------------------------|----------------------------------|---------------------|-----------------------------|---|
| | | Proposed Plan
Electricity mWh | GHGs
metric tons | | CO2 Equivalent
Emissions (metric tons) |
| eCO2 | 524 | 18,430 | 4,380 | 1 | 4380 |
| Nitrous Oxide (N2O) | 0 | 18,430 | 0.0 | 296 | 0 |
| Methane (CH4) | 0 | 18,430 | 0.0 | 23 | 0 |
| Total Indirect GHG Emissions from Project Electricity Use= | | | | | 4380 |
| Net Increase in GHG Emissions (Project -Existing to be Demolished) = | | | | | 3099 |

Greenhouse Gas (GHG) Emissions from Existing

Indirect Greenhouse Gas (GHG) Emissions from Existing use of Electricity (Power Plant Emissions)

Estimated Project Annual Electrical Use: 4,443,600 kWh (kilowatt hours)/year
4,444 mWh (megawatt hours)/year

| Indirect GHG gases | Emission Factor
lb/mWh | Annual | | CO2
Equivalent
Factor | Annual |
|---|---------------------------|----------------------------|---------------------|-----------------------------|---|
| | | Project
Electricity mWh | GHGs
metric tons | | CO2 Equivalent
Emissions (metric tons) |
| Carbon Dioxide Eq. (eCO2) | 635.67 | 4,444 | 1,281 | 1 | 1281 |
| Nitrous Oxide (N2O) | 0 | 4,444 | 0.0 | 296 | 0 |
| Methane (CH4) | 0 | 4,444 | 0.0 | 23 | 0 |
| Total Indirect GHG Emissions from Existing to be demolished Electricity Use= | | | | | 1281 |
| (2007 PG&E eCO2rate) | | ALT A Percentage = | | | 102.50 |

Water Usage Emissions

Water Demand = 0.1136 MGD (assumes 0.142 MGD of demand and 20 % reduction from CALGREEN standards
0.025 MGD water demand for existing uses to be demolished)

Water useage = 0.0886 MGD
= 32.339 MG/year

Energy use factor = 1450 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
4.69E+04 kW-hr/yr
4.69E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

| | CO2 | CH4 | N2O |
|-------------------|------------------|------------------|------------------|
| CALI Subregion | 724.12 lbs/MW-hr | 0.0302 lbs/MW-hr | 0.0081 lbs/MW-hr |
| Total Emissions = | 3.40E+04 lb/yr | 1.42E+00 lb/yr | 3.80E-01 lb/yr |

Total emissions as eCO2 =

| | | | |
|-----------------|-----------------|-----------------|----------|
| 3.40E+04 lb/yr | 2.97E+01 lb/yr | 1.18E+02 lb/yr | |
| 1.70E+01 ton/yr | 1.49E-02 ton/yr | 5.89E-02 ton/yr | |
| 1.54E+01 MT/yr | 1.35E-02 MT/yr | 5.34E-02 MT/yr | 1.55E+01 |

TOTAL WATER USAGE EMISSIONS AS eCO2 = 3.41E+04 lb/yr

1.55E+04 kg/yr

16 MT/yr

WasteWater Useage Emissions

Water Output = 0.102285 MGD (assumes 0.128 MGD of output and 20 % reduction from CALGREEN standards
0.0225 MGD water output for existing uses to be demolished

Water outflow = 0.079785 MGD
= 29.12145 MG/year

Energy use factor = 2500 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
7.28E+04 kW-hr/yr
7.28E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

| | CO2 | CH4 | N2O |
|-------------------|------------------|------------------|------------------|
| CALI Subregion | 724.12 lbs/MW-hr | 0.0302 lbs/MW-hr | 0.0081 lbs/MW-hr |
| Total Emissions = | 5.27E+04 lb/yr | 2.20E+00 lb/yr | 5.90E-01 lb/yr |

Total emissions as eCO2 =

| | | |
|-----------------|-----------------|-----------------|
| 5.27E+04 lb/yr | 4.62E+01 lb/yr | 1.83E+02 lb/yr |
| 2.64E+01 ton/yr | 2.31E-02 ton/yr | 9.14E-02 ton/yr |
| 2.39E+01 MT/yr | 2.09E-02 MT/yr | 8.29E-02 MT/yr |

TOTAL WasteWATER USAGE EMISSIONS AS eCO2 =

5.29E+04 lb/yr

2.41E+04 kg/yr

24 MT/yr

APPENDIX J

Alternatives Data



AECOM
2101 Webster Street
Suite 1900
Oakland, CA 94612
www.aecom.com

510 622 6600 tel
510 834 5220 fax

Memorandum

TABLE 1
PROJECT WEEKDAY PERSON-TRIP GENERATION

| Land Use | Original Project Description | | | | Alternative 1: South Tower Build Only | | | | Alternative 2: Onsite Max Reduced Impacts | | | |
|--|------------------------------|---------------|--------------|--------------|---------------------------------------|--------------|--------------|--------------|---|--------------|--------------|--------------|
| | Size (KSF) | Daily Total | AM Peak Hour | PM Peak Hour | Size (KSF) | Daily Total | AM Peak Hour | PM Peak Hour | Size (KSF) | Daily Total | AM Peak Hour | PM Peak Hour |
| Office (North Tower) | 768 | 7,438 | 1,111 | 1,090 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Office (South Tower) | 552 | 5,766 | 854 | 809 | 552 | 5,766 | 854 | 809 | 222 | 2,860 | 412 | 379 |
| Retail | 46 | 5,210 | 285 | 521 | 46 | 5,210 | 285 | 521 | 46 | 5,210 | 285 | 521 |
| Existing Retail (to be removed) ^a | (48) | (5,210) | (285) | (521) | (48) | (5,210) | (285) | (521) | (48) | (5,210) | (285) | (521) |
| Net New Person-Trips | | 13,204 | 1,965 | 1,899 | | 5,766 | 854 | 809 | | 2,860 | 412 | 379 |

^a Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2010.

TABLE 2
PROJECT WEEKDAY VEHICLE-TRIP GENERATION ^a

| Land Use | Original Project Description | | | | Alternative 1: South Tower Build Only | | | | Alternative 2: Onsite Max Reduced Impacts | | | |
|--|------------------------------|--------------|--------------|--------------|---------------------------------------|--------------|--------------|--------------|---|--------------|--------------|--------------|
| | Size (KSF) | Daily Total | AM Peak Hour | PM Peak Hour | Size (KSF) | Daily Total | AM Peak Hour | PM Peak Hour | Size (KSF) | Daily Total | AM Peak Hour | PM Peak Hour |
| Office (North Tower) | 768 | 4,487 | 671 | 657 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Office (South Tower) | 552 | 3,479 | 516 | 487 | 552 | 3,479 | 516 | 487 | 222 | 1,726 | 248 | 229 |
| Retail | 46 | 5,002 | 246 | 449 | 46 | 5,002 | 246 | 449 | 46 | 5,002 | 246 | 449 |
| Existing Retail (to be removed) ^b | (48) | (5,002) | (246) | (449) | (48) | (5,002) | (246) | (449) | (48) | (5,002) | (246) | (449) |
| Net New Person-Trips | | 7,966 | 1,187 | 1,144 | | 3,479 | 516 | 487 | | 1,726 | 248 | 229 |

^a Vehicle-trip calculations based on 70 percent auto mode split and Average Vehicle Occupancy of 1.16.

^b Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2010.

**TABLE 3
CUMULATIVE (2030) PLUS PROJECT INTERSECTION LEVELS OF SERVICE**

| # | Intersection | Traffic Cont. | Cumulative (2030) without Project Conditions | | | | Cumulative (2030) plus Project Conditions | | | | ALTERNATIVE 1: Cumulative plus Project Conditions (South Tower Only) | | | | ALTERNATIVE 2: Cumulative plus Project Conditions (Onsite Maximum Reduced Impacts) | | | |
|------------------|--|---------------|--|-------------------|--------------|-------------------|---|-------------------|--------------|-------------------|--|-------------------|--------------|-------------------|--|-------------------|--------------|-------------------|
| | | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | | | LOS | Del. ^a | LOS | Del. ^a | LOS | Del. ^a | LOS | Del. ^a | LOS | Del. ^a | LOS | Del. ^a | LOS | Del. ^a | LOS | Del. ^a |
| Outside Downtown | | | | | | | | | | | | | | | | | | |
| 2 | Oakland Ave. / Perry Pl. / I-580 EB Ramps | Signal | E | 65.9 | F | >120 | F | 83.7 | F | >120 | E | 74.3 | F | >120 | C | 27.7 | F | >120 |
| 45 | Grand Avenue / El Embarcadero | Signal | C | 23.4 | F | >120 | C | 23.9 | F | >120 | C | 23.6 | F | >120 | C | 23.4 | F | >120 |
| 47 | Grand Avenue / MacArthur Blvd. (EB) | Signal | E | 68.3 | F | >120 | E | 68.6 | F | >120 | E | 68.3 | F | >120 | E | 68.3 | F | >120 |
| 48 | Lakeshore Avenue / MacArthur Blvd. (EB) | Signal | F | 94.5 | F | >120 | F | 94.4 | F | >120 | F | 94.4 | F | >120 | F | 94.5 | F | >120 |
| 50 | Harrison Street / MacArthur Blvd. (WB) | Signal | F | 83.2 | C | 21.3 | F | 102.1 | C | 21.5 | F | 88.8 | C | 21.4 | F | 83.6 | C | 20.8 |
| Within Downtown | | | | | | | | | | | | | | | | | | |
| 12 | Harrison St. / Grand Ave. | Signal | F | 93.8 | F | >120 | F | >120 | F | >120 | F | >120 | F | >120 | D | 53.5 | F | >120 |
| 13 | Harrison St. / 21st St. | Signal | A | 7.5 | B | 19.9 | B | 11.5 | F | 98.7 | A | 9.8 | D | 50.7 | A | 9.0 | C | 21.0 |
| 44 | Oak Street / 5th Street / I-880 SB On-Ramp | Signal | F | >120 | F | >120 | F | >120 | F | >120 | F | >120 | F | >120 | E | 77.3 | F | >120 |

Bold indicates significant impact.

Project contributions under Alternative 2 would not exceed thresholds of significance and, therefore, Alternative 2 would not result in significant impacts at the above locations.

^a The LOS and delay for signalized intersections represent the average delay for all traffic movements.

SOURCE: AECOM, 2010.

TABLE 4
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE

| No. | Roadway Segment | Dir. | Ln. | Capacity
(veh/hr) | Cumulative (2030)
without Project Conditions | | | | | | Cumulative (2030) plus Project
(Phase I and Phase II) Conditions | | | | | |
|-------------------------|---|------|-----|----------------------|---|-------|------|--------------|-------|------|---|-------|------|--------------|-------|------|
| | | | | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c |
| Caltrans Facilities | | | | | | | | | | | | | | | | |
| 3 | I-880
from Oak Street to 5th Avenue | EB | 4 | 8,000 | E | 7,390 | 0.92 | E | 7,920 | 0.99 | E | 7,405 | 0.93 | F | 8,014 | 1.00 |
| | | WB | 4 | 8,000 | E | 7,925 | 0.99 | E | 7,217 | 0.90 | F | 8,029 | 1.00 | E | 7,237 | 0.90 |
| Non-Caltrans Facilities | | | | | | | | | | | | | | | | |
| 9 | Grand Avenue
from Harrison St. to El Embarcadero | EB | 2 | 1,800 | C | 936 | 0.52 | F | 2,284 | 1.27 | C | 940 | 0.52 | F | 2,425 | 1.35 |
| | | WB | 2 | 1,800 | E | 1,782 | 0.99 | D | 1,326 | 0.74 | F | 2,010 | 1.12 | D | 1,373 | 0.76 |
| 10 | Harrison Street / Oakland Avenue
from I-580 to 27th Street | NB | 2 | 1,800 | E | 1,718 | 0.95 | F | 2,342 | 1.30 | E | 1,776 | 0.99 | F | 2,614 | 1.45 |
| | | SB | 2 | 1,800 | E | 1,571 | 0.87 | C | 987 | 0.55 | F | 1,808 | 1.00 | C | 1,027 | 0.57 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | ALTERNATIVE 1: Cumulative plus Project
Conditions (South Tower Only) | | | | | | ALTERNATIVE 2: Cumulative plus Project
Conditions (Onsite Maximum Reduced Impacts) | | | | | |
| No. | Roadway Segment | Dir. | Ln. | Capacity
(veh/hr) | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | | | | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c | LOS | Vol. | v/c |
| Caltrans Facilities | | | | | | | | | | | | | | | | |
| 3 | I-880
from Oak Street to 5th Avenue | EB | 4 | 8,000 | E | 7,405 | 0.93 | F | 8,014 | 1.00 | E | 7,393 | 0.92 | E | 7,939 | 0.99 |
| | | WB | 4 | 8,000 | F | 8,029 | 1.00 | E | 7,237 | 0.90 | E | 7,946 | 0.99 | E | 7,221 | 0.90 |
| Non-Caltrans Facilities | | | | | | | | | | | | | | | | |
| 9 | Grand Avenue
from Harrison St. to El Embarcadero | EB | 2 | 1,800 | C | 940 | 0.52 | F | 2,425 | 1.35 | C | 937 | 0.52 | F | 2,312 | 1.28 |
| | | WB | 2 | 1,800 | F | 2,010 | 1.12 | D | 1,373 | 0.76 | E | 1,789 | 0.99 | D | 1,335 | 0.74 |
| 10 | Harrison Street / Oakland Avenue
from I-580 to 27th Street | NB | 2 | 1,800 | E | 1,776 | 0.99 | F | 2,614 | 1.45 | E | 1,730 | 0.96 | F | 2,396 | 1.33 |
| | | SB | 2 | 1,800 | F | 1,808 | 1.00 | C | 1,027 | 0.57 | E | 1,618 | 0.90 | C | 995 | 0.55 |

Bold indicates significant impact.

Project contributions under Alternative 2 would not exceed thresholds of significance and, therefore, Alternative 2 would not result in significant impacts at the above locations.

SOURCE: AECOM, 2010.

GHG EMISSIONS INVENTORY AND DATA – ALTERNATIVE 1

| | | Target Year: | 2015 | 2011 | |
|--|--|--------------|----------|------------------|--|
| Mitigated Transportation | | | | | |
| | | Project | Baseline | Project-Baseline | |
| Operational Vehicles from URBEMIS (CO2 tons/year): | | 4,831.10 | 0.00 | | |
| Metric Ton Adjustment (CO2 metric tons/year): | | 4,383.94 | 0.00 | | |
| Pavley Regulation Adjustment (CO2 metric tons/year): | | 4,053.25 | 0.00 | | |
| US EPA Adjustment (CO2e metric tons/year): | | 4,266.58 | 0.00 | | |
| Low Carbon Fuels Adjustment (CO2e metric tons/year): | | 4,189.78 | 0.00 | | |
| Total (CO2e metric tons/year): | | | | 4,189.78 | |

| Mitigated Natural Gas | | | |
|------------------------|---------|----------|------------------|
| | Project | Baseline | Project-Baseline |
| CO2 metric tons/year: | 680.702 | 0.000 | |
| CH4 metric tons/year: | 0.064 | 0.000 | |
| N2O metric tons/year: | 0.001 | 0.000 | |
| CO2e metric tons/year: | 682.446 | 0.000 | |
| CO2e metric tons/year: | | | 682.45 |

| | | Mitigated Solid Waste | |
|---|---------|-----------------------|--------------------|
| | Project | Baseline | Project - Baseline |
| Truck Haul CO2 (metric tons/year): | 4.84 | 0.00 | |
| Truck Haul CH4 (metric tons/year): | 0.0001 | 0.0000 | |
| Truck Haul CO2e (metric tons/year): | 4.85 | 0.00 | |
| Landfill Offgasing (CO2e metric tons/year): | 165.52 | 0.00 | |
| Total Solid Waste (CO2e metric tons/year): | 170.36 | 0.00 | |
| Total Solid Waste (CO2e metric tons/year): | | | 170.36 |

*** Select Mitigation Measures on the Mitigation Tab ==>

[Mitigation](#)

Baseline Landfill disposal option:

Select 1 of 3 options

- ☐ Landfilling only
 ☒ Landfilling with Flaring to Burn Methane
 ☐ Landfilling with Energy Recovery

Indirect Greenhouse Gas (GHG) Emissions from Alternative 1 Electricity (Power Plant Emissions)

Estimated Proposed Plan Annual Electrical Use: 8,689,936 kWh (kilowatt hours)/year
8,690 mWh (megawatt hours)/year

| Indirect GHG gases | Emission Factor
lb/mWh | Annual | | CO2
Equivalent
Factor | Annual |
|---|---------------------------|----------------------------------|---------------------|-----------------------------|---|
| | | Proposed Plan
Electricity mWh | GHGs
metric tons | | CO2 Equivalent
Emissions (metric tons) |
| eCO2 | 524 | 8,690 | 2,065 | 1 | 2065 |
| Nitrous Oxide (N2O) | 0 | 8,690 | 0.0 | 296 | 0 |
| Methane (CH4) | 0 | 8,690 | 0.0 | 23 | 0 |
| Total Indirect GHG Emissions from Project Electricity Use= | | | | | 2065 |
| Net Increase in GHG Emissions (Alt A -Existing to be Demolished) = | | | | | 1995 |

Alternative 1

Water Usage Emissions

Water Demand = 0.049984 MGD (assumes 44% of Project 0.142 MGD of demand based on area and 20 % reduction from CALGREEN standards
 0.002 MGD water demand for existing uses to be demolished (0.92% less than project)

Water useage = 0.047984 MGD
 = 17.51416 MG/year

Energy use factor = 1450 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
 2.54E+04 kW-hr/yr
 2.54E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

| | CO2 | CH4 | N2O |
|-------------------|------------------|------------------|------------------|
| CALI Subregion | 724.12 lbs/MW-hr | 0.0302 lbs/MW-hr | 0.0081 lbs/MW-hr |
| Total Emissions = | 1.84E+04 lb/yr | 7.67E-01 lb/yr | 2.06E-01 lb/yr |

Total emissions as eCO2 =

| | | |
|-----------------|-----------------|-----------------|
| 1.84E+04 lb/yr | 1.61E+01 lb/yr | 6.38E+01 lb/yr |
| 9.19E+00 ton/yr | 8.05E-03 ton/yr | 3.19E-02 ton/yr |
| 8.34E+00 MT/yr | 7.30E-03 MT/yr | 2.89E-02 MT/yr |

TOTAL WATER USAGE EMISSIONS AS eCO2 =

1.85E+04 lb/yr

8.40E+03 kg/yr

8 MT/yr

Alternative 1

Waste Water Usage Emissions

Water Outflow = 0.045005 MGD (assumes 44% of Project 0.128 MGD output based on area and 20 % reduction from CALGREEN standards
0.002 MGD water demand for existing uses to be demolished (92% less than project)

Water Outflow = 0.043005 MGD
= 15.69694 MG/year

Energy use factor = 2500 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
3.92E+04 kW-hr/yr
3.92E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

| | CO2 | CH4 | N2O |
|-------------------|------------------|------------------|------------------|
| CALI Subregion | 724.12 lbs/MW-hr | 0.0302 lbs/MW-hr | 0.0081 lbs/MW-hr |
| Total Emissions = | 2.84E+04 lb/yr | 1.19E+00 lb/yr | 3.18E-01 lb/yr |

Total emissions as eCO2 =

| | | |
|-----------------|-----------------|-----------------|
| 2.84E+04 lb/yr | 2.49E+01 lb/yr | 9.85E+01 lb/yr |
| 1.42E+01 ton/yr | 1.24E-02 ton/yr | 4.93E-02 ton/yr |
| 1.29E+01 MT/yr | 1.13E-02 MT/yr | 4.47E-02 MT/yr |

TOTAL WATER USAGE EMISSIONS AS eCO2 = 2.85E+04 lb/yr

1.30E+04 kg/yr

13 MT/yr

GHG EMISSIONS INVENTORY AND DATA – ALTERNATIVE 2

| | | Target Year: | 2015 | 2011 | |
|--|--|--------------|----------|----------|------------------|
| Mitigated Transportation | | | Project | Baseline | Project-Baseline |
| Operational Vehicles from URBEMIS (CO2 tons/year): | | | 2,396.29 | 0.00 | |
| Metric Ton Adjustment (CO2 metric tons/year): | | | 2,174.49 | 0.00 | |
| Pavley Regulation Adjustment (CO2 metric tons/year): | | | 2,010.47 | 0.00 | |
| US EPA Adjustment (CO2e metric tons/year): | | | 2,116.28 | 0.00 | |
| Low Carbon Fuels Adjustment (CO2e metric tons/year): | | | 2,078.19 | 0.00 | |
| Total (CO2e metric tons/year): | | | | | 2,078.19 |

| Mitigated Natural Gas | | | |
|------------------------|---------|----------|------------------|
| | Project | Baseline | Project-Baseline |
| CO2 metric tons/year: | 273.760 | 0.000 | |
| CH4 metric tons/year: | 0.026 | 0.000 | |
| N2O metric tons/year: | 0.001 | 0.000 | |
| CO2e metric tons/year: | 274.462 | 0.000 | |
| CO2e metric tons/year: | | | 274.46 |

| | | Mitigated Solid Waste | |
|---|---------|-----------------------|--------------------|
| | Project | Baseline | Project - Baseline |
| Truck Haul CO2 (metric tons/year): | 1.95 | 0.00 | |
| Truck Haul CH4 (metric tons/year): | 0.0000 | 0.0000 | |
| Truck Haul CO2e (metric tons/year): | 1.95 | 0.00 | |
| Landfill Offgasing (CO2e metric tons/year): | 66.57 | 0.00 | |
| Total Solid Waste (CO2e metric tons/year): | 68.52 | 0.00 | |
| Total Solid Waste (CO2e metric tons/year): | | | 68.52 |

*** Select Mitigation Measures on the Mitigation Tab ==>

[Mitigation](#)

Baseline Landfill disposal option:

Select 1 of 3 options

- ☐ Landfilling only
 ☒ Landfilling with Flaring to Burn Methane
 ☐ Landfilling with Energy Recovery

Indirect Greenhouse Gas (GHG) Emissions from Alternative 2 Electricity (Power Plant Emissions)

Estimated Proposed Plan Annual Electrical Use: 296,769 kWh (kilowatt hours)/year
297 mWh (megawatt hours)/year

| Indirect GHG gases | Emission Factor
lb/mWh | Annual | | CO2
Equivalent
Factor | Annual |
|---|---------------------------|----------------------------------|---------------------|-----------------------------|---|
| | | Proposed Plan
Electricity mWh | GHGs
metric tons | | CO2 Equivalent
Emissions (metric tons) |
| eCO2 | 524 | 297 | 71 | 1 | 70.5 |
| Nitrous Oxide (N2O) | 0.0037 | 297 | 0.0 | 296 | 0.00E+00 |
| Methane (CH4) | 0.0067 | 297 | 0.0 | 23 | 0.00E+00 |
| Total Indirect GHG Emissions from Project Electricity Use= | | | | | 71 |
| No Demolition | | | | | |

Alternative 2

Water Useage Emissions

Water Demand = 0.02272 MGD (assumes 20% of Project 0.142 MGD of demand based on area and 20 % reduction from CALGREEN standards
0 MGD water demand for existing uses to be demolished)

Water useage = 0.02272 MGD
= 8.2928 MG/year

Energy use factor = 1450 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
1.20E+04 kW-hr/yr
1.20E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

| | CO2 | CH4 | N2O |
|-------------------|------------------|------------------|------------------|
| CALI Subregion | 724.12 lbs/MW-hr | 0.0302 lbs/MW-hr | 0.0081 lbs/MW-hr |
| Total Emissions = | 8.71E+03 lb/yr | 3.63E-01 lb/yr | 9.74E-02 lb/yr |

Total emissions as eCO2 =

| | | |
|-----------------|-----------------|-----------------|
| 8.71E+03 lb/yr | 7.63E+00 lb/yr | 3.02E+01 lb/yr |
| 4.35E+00 ton/yr | 3.81E-03 ton/yr | 1.51E-02 ton/yr |
| 3.95E+00 MT/yr | 3.46E-03 MT/yr | 1.37E-02 MT/yr |

TOTAL WATER USAGE EMISSIONS AS eCO2 =

8.75E+03 lb/yr

3.98E+03 kg/yr

4.E+00 MT/yr

Alternative 2

Water Useage Emissions

Water Outflow = 0.020457 MGD (assumes 20% of Project 0.142 MGD of demand based on area and 20 % reduction from CALGREEN standards
0 MGD water demand for existing uses to be demolished)

Water Outflow = 0.020457 MGD
= 7.46679 MG/year

Energy use factor = 2500 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
1.87E+04 kW-hr/yr
1.87E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

| | CO2 | CH4 | N2O |
|-------------------|------------------|------------------|------------------|
| CALI Subregion | 724.12 lbs/MW-hr | 0.0302 lbs/MW-hr | 0.0081 lbs/MW-hr |
| Total Emissions = | 1.35E+04 lb/yr | 5.64E-01 lb/yr | 1.51E-01 lb/yr |

Total emissions as eCO2 =

| | | |
|-----------------|-----------------|-----------------|
| 1.35E+04 lb/yr | 1.18E+01 lb/yr | 4.69E+01 lb/yr |
| 6.76E+00 ton/yr | 5.92E-03 ton/yr | 2.34E-02 ton/yr |
| 6.13E+00 MT/yr | 5.37E-03 MT/yr | 2.13E-02 MT/yr |

TOTAL WATER USAGE EMISSIONS AS eCO2 =

1.36E+04 lb/yr

6.17E+03 kg/yr

6.17E+00 MT/yr