CITY OF SOUTH SAN FRANCISCO
SOUTH SAN FRANCISCO DOWNTOWN STATION AREA SPECIFIC PLAN
Environmental Impact Report

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Volume I: Draft EIR

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Acronyms/Abbreviations

Abbreviation	Definition
°C	degrees Celsius
°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACP	asbestos cement
afy	acre-feet per year
AIM	Advance Infrastructure Mitigation
ALS	Advanced Life Support
ALUP	Airport Land Use Plan
ARB	[California] Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BART	Bay Area Rapid Transit
Basin	San Francisco Bay Area Air Basin
Basin Plan	San Francisco Bay Region Water Quality Control Plan
BAWSCA	Bay Area Water Supply and Conservation Agency
Bay Area	San Francisco Bay Area
BCDC	San Francisco Bay Conservation and Development Commission
BFI	Browning-Ferris Industries
BMP	best management practice
BOD	biological oxygen demand
Btu	British thermal unit
C/CAG	City/County Association of Governments of San Mateo County
CAA	Clean Air Act
CAFE	corporate average fuel economy
Cal EMA	California Emergency Management Agency
Cal OSHA	California Occupational Safety and Health Administration
Cal/EPA	California Environmental Protection Agency
CALGreen	CCR Title 24, Part 11 (California's Green Building Standard Code)
California PUC	California Public Utilities Commission
CalRecycle	[California] Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation

Abbreviation	Definition
CAP	climate action plan
CAS	California Adaptation Strategy
CBC	California Building Code
CBSC	California Building Standards Code
CCA	Community Choice Aggregation
CCAA	California Clean Air Act
CCCC	California Climate Change Center
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDOF	California Department of Finance
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CF_4	carbontetrafluoride
CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
cfy	cubic feet per year
CH_4	methane
CHCR	California Register of Historic Resources
CHL	California Historical Landmarks
CIWMB	California Integrated Waste Management Board
cm	centimeters
CMP	Congestion Management Plan
CMP	Congestion Management Program
CNEL	community noise equivalent level
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COG	Council of Governments
CPHI	California Points of Interest
CPUC	California Public Utilities Commission
CWA	Clean Water Act
CWC	California Water Code
CWSC	California Water Service Company
dB	decibels
dBA	A-weighted decibels
DDT	dichloro-diphenyl-trichloroethane

Abbreviation	Definition
DHS	Department of Health Services
DIP	ductile iron
DPH	[California] Department of Public Health
DPM	diesel particulate matter
DTSC	[California] Department of Toxic Substance Control
du	dwelling units
EDD	Employment Development Department
EIR	environmental impact report
ESP	energy service provider
FAA	Federal Aviation Administration
FAR	floor-area ratio
FEIR	final environmental impact report
FEMA	Federal Emergency Management Agency
FERC	federal Energy Regulatory Commission
FHWA	Federal Highway Administration
Findings	Findings of Fact
FR	Federal Register
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	fiscal year
GFA	gross floor area
GHG	greenhouse gas
gpcd	gallons per capita per day
gpd	gallons per day
GWP	global warming potential
HCD	[California Department of] Housing and Community Development
HCM	Highway Capacity Manual
HDPE	high-density polyethylene
HFC	hydrofluorocarbon
HMGP	Hazard Mitigation Grant Program
HRA	health risk assessment
HRI	[California State] Historic Resources Inventory
HVAC	heating, ventilation, and air conditioning
I/I	infiltration and inflow
ICS	Incident Command System
ICU	Intersection Capacity Utilization

Abbreviation	Definition
IOUs	investor-owned utilities
IPCC	Intergovernmental Panel on Climate Change
IRWD	Irvine Ranch Water District
kV	kilovolt
kWh/yr	kilowatt-hours per year
L_{eq}	equivalent energy level
LOS	levels of service
LUST	leaking underground storage tank
mgd	million gallons per day
MM	mitigation measures
MMP	mitigation monitoring program
MMT	million metric tons
mpg	miles per gallon
mph	miles per hour
MPO	metropolitan planning organization
MRF/TS	Blue Line Material Recovery Facility/Transfer Site
MSL	mean sea level
MT	metric ton
MTC	Metropolitan Transportation Commission
N_2O	nitrous oxide
NAHC	Native American Heritage Commission
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act of 1966
NIC	Northwest Information Center
NO_2	nitrogen dioxide
NOI	notice of intent
NOP	notice of preparation
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSLU	noise-sensitive land uses
NWIC	Northwest Information Center
O_3	ozone
OASIS	Operational Area Satellite Information System
OES	Office of Emergency Services
OPR	California Governor's Office of Planning and Research

Abbreviation	Definition
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
pcpmpl	passenger car equivalents per mile of roadway per lane
PDA	priority development areas
PeMS	Performance Measurement System
PFC	perfluorinated carbon
PG&E	Pacific Gas and Electric
PM_{10}	respirable particulate matter
$PM_{2.5}$	fine particulate matter
ppb	parts per billion
pph	persons per household
ppm	parts per million
PPV	peak particle velocity
PRC	[California] Public Resources Code
proposed project	South San Francisco Downtown Station Area Specific Plan
PROS	Park, Recreation, and Open Space
PSD	Prevention of Significant Deterioration
PTE	potential to emit
PVC	polyvinyl chloride
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RHNA	Regional Housing Needs Allocation
RLMP	Responsible Laboratory Management Practice
ROG	reactive organic gases
ROW	right-of-way
RPC	reinforced concrete
RPS	Renewable Portfolio Standard
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
RWS	Regional Water System
SALUP	Station Area and Land Use Planning
SB	Senate Bill
Scavengers	South San Francisco Scavenger Company
SCS	sustainable communities strategies
SDWA	Safe Drinking Water Act

Abbreviation	Definition
SEMS	Standardized Emergency Management System
sf	square feet
SF_6	sulfurhexafluoride
SFB RWQCB	San Francisco Bay Regional Water Quality Control Board
SFBCDC	San Francisco Bay Conservation and Development Commission
SFHA	Special Flood Hazard Area
SFO	San Francisco International Airport
SFWD	San Francisco Water Department
SHL	State Housing Law
SIP	State Implementation Plan
SMCS	San Mateo County Sheriff's Department
SO_2	sulfur dioxide
SO_X	sulfur oxide
Specific Plan	South San Francisco Downtown Station Area Specific Plan
SPRR	Southern Pacific Railroad
SSFD	South San Francisco District
SSFFD	South San Francisco Fire Department
SSFMC	South San Francisco Municipal Code
SSFPD	South San Francisco Police Department
SSFUSD	South San Francisco Unified School District
SSFWQCP	South San Francisco Water Quality Control Plan
SSMP	sewer system management plan
STOPPP	San Mateo Countywide Stormwater Pollution Prevention Program
SWIS	Solid Waste Information System
SWMP	stormwater management plan
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TBACT	Best Available Control Technology for Toxics
TMDL	total maximum daily load
TOD	transit-oriented development
TSS	total suspended solid
UCMP	University of California Museum of Paleontology
US-101	United States Highway 101
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

Abbreviation	Definition
USGS	United States Geological Survey
UWMP	urban water management plan
v/c	volume-to-capacity
VCAPCD	Ventura County Air Pollution Control District
VCP	vitrified clay
VMT	vehicle miles traveled
VOC	volatile organic compound
VTA	Valley Transportation Authority
WDR	waste discharge requirement
WQCP	Water Quality Control Plant
WSA	Water Supply Agreement
WSIP	Water System Improvement Program

CHAPTER 1 Introduction

This environmental impact report (EIR) examines the potential effects of the proposed South San Francisco Downtown Station Area Specific Plan (Specific Plan or proposed project). The City of South San Francisco is the lead agency for this project. The background for the proposed project and the legal basis for preparing an EIR are described below.

1.1 PURPOSE AND LEGAL AUTHORITY

The Specific Plan would guide the City in its planning efforts to create a vibrant, transit-supportive, diverse Downtown, particularly the area surrounding the City's Caltrain commuter rail station. The study area includes approximately thirty-five blocks within 0.5 mile of the existing Caltrain station. The Specific Plan crafts a vision for the Downtown core, and identifies an implementation process to achieve City and community goals, including design standards and regulations for future development. The Specific Plan will support transit-oriented development (TOD); create an open space framework; create pedestrian linkages, lanes, and a pedestrian priority zone; create a new bicycle network; and employ new parking strategies.

The Specific Plan will require review and recommendation by the Planning Commission and adoption of the Specific Plan is in the discretion of the City Council of South San Francisco. Adoption of the Specific Plan is considered a project under the California Environmental Quality Act (CEQA) and is, therefore, subject to CEQA requirements. In accordance with CEQA Guidelines Section 15121, the purpose of this EIR is to serve as an informational document that:

> … will inform public agency decision-makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project.

The EIR must also disclose significant environmental impacts that cannot be avoided, growth inducing impacts, effects not found to be significant, and significant cumulative impacts of all past, present, and reasonably anticipated future projects.

This EIR is a Program EIR prepared pursuant to CEQA Guidelines Section 15168. A Program EIR is an EIR that is prepared on a series of actions that can be characterized as one large project. As stated in the CEQA Guidelines, the use of a Program EIR can provide the following advantages:

1. Provide an occasion for a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action.
2. Ensure consideration of cumulative impacts that might be slighted in a case-by-case analysis.
3. Avoid duplicative reconsideration of basic policy considerations.
4. Allow the Lead Agency to consider broad policy alternatives and program wide mitigation measures at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts.
5. Allow reduction in paperwork.

This EIR will review existing conditions in the City of South San Francisco, analyze potential environmental impacts from implementation of the Specific Plan, identify policies from the proposed project that serve to reduce and minimize impacts, and identify mitigation measures, if necessary, to reduce potentially significant impacts of the proposed project. As the EIR does not focus on any specific development projects within the City, subsequent activities in the City that involve individual projects must be examined in light of the Program EIR to determine whether any additional environmental review is necessary. If it is determined that an individual project would result in adverse impacts on the environment, an additional environmental document would be required.

The purpose of this report is to serve as an informational document for the public and City of South San Francisco decision-makers. The process will culminate with Planning Commission and City Council hearings to consider certification of a Final EIR (FEIR) and a decision on whether or not to approve the Specific Plan.

1.2 SCOPE OF THE EIR

This EIR addresses the potential environmental effects of implementation of the proposed project within Downtown South San Francisco. As the proposed Specific Plan is a comprehensive plan that outlines the future potential for growth and development within the study area, the scope of the EIR includes an examination of all environmental issues that are considered in the 2014 CEQA Guidelines Appendix G. In addition, the environmental issues analyzed in this document will include those areas determined to be potentially significant by the notice of preparation (NOP), responses to the NOP, and City staff. The NOP and comment letters received during the NOP review period are included in Appendix A of this EIR. The NOP identified that the EIR would address potential impacts to the following issue areas associated with implementation of the proposed project:

- Aesthetics
- Air Quality
- Cultural Resources
- Greenhouse Gas Emissions
- Land Use/Planning
- Noise
- Recreation
- Transportation/Traffic
- Utilities/Service Systems:
  - Water Supply
  - Sewer
  - Solid Waste
  - Electricity
  - Natural Gas

In accordance with CEQA Guidelines Section 15128 (Effects Not Found to Be Significant), Chapter 5 (Other CEQA Considerations) of this EIR explains why some environmental impacts related to agriculture/forestry resources, biological resources, geology/soils, hazards/hazardous materials, hydrology/water quality, and mineral resources were not considered significant and, therefore, are not analyzed further in this EIR.

In preparing the EIR, pertinent policies of the Specific Plan were evaluated for their ability to reduce impacts resulting from implementation of the proposed project. Regional and local agencies that regulate and provide services to the City were also contacted for information. A list of references and persons consulted are provided at the end of each chapter.

Chapter 6 (Alternatives to the Proposed Project) of the EIR was prepared in accordance with CEQA Guidelines Section 15126.6, which requires an evaluation of a reasonable range of alternatives, including the No Project Alternative. It also identifies the "environmentally superior" alternative among the alternatives assessed.

1.2.1 Environmental Setting/Definition of the Baseline

According to CEQA Guidelines Section 15125, an EIR must include a description of the existing physical environmental conditions in the vicinity of the project to provide the "baseline condition" against which project-related impacts are compared. Normally, the baseline condition is the physical condition that exists when the NOP is published. The NOP for the Specific Plan EIR was published October 1, 2013. The CEQA Guidelines recognize that the date for establishing an environmental baseline cannot be rigid. Because physical environmental conditions may vary over a range of time periods, the use of environmental baselines that differ from the date of the NOP is reasonable and appropriate when doing so results in a more accurate or conservative environmental analysis.

For analytical purposes, impacts associated with implementation of the Specific Plan are derived from the environmental setting in 2013. This EIR presents and analyzes the proposed allowable growth scenario as a result of the Specific Plan from 2014 through a planning horizon of 2035. As a practical matter, actual development under any area plan is typically substantially less than the entitlement or theoretical limit of development because of building and zoning restrictions as well as several economic factors and market forces. The Market Demand Analysis[1] determined that a reasonably foreseeable build-out of the Specific Plan over the 20-year planning period would be 25 percent of the parcels in the study area. Therefore, this EIR assumes that 25 percent of the parcels within the study area will be redeveloped in this 20-year timeframe.

1.3 INTENDED USE OF THE EIR

This EIR has been prepared to analyze potentially significant environmental impacts associated with future development resulting from implementation of the proposed Specific Plan, and also addresses appropriate and feasible mitigation measures or project alternatives that would minimize or eliminate these impacts. Additionally, this EIR will provide the primary source of environmental information for the City of South San Francisco, the lead agency, to use when considering the proposed Specific Plan.

This EIR is intended to provide decision-makers and the public with information that enables them to intelligently consider the environmental consequences of the proposed action. This EIR identifies significant or potentially significant environmental effects, as well as ways in which those impacts can be reduced to less-than-significant levels, whether through the imposition of mitigation measures or through

[1] BAE Urban Economics, *South San Francisco Downtown Station Area Plan Market Demand Analysis* (August 24, 2012).

the implementation of specific alternatives to the project. In a practical sense, this document functions as a technique for fact-finding, allowing concerned citizens and agency staff an opportunity to collectively review and evaluate baseline conditions and project impacts through a process of full disclosure.

1.4 LEAD, RESPONSIBLE, AND TRUSTEE AGENCIES

The City of South San Francisco is the lead agency for the project because it holds principal responsibility for approving the project. A responsible agency refers to a public agency, other than the lead agency, that has discretionary approval over the project. The proposed Specific Plan is a planning document for the City of South San Francisco to utilize moving forward. As such, the Specific Plan does not address a specific or proposed development, and no responsible agencies are identified at this time. Subsequent development projects will be subject to discretionary approval by the City and, depending on the development proposal, other public agencies. In addition to the City of South San Francisco, future projects within the City may require approval from:

- State Water Resources Control Board (General Construction Activity Stormwater Permit)
- Peninsula Corridor Joint Powers Board (Caltrain)
- California Department of Transportation (Caltrans)
- California Department of Toxic Substances Control (DTSC)
- Regional Water Quality Control Board (RWQCB)
- Bay Area Air Quality Management District (BAAQMD)
- Federal Aviation Administration (FAA)

A trustee agency is a state agency having jurisdiction by law over natural resources affected by a project, which are held in trust for the people of the state. As discussed above, the Specific Plan is a planning document for the Downtown area of the City of South San Francisco and does not address specific or proposed development. As such, no trustee agencies are identified at this time. However, in relation to future development within the City, trustee agencies may include the CDFW regarding biological resources, USACE regarding waters of the US and wetlands, and the Bay Area Air Quality Management District (BAAQMD) regarding issues of air quality and associated permitting.

1.5 ENVIRONMENTAL REVIEW PROCESS

This EIR has been prepared to meet all of the substantive and procedural requirements of CEQA (California Public Resources Code [PRC] Sections 21000 et seq.), CEQA Guidelines (California Code of Regulations, Title 14, Sections 15000 et seq.), and the rules, regulations and procedures for the implementation of CEQA as adopted by the City of South San Francisco. The City of South San Francisco is the lead agency for this project, taking responsibility for conducting the environmental review and approving or denying the project.

The Specific Plan will guide the City in its planning efforts to create a vibrant, transit-supportive, diverse Downtown, particularly the area surrounding the City's Caltrain commuter rail station. The lead agency has determined that an EIR for the Specific Plan would best serve the City if it contains a comprehensive

examination of all environmental issues that are contained in 2014 CEQA Guidelines Appendix G with the exception of agriculture/forestry resources, biological resources, geology/soils, hazards/hazardous materials, hydrology/water quality, and mineral resources. The EIR analyzes all aspects of the Specific Plan to determine whether any aspect of the project, either individually or cumulatively, may cause a significant effect on the environment.

The City prepared an Initial Study and Notice of Preparation (IS/NOP) in October 2013, which are included in Appendix A and are filed with the California Governor's Office of Planning and Research (OPR) as an indication that an EIR would be prepared. In turn, the IS/NOP was distributed to involved public agencies and interested parties for a 30-day public review period beginning October 1, 2013, and ending October 30, 2013. The purpose of the public review period was to solicit comments on the scope and content of the environmental analysis to be included in the EIR. The City received five comment letters on the IS/NOP, which are also included in Appendix A of this EIR. Agencies or interested persons who did not respond during the public review period of the IS/NOP had an opportunity to comment during the public review period for this EIR, as well as at subsequent hearings on the Specific Plan. In addition to the filing of the IS/NOP, the City held a Public Scoping meeting on October 16, 2013, to encourage and solicit comments from the public on the proposed project.

This EIR will be distributed to affected agencies, surrounding cities, involved public agencies, and interested parties for a 45-day review period in accordance with CEQA Guidelines Section 15087. During the 45-day public review period, this EIR is available for general public review on the City's website for the Specific Plan (http://www.ssfdowntownplan.org/) and at the following locations:

City of South San Francisco
Planning Division
315 Maple Avenue
South San Francisco, CA 94083

City of South San Francisco
City Clerk's Office
400 Grand Avenue
South San Francisco, CA 94080

South San Francisco Main Library
840 West Orange Avenue
South San Francisco, CA 94080

South San Francisco Grand Avenue Library
306 Walnut Avenue
South San Francisco, CA 94080

Interested parties may provide comments on the EIR in written form. Comments should be addressed to the City of South San Francisco to the following address:

City of South San Francisco
Economic and Community Development Department
315 Maple Avenue
South San Francisco, CA 94083
Attention: Ms. Susy Kalkin, Chief Planner

Your comments may also be sent by FAX to 650.829.6639 or by email to downtownplan@ssf.net (include SSF Downtown Station Area Specific Plan EIR in the subject heading).

Upon completion of the 45-day public review period, written responses to all comments raised with respect to environmental issues discussed in the EIR will be prepared and incorporated into the FEIR. Furthermore, written responses to comments received from any public agencies will be made available to these agencies at least 10 days prior to the public hearing during which the certification of the FEIR will be considered. These comments, and their responses, will be included in the FEIR for consideration by the City of South San Francisco Planning Commission and City Council.

According to PRC Section 21081, the lead agency must make specific Findings of Fact (Findings) before approving the FEIR, when the EIR identifies significant environmental impacts that may result from a project. The purpose of the Findings is to establish the link between the contents of the FEIR and the action of the lead agency with regard to approval or rejection of the project. Prior to approval of a project, one of three findings must be made:

- Changes or alterations have been required in, or incorporated into, the project that avoid or substantially lessen the significant environmental effect as identified in the FEIR.
- 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 other agency.
- Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the FEIR.

Additionally, according to PRC Section 21081.6, for projects in which significant impacts will be avoided by mitigation measures, the lead agency must include a mitigation monitoring program (MMP) as part of the FEIR. The purpose of the MMP is to ensure compliance with required mitigation during implementation of the project.

However, environmental impacts may not always be mitigated to a less-than-significant level. When this occurs, impacts are considered significant and unavoidable. If a public agency approves a project that has significant and unavoidable impacts, the agency shall state in writing the specific reasons for approving the project, based on the FEIR and any other information in the public record. This is termed a "Statement of Overriding Considerations" and is used to explain the specific reasons why the benefits of a proposed project make its unavoidable environmental effects acceptable. The statement is prepared, if required, after the FEIR has been completed, yet before action to approve the project has been taken. Ultimately, the lead agency must certify the FEIR prior to approving a specific project.

1.6 AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

During the environmental review process, NOP comment letters were received from various parties who raised issues of concern. These comment letters, and verbal comments received at the public scoping meeting (Appendix A) were used to determine areas of potential controversy and issues to be resolved. These issues are summarized below:

- Traffic impacts to local, county, and state facilities
- Impacts to trails and recreational facilities
- Traffic impacts related to jobs/housing ratio
- Cultural resource issues, including tribal consultation per SB 18 and potential for buried cultural resources
- Impacts to population and housing, including displacement of existing affordable housing and local businesses
- Impacts to air quality
- Conflicts with an active railroad right-of-way (ROW)

1.7 DOCUMENT ORGANIZATION

This EIR has been designed for easy use and reference. To help the reader locate information of particular interest, a brief summary of the contents of each section of the EIR is provided. References are contained at the end of each respective chapter. The following chapters are contained within the EIR:

- **Chapter 1: Introduction**—This chapter describes the purpose, approach, intended use, and scope of the EIR, a summary of the environmental and public review process, agencies relevant to the proposed project, the availability of the EIR, and a brief outline of this document's organization.
- **Chapter 2: Summary**—This chapter contains a summary of the proposed project, as well as a summary of environmental impacts, proposed mitigation, level of significance after mitigation, and unavoidable impacts.
- **Chapter 3: Project Description**—This chapter provides a detailed description of the proposed project, including a description of the project location, environmental setting and regulations, project background, project objectives, and project characteristics.
- **Chapter 4: Environmental Analysis**—This chapter describes and evaluates the environmental issue areas, applicable environmental thresholds, environmental impacts (both short-term and long-term), policy considerations related to the particular environmental issue area under analysis, mitigation measures capable of minimizing environmental harm, and a discussion of cumulative impacts. Recommendations are made, as appropriate, where additional actions must be taken to ensure consistency with environmental policies.
- **Chapter 5: Other CEQA Considerations**—This chapter provides analysis, as required by CEQA, regarding impacts that would result from the proposed project, including effects found not to be significant, growth-inducing impacts, significant irreversible change to the environment, and significant and unavoidable impacts.

- **Chapter 6: Alternatives to the Proposed Project**—This chapter analyzes feasible alternatives to the proposed project, including a No Project/Existing General Plan and a Mixed-Use Village alternative.
- **Chapter 7: Report Preparers**—This chapter identifies all of the individuals responsible for the preparation of this EIR.

1.8 REFERENCES

BAE Urban Economics. 2012. *South San Francisco Downtown Station Area Plan Market Demand Analysis*, August 24.

CHAPTER 2 Summary

2.1 PURPOSE OF THE SUMMARY

This section summarizes the characteristics of the proposed project, the environmental impacts, mitigation measures, and residual impacts of the proposed project.

2.2 INTRODUCTION

This EIR is intended to provide decision-makers and the public with information that enables them to intelligently consider the environmental consequences of the proposed action. This EIR identifies significant or potentially significant environmental effects, as well as ways in which those impacts can be reduced to less-than-significant levels, through the imposition of mitigation measures (MMs), or through the implementation of alternatives to the project.

2.3 SUMMARY OF PROPOSED PROJECT

The proposed South San Francisco Downtown Station Area Specific Plan (Specific Plan or proposed project) will guide the City in its planning efforts to create a vibrant, transit-supportive, diverse Downtown, particularly the area surrounding the City's Caltrain commuter rail station. The study area includes approximately thirty-five blocks within 0.5 mile of the existing Caltrain station. The Specific Plan will craft a vision for the Downtown core, and identify an implementation process to achieve City's and the community's goals, including design standards and regulations for future development. The Specific Plan will support transit-oriented development (TOD); create an open space framework; create pedestrian linkages, lanes, and a pedestrian-priority zone; create a new bicycle network; and employ new parking strategies.

The types of land uses accommodated in the study area under the Specific Plan would be similar to existing conditions. However, these uses would be intensified, particularly within 0.25 mile of the future Caltrain station. Within this zone, a Downtown Transit Core Designation is proposed, allowing up to 120 dwelling units per acre under special conditions. Grand Avenue would continue to be the historic core of the City and building heights would be limited to about 45 feet directly fronting Grand Avenue to protect the pedestrian and historic scale of Grand Avenue. Heights off Grand Avenue in this zone would be allowed up to 85 feet to allow for higher intensity development. Proposed allowable building heights in the entire study area are provided in Figure 3-4 (Proposed Height Limits).

The remainder of the Downtown area, which includes the Grand Avenue Core and the Downtown Residential Core, from Tamarack Lane south to Second Lane, would provide for higher intensities than currently allowed, up to 65 feet in height and up to 80 dwelling units per acre, with up to 100 units per acre allowed if specific criteria are met, and for the inclusion of affordable senior housing a density of up to 125 dwelling units would be allowed. Along Airport Boulevard and south of Armour Avenue, a new medium-density mixed-use designation will encourage higher density residential (up to 50 dwelling units per acre if specific criteria are met) as well as business commercial at up to 0.5 floor-area ratio (FAR). No

land use changes are proposed for the Business Commercial designations currently applied to the zone framed by US-101, the rail tracks, and Airport Boulevard and the area along Airport Boulevard, north of Armour Avenue. The East of US-101 area would continue to be designated a high intensity employment center, and similar to existing conditions, no residential use would be allowed. However, the maximum allowable density would increase from 2.0 FAR to approximately 3.5 FAR, if specific criteria are met. Assuming that 25 percent of the parcels in the study area would be redeveloped over the lifetime of the plan, the Specific Plan would accommodate a net increase of approximately 1,435 dwelling units, 0.8 million square feet (sf) of commercial uses, 21,000 sf of industrial uses, and 1.2 million sf of new office/research and development uses.

2.4 CLASSIFICATION OF ENVIRONMENTAL IMPACTS

Under CEQA, a "significant impact" represents a substantial or potentially substantial adverse physical change to the environment. In evaluating specific effects, this EIR identifies thresholds of significance for each effect, evaluates the potential environmental change associated with each effect, and then characterizes the effects as impacts in the following categories:

- **Less Than Significant**—Results in no substantial adverse change to existing environmental conditions
- **Potentially Significant**—Constitutes a substantial adverse change to existing environmental conditions that can be mitigated to less-than-significant levels by implementation of proposed potentially feasible mitigation measures or by the selection of an environmentally superior project alternative
- **Significant and Unavoidable**—Constitutes a substantial adverse change to existing environmental conditions that cannot be fully mitigated by implementation of all feasible mitigation measures

2.5 SIGNIFICANT AND UNAVOIDABLE IMPACTS

The following significant and unavoidable impacts would result from future development of the proposed project. A detailed discussion of these impacts can be found in Section 4.2 (Air Quality), Section 4.3 (Cultural Resources), Section 4.6 (Noise), and Section 4.10 (Transportation/Traffic) of this document.

- **Air Quality**
  - > Implementation of the proposed project would violate an air quality standard or contribute substantially to an existing or projected air quality violation.
- **Cultural Resources**
  - > Implementation of the proposed project could cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5.
- **Noise**
  - > Implementation of the proposed project would result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

- **Traffic/Transportation**
  - > Implementation of the Specific Plan would conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system.
  - > Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on two northbound segments and one southbound segment of US-101 and would add traffic greater than 1 percent to a freeway segment already operating at LOS F under No Project Conditions for one northbound segment and two southbound segments, resulting in a significant project contribution under Existing Plus Project Conditions.
  - > Implementation of the Specific Plan would conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system under cumulative plus project conditions.
  - > Implementation of the Specific Plan would conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system under Cumulative Plus Project conditions for two intersections.
  - > Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on one northbound segment of US-101 and would add traffic greater than 1 percent of the freeway segment volume to a segment already operating at LOS F under No Project Conditions on five northbound segments and five southbound segments of US-101 under cumulative conditions.
  - > Implementation of the Station Area Plan would add traffic greater than 1 percent of the freeway ramp volume and deteriorate LOS from E to F for one southbound US-101 ramp during the PM peak hour under cumulative conditions.

2.6 ALTERNATIVES

As required by CEQA Guidelines Section 15126.6(a) and recent court cases, an EIR must:

> Describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives.

Further, CEQA Guidelines Section 15126.6(b) states:

> The discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

Alternatives evaluated in this EIR include the following:

- **Alternative 1: No Project/Continuation of Existing General Plan Alternative**—This legally mandated alternative, which is not subject to the requirements to meet most of the project objectives of the proposed plan or to substantially lessen any of the significant effects of the project, reflects conditions likely to occur in the future without the adoption of the proposed plan. Future land uses in the study area would be guided by continued implementation of the General Plan land use designations and zoning, as applicable.

- **Alternative 2: Mixed Use Village**—This alternative balances locational opportunities for new housing with additional sites for employment uses in the study area, with residential uses predominating in the Downtown, and a mix of residential and employment in the Eastern Neighborhood.

2.7 SUMMARY OF IMPACTS AND MITIGATION MEASURES

Pursuant to CEQA Guidelines Section 15123(b)(1), Table 2-1 (Summary of Environmental Effects and Mitigation Measures) contains a summary of less-than-significant, potentially significant, or significant and unavoidable environmental impacts associated with the proposed project, mitigation measures that would reduce or avoid those effects, and the level of significance of the impacts following the implementation of mitigation measures.

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
AESTHETICS			
Impact 4.1-1 Implementation of the proposed project would not have a substantial adverse effect on a scenic vista. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.1-2 Implementation of the proposed project would not substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.1-3 Implementation of the proposed project would not substantially degrade the existing visual character or quality of the site and its surroundings. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
AIR QUALITY			
Impact 4.2-1 Implementation of the proposed project has the potential to conflict with or obstruct implementation of the applicable air quality plan. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level. Therefore, this would be a *significant and unavoidable* impact.	PS	**MM4.2-2**, below, would apply. No additional mitigation measures would be feasible.	SU
Impact 4.2-2 Implementation of the proposed project would violate an air quality standard or contribute substantially to an existing or projected air quality violation. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level for construction activities.	PS	**MM4.2-1** Construction emissions for all future development under the Specific Plan shall be quantified prior to the start of construction. For projects where construction emissions are anticipated to exceed the most recent City-adopted thresholds, in addition to the BAAQMD Basic Construction Mitigation Measures, construction activities shall implement the BAAQMD Additional Construction Mitigation Measures to reduce construction emissions of criteria air pollutants to below significance criteria. Mitigation reductions shall be quantified prior to the start of construction to demonstrate that adequate measures have been identified to reduce project emissions. The Additional Construction Mitigation Measures include the following:	SU

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
Therefore, this would be a *significant and unavoidable* impact.		1. 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. 2. All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. 3. Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity. 4. 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. 5. 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. 6. All trucks and equipment, including their tires, shall be washed off prior to leaving the site. 7. 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. 8. Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than 1 percent. 9. Minimizing the idling time of diesel powered construction equipment to two minutes. 10. The project 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 NO_X reduction and 45 percent PM reduction compared to the most recent California ARB 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 such become available. 11. Use low-ROG coatings beyond the local requirements (i.e., Regulation 8, Rule 3: Architectural Coatings). 12. All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of NO_X and PM. 13. All contractors shall use equipment that meets California ARB's most recent certification standard for off-road heavy-duty diesel engines. **MM4.2-2** Prior to issuance of a building permit for future development projects under the Specific Plan, the applicant shall demonstrate implementation of recommended BAAQMD operational mitigation measures as necessary to reduce operational emissions of criteria air pollutants to below significance criteria.	

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		Operational emissions and mitigation reductions will be quantified prior to issuance of the building permit to demonstrate that adequate measures have been identified to reduce project emissions. The recommended measures include, but are not limited to, any of the following: 1. Increase on-street parking fees. 2. Daily parking charge for employees. 3. Provide a parking "cash-out" incentive for employees who use alternative transportation to commute. 4. Provide subsidized or free transit passes to employees. 5. Encourage alternative compressed work schedules and telecommuting. 6. Provide a ridesharing program.	
Impact 4.2-3 Implementation of the proposed project would result in a cumulatively considerable net increase of a criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors). This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.	PS	**MM4.2-2** would apply.	LTS
Impact 4.2-4 Implementation of the proposed project would expose sensitive receptors to substantial pollutant concentrations. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.	PS	**MM4.2-3** *Siting Sensitive Receptors near Potential TAC Source.* A Health Risk Assessment (HRA) shall be prepared by a qualified air quality professional for development of a project that would introduce new sensitive receptors in the study area within the siting distance for any use listed in ARB Air Quality and Land Use Handbook Table 1-1 (reproduced here as Table 4.2-11 [Recommendations on Siting New Sensitive Land Uses]). Sensitive receptors include day care centers, schools, retirement homes, hospitals, medical patients in residential homes, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. Such a project shall not be considered for approval until an HRA has been completed and approved by the City. The methodology for the HRA shall follow the Office of Environmental Health Hazard Assessment and BAAQMD guidelines for the preparation of HRAs. If a potentially significant health risk is identified, the HRA shall identify appropriate measures to reduce the potential health risk to below a significant level or the sensitive receptor shall be sited in another location.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*

Table 4.2-11 Recommendations on Siting New Sensitive Land Uses

Source Category	*Advisory Recommendations*
Freeways and High-Traffic Roads	Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.
Distribution Centers	Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week) Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points.
Rail Yards	Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard. Within 1 mile of a rail yard, consider possible siting limitations and mitigation approaches.
Ports	Avoid siting new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the ARB on the status of pending analyses of health risks.
Refineries	Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult local air districts or the ARB on the status of pending analyses of health risks.
Chrome Platers	Avoid siting new sensitive land uses within 1,000 feet of a chrome plater.
Dry Cleaners Using Perchloroethylene	Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines provide 500 feet. For operations with three or more machines consult with the local air district. Do not site new sensitive land uses in the same building with perchloroethylene dry cleaning operations.

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		Gasoline Dispensing Facilities: Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50-foot separation is recommended for typical gas dispensing facilities. SOURCE: California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective* (April 2005). These recommendations are advisory. Land use agencies have to balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues. Recommendations are based primarily on data showing that the air pollution exposures addressed here (i.e., localized) can be reduced as much as 80% with the recommended separation. The relative risk for these categories varies greatly. To determine the actual risk near a particular facility, a site-specific analysis would be required. Risk from diesel PM will decrease over time as cleaner technology phases in. These recommendations are designed to fill a gap where information about existing facilities may not be readily available and are not designed to substitute for more specific information if it exists. The recommended distances take into account other factors in addition to the available health risk data. Site-specific project design improvements may help reduce air pollution exposures and should also be considered when siting new sensitive land uses. This table does not imply that mixed residential and commercial development in general is incompatible. Rather it focuses on known problems like dry cleaners using perchloroethylene that can be addressed with reasonable preventative actions. **MM4.2-4** *Siting of New Toxic Air Contaminant Sources Near Sensitive Receptors.* Prior to approval of any project that includes potential sources of significant TAC emissions that is not subject to a BAAQMD permit, that is proposed in a close proximity to a sensitive receptor, a Health Risk Assessment (HRA) shall be prepared by a qualified air quality professional. The land uses listed in ARB Air Quality and Land Use Handbook Table 1-1 (reproduced above as Table 4.2-11 [Recommendations on Siting New Sensitive Land Uses]), shall be considered potentially significant sources of TAC emissions. Such a proposed project will be considered in close proximity to a sensitive receptor if it would be located within the siting distance outline for the use in Table 1-1 of the ARB Air Quality and Land Use Handbook. Sensitive receptors include day care centers, schools, retirement homes, hospitals, medical patients in residential homes, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. Such a project shall not be considered for approval until an HRA has been completed and approved by the City. The methodology for the HRA shall follow the Office of Environmental Health Hazard Assessment and BAAQMD guidelines for the preparation of HRAs. If a potentially significant health risk is	

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		identified, the HRA shall identify appropriate measures to reduce the potential health risk to below a significant level, or the proposed facility shall be sited in another location.	
Impact 4.2-5 Implementation of the proposed project would create objectionable odors affecting a substantial number of people. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.	PS	**MM4.2-6** Prior to issuance of a certificate of occupancy for new industrial land uses identified in the BAAQMD CEQA Guidelines or ARB Air Quality and Land Use Handbook as a typical source of odors, the applicant shall demonstrate implementation of best management practices to minimize odors. Best management practices vary by industrial type. In all cases, exhaust vents should be located as far from sensitive receptors as possible. Best management practices recommended by the BAAQMD in the CEQA Guidelines shall be implemented as applicable, and may include the following: ■ Vapor Recovery Systems ■ Injection of masking odorants into process streams ■ Thermal oxidation ■ Carbon absorption ■ Scrubbers ■ Catalytic oxidation	LTS
CULTURAL RESOURCES			
Impact 4.3-1 Implementation of the proposed project could cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level. Therefore, this would be a *significant and unavoidable* impact.	PS	**MM4.3-1** Prior to development activities that would demolish or otherwise physically affect buildings or structures 45 years old or older, the project applicant shall retain a cultural resource professional who meets the Secretary of the Interior's Professional Qualifications Standards for Architectural History to determine if the project would cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5. The investigation shall include, as determined appropriate by the cultural resource professional and the City of South San Francisco, the appropriate archival research, including, if necessary, an updated records search of the Northwest Information Center (NWIC) of the California Historical Resources Information System and a pedestrian survey of the proposed development area to determine if any significant historic-period resources would be adversely affected by the proposed development. The results of the investigation shall be documented in a technical report or memorandum that identifies and evaluates any historical resources within the development area and includes recommendations and methods for eliminating or reducing impacts on historical resources. The technical report or memorandum shall be submitted to the City of South San Francisco for approval. As determined necessary by the City, environmental documentation (e.g., CEQA documentation) prepared for future development within the project site shall reference or incorporate the findings and recommendations of the technical report or memorandum. The project applicant shall be responsible for implementing methods for eliminating or reducing impacts on historical resources identified in the technical report or memorandum.	SU

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
Impact 4.3-2 Implementation of the proposed project could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.	PS	**MM4.3-2** Prior to any earth-disturbing activities (e.g., excavation, trenching, grading) that could encounter previously undisturbed soils, the project applicant shall retain a City approved archaeologist to determine if the project could result in a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5. The results of the cultural resources investigation shall be documented in a technical report or memorandum that identifies and evaluates any archaeological resources within the development area and includes recommendations and methods for avoiding impacts on archaeological resources or reducing impacts to a less-than-significant level. The technical report or memorandum shall be submitted to the City of South San Francisco for approval. The project applicant shall be responsible for implementing methods for avoiding or reducing impacts on archaeological resources identified in the technical report or memorandum. Projects under the Specific Plan that would not encounter previously undisturbed soils and would therefore not be required to retain an archaeologist shall demonstrate non-disturbance to the City through the appropriate construction plans or geotechnical studies prior to any earth-disturbing activities. Projects that would include any earth disturbance (disturbed or undisturbed soils) shall comply with mitigation measure MM4.3-3. **MM4.3-3** If evidence of an archaeological site or other suspected historical resource as defined by CEQA Guidelines Section 15064.5, are discovered during any project-related earth-disturbing activities (including projects that would not encounter undisturbed soils), all earth-disturbing activity within 100 feet of the find shall be halted and the City of South San Francisco shall be notified. The project applicant shall retain a City-approved archaeologist to assess the significance of the find. Impacts to any significant resources shall be mitigated to a less-than-significant level through methods determined adequate by the archaeologist as approved by the City. **MM4.3-4** Prior to start of construction, all construction personnel involved in ground-disturbing activities and the supervision of such activities will undergo worker environmental awareness training. The archaeological resources training components will be presented by a City-approved cultural resources consultant. The training will describe the types of archaeological resources that may be found in the proposed study area and how to recognize such resources; the protocols to be followed if archaeological resources are found, including communication protocols; and the laws relevant to the protection of archaeological resources and the associated penalties for breaking these laws. Additionally, prior to construction, City-approved archaeological resources consultants will meet with the applicant's grading and excavation contractors to provide comments and suggestions concerning monitoring plans and to discuss excavation and grading plans.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
Impact 4.3-3 Implementation of the proposed project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.	PS	**MM4.3-4** would apply. **MM4.3-5** Prior to any earth-disturbing activities (e.g., excavation, trenching, grading) that could encounter undisturbed soils, the project applicant shall retain a professional paleontologist to determine if the project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. The results of the investigation shall be documented in a technical report or memorandum that identifies the paleontological sensitivity of the development area and includes recommendations and methods for avoiding or reducing impacts to a less-than-significant level for paleontological resources or unique geologic features. The technical report or memorandum shall be submitted to the City for approval. The project applicant shall be responsible for implementing methods for avoiding or reducing impacts on paleontological resources or unique geologic features identified in the technical report or memorandum. Projects that would not encounter undisturbed soils and would therefore not be required to retain a paleontologist shall demonstrate non-disturbance to the City through the appropriate construction plans or geotechnical studies prior to any earth-disturbing activities. Projects that would include any earth disturbance (disturbed or undisturbed soils) shall comply with mitigation measure MM4.3-6. **MM4.3-6** Should paleontological resources (i.e., fossil remains) or unique geologic features be identified at a particular site during project construction, construction shall cease within 100 feet of the find and the City of South San Francisco shall be notified. The project applicant shall retain a City approved paleontologist to assess the significance of the find. Impacts to any significant resources shall be mitigated to a less-than-significant level through methods determined adequate by the paleontologist, and as approved by the City. In considering any suggested mitigation proposed by the consulting paleontologist, the City of South San Francisco staff shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, applicable regulations, policies and land use assumptions, and other considerations. If avoidance is unnecessary or infeasible, other appropriate measures (e.g., monitoring and/or data recovery) shall be instituted.	LTS
Impact 4.3-4 Implementation of the proposed project could disturb human remains, including those interred outside of formal cemeteries. This is considered a potentially significant impact. However, compliance with standard regulations would reduce this impact to a *less-than-significant* level.	PS	No mitigation measures would be required.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		GREENHOUSE GAS EMISSIONS	
Impact 4.4-1 Implementation of the proposed project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to *less than cumulatively significant*.	PS	**MM4.4-1** All construction projects shall incorporate, to the greatest extent feasible, the most recent Best Management Practices for Greenhouse Gas Emissions as indicated by the BAAQMD.[2] Best Management Practices to reduce GHG emissions during construction may include, but are not limited to: ■ Use of alternative-fueled (e.g., biodiesel, electric) construction vehicles/equipment of at least 15 percent of the fleet ■ Using local building materials of at least 10 percent ■ Recycle at least 50 percent of construction waste or demolition materials **MM4.4-2** *Support Expansion of Public and Private Transit Programs to Reduce Employee Commutes (1.2).* Employers within the study area shall subscribe to the South San Francisco TDM Ordinance such that a minimum of 25 percent of all employees are included. The South San Francisco TDM Ordinance requires that all nonresidential developments producing 100 average trips per day or more meet a 28 percent non-drive-alone peak hour requirement with fees assessed for noncompliance. **MM4.4-3** *Reduce Dependence on Autos through Smart Parking Policies (1.3).* This measure would implement Smart Parking Policies, such as shared parking, to reduce available parking by 10 percent. **MM4.4-4** *Expand the Use of Alternative-Fuel Vehicles (2.1).* Nonresidential and residential land uses can encourage the use of alternative-fueled vehicles by providing charging stations. In support of this measure, development within the study area shall ensure that a minimum of 60 electric vehicle chargers are installed within nonresidential land uses and within the residential units electric charging capabilities are available for a minimum of 200 vehicles. **MM4.4-5** *Reduce Emissions from Off-Road Vehicles and Equipment (2.2).* In support of this measure, development within the study area shall ensure that a minimum of 25 percent of all lawnmowers and leaf blowers acquired/used within the study area would be electric. This requires that there be sufficient electrical outlets outside of all residential and nonresidential units to encourage the use of non-gas-fueled lawn maintenance equipment. **MM4.4-6** *Maximize Energy Efficiency in the Built Environment through Standards and the Plan Review Process (3.1).* All new development within the study area shall, at a minimum, comply with the CALGreen Tier 1 standards and exceed 2013 Title 24 by a minimum of 10 percent. **MM4.4-7** *Address Heat Island Issues and Expand the Urban Forest (3.4).* At a minimum, 322,000 square feet of all new nonresidential development and 75 new residential units shall address heat island effect issues by using high albedo surfaces and technologies identified in the voluntary CALGreen Standards.	LTS

[2] Above BMPs are subject to change over time. Bay Area Air Quality Management District will post updates to this list at www.baaqmd.gov.

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		This is in addition to the requirements of all new development to plant trees in accordance with Zoning Code Chapter 13.30 with placement used to maximize building shading. **MM4.4-8** *Promote Energy Information Sharing and Educate the Community about Energy-Efficient Behaviors and Construction (3.5).* Develop as part of the Specific Plan an educational information packet that will be distributed to residential and nonresidential land owners. These information packets shall detail potential behavioral changes that can be instituted to save energy, such as unplugging appliances, air-drying clothes, and daylighting strategies. **MM4.4-9** *Energy Reduction (4.1).* In addition to complying with MM4.4-6, the development within the study area shall include the use of solar panels such that a minimum of 35,000 square feet of nonresidential land use roof space is converted to solar panels, 205 residential units are equipped with solar hot water heaters, and the electricity of an additional 75 dwelling units is offset by solar panel arrays associated with the new residential development. **MM4.4-10** *Water Reduction (6.1).* Nonresidential and residential land uses shall reduce per capita water consumption by 40 gallons per day. Measures to be implemented to reduce water consumption may include, but are not limited to: ■ Limiting turf area in commercial and multi-family projects ■ Restricting hours of irrigation to between 3:00 AM and 2 hours after sunrise (suggestion to be included in the energy information saving package) ■ Installing irrigation controllers with rain sensors ■ Landscaping with native, water-efficient plants ■ Installing drip irrigation systems ■ Reducing impervious surfaces ■ Installing high-efficiency, water-saving appliances	
Impact 4.4-2 Implementation of the proposed project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to *less than cumulatively significant*.	PS	**MM4.4-1 through MM4.4-10** would apply.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		LAND USE/PLANNING	
Impact 4.5-1 Implementation of the proposed Specific Plan would adopt new standards and permit land uses not currently allowed within the study area. However, the proposed Specific Plan would not conflict with applicable land use plans, policies, or regulations adopted for the purpose of mitigating an environmental effect. This impact would be *less than significant*.	LTS	No mitigation measures would be required.	LTS
		NOISE	
Impact 4.6-1 Implementation of the Specific Plan could result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. This is considered a potentially significant impact. However, implementation of mitigation would reduce the impact from operational noise sources to a *less-than-significant* level.	PS	**MM4.6-1** *HVAC Mechanical Equipment Shielding.* Prior to the approval of building permits for non-residential development, the applicant shall submit a design plan for the project demonstrating that the noise level from operation of mechanical equipment will not exceed the exterior noise level limits for a designated receiving land use category as specified in Noise Ordinance Section 8.32.030. Noise control measures may include, but are not limited to, the selection of quiet equipment, equipment setbacks, silencers, and/or acoustical louvers. **MM4.6-2** *Site-Specific Acoustic Analysis—Nonresidential Development.* Prior to the approval of building permits for new non-residential land uses where exterior noise level exceeds 70 dBA CNEL, an acoustical analysis shall be performed to determine appropriate noise reduction measures such that exterior noise levels shall be reduced to be below 70 dBA CNEL, unless a higher noise compatibility threshold (up to 75 dBA CNEL) has been determined appropriate by the City of South San Francisco. The analysis shall detail the measures that will be implemented to ensure exterior noise levels are compatible with the proposed use. Measures that may be implemented to ensure appropriate noise levels include, but are not limited to, setbacks to separate the proposed nonresidential structure from the adjacent roadway, or construction of noise barriers on site. **MM4.6-3** *Site-Specific Acoustic Analysis—Multifamily Residences.* Prior to the approval of building permits for the following uses, an acoustical analysis shall be performed to ensure that interior noise levels due to exterior noise sources shall be below 45 dBA CNEL: ■ Multifamily residences where exterior noise levels exceed 65 dBA CNEL or where noise contours identified in the General Plan Noise Element project a CNEL between 65 and 70 dBA ■ Multifamily residential units that are located within the same building as commercial development ■ Multifamily residential units located near a structure requiring an HVAC system	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		■ Building plans shall be available during design review and shall demonstrate the accurate calculation of noise attenuation for habitable rooms. For these areas, it may be necessary for the windows to be able to remain closed to ensure that interior noise levels meet the interior standard of 45 dBA CNEL. Consequently, based on the results of the interior acoustical analysis, the design for buildings in these areas may need to include a ventilation or air conditioning system to provide a habitable interior environment with the windows closed. Additionally, for new multifamily residences on properties where train horns and railroad crossing warning signals are audible, the acoustical analysis shall ensure that interior noise levels during crossing events do not exceed the Interior Noise Standards in Noise Ordinance Section 8.32.040.	
Impact 4.6-2 Construction of the proposed project would result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.	PS	**MM4.6-4** *Construction Vibration.* For all construction activities within the study area, the construction contractor shall implement the following measures during construction: a. The construction contractor shall provide, at least three weeks prior to the start of construction activities, written notification to all residential units and nonresidential tenants within 115 feet of the construction site informing them of the estimated start date and duration of vibration-generating construction activities. b. Stationary sources, such as temporary generators, shall be located as far from off-site receptors as possible. c. Trucks shall be prohibited from idling along streets serving the construction site.	LTS
Impact 4.6-3 Operation of the proposed project would result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.	PS	**MM4.6-5** *Rail Line Groundborne Vibration.* Implement the current FTA and Federal Railroad Administration (FRA) guidelines, where appropriate, to limit the extent of exposure that sensitive uses may have to groundborne vibration from trains. Specifically, Category 1 uses (vibration-sensitive equipment) within 300 feet from the rail line, Category 2 uses (residences and buildings where people normally sleep) within 200 feet, and Category 3 uses (institutional land uses) within 155 feet of the rail line shall require a site-specific groundborne vibration analysis conducted by a qualified groundborne vibration specialist in accordance with the current FTA and FRA guidelines prior to obtaining a building permit. Vibration control measures deemed appropriate by the site-specific groundborne vibration analysis to meet 65 VdB, 72 VdB, and 75 VdB respectively for Category 1, Category 2, and Category 3 uses, shall be implemented by the project applicant and approved by the City prior to receiving a building permit.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
Impact 4.6-4 Implementation of the proposed project would result in a substantial permanent increase in ambient noise levels as a result of increased traffic in the project vicinity above levels existing without the project. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level. Therefore, the increase in traffic noise would be a *significant and unavoidable* impact.	PS	No feasible mitigation measures would be available.	SU
Impact 4.6-5 The proposed project would not result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
POPULATION/HOUSING			
Impact 4.7-1 Implementation of the proposed project would not induce substantial population growth. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.7-2 Construction of development projects pursuant to the Specific Plan would not displace substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		PUBLIC SERVICES	
Impact 4.8-1 Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 fire protection and emergency response. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.8-2 Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 police protection. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.8-3 Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 schools. Impacts to school services would be *less than significant*.	LTS	No mitigation measures would be required.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
Impact 4.8-4 Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 libraries. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
RECREATION			
Impact 4.9-1 Implementation of the proposed project would not 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. This impact would be *less than significant*.	LTS	No mitigation measures would be required.	LTS
Impact 4.9-2 Development pursuant to the Specific Plan could include recreational facilities or require the construction or expansion of recreational facilities, but these specific components would not have an adverse physical effect on the environment not already included in the overall analysis of Specific Plan impacts. The impact for any recreational component would be *less than significant*.	LTS	No mitigation measures would be required.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		TRANSPORTATION/TRAFFIC	
Impact 4.10-1 Implementation of the Specific Plan could conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system. This is considered a potentially significant impact. Implementation of mitigation would reduce impacts to most intersections to *less than significant*, but impacts would remain *significant and unavoidable* for five intersections.	PS	**MM4.10-1** A signal timing adjustment to redistribute green time to better serve future vehicle volumes would reduce delay at the intersection, and improve operations at #1 Miller Avenue/Linden Avenue. This would cause the intersection to operate at an acceptable LOS D in the PM peak hour. **MM4.10-2** Convert one westbound through lane to a second westbound left-turn lane, and retime and optimize the traffic signal at E. Grand Avenue/Gateway Boulevard. **MM4.10-3** Modify the eastbound approach to include one left-turn pocket and one through-right shared lane, and retime and optimize the traffic signal at Grand Avenue/Airport Boulevard to reallocate green time. **MM4.10-4** Add a southbound left-turn pocket by removing existing parking and retime and optimize the traffic signal at Baden Avenue/Linden Avenue to reallocate green time to better serve future volumes. **MM4.10-5** Modify the westbound approach to add a left-turn pocket, modifying the approach to include three left-turn lanes, one through lane, and one right-turn lane, and optimize the traffic signal at San Mateo Avenue/Airport Boulevard to reallocate green time to better serve future volumes. **MM4.10-6** Include an additional westbound through lane, add a second southbound right-turn pocket, and retime and optimize the traffic signal at South Airport Boulevard/Gateway Boulevard to reallocate green time to better serve future traffic volumes. **MM4.10-7** A signal timing adjustment to redistribute green time to better serve future vehicle volumes would reduce queuing at the southbound right-turn movement. This would cause the intersection to operate at an acceptable LOS D and with acceptable queue lengths during the PM peak hour.	SU
Impact 4.10-2 Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on two northbound segments and one southbound segment of US-101 and would add traffic greater than 1 percent to a freeway segment already operating at LOS F under No Project Conditions for one northbound segment and two southbound segments, resulting in a significant project contribution under Existing Plus Project Conditions.	PS	No feasible mitigation measures would be available.	SU

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
Impact 4.10-3 Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway ramp volume for the northbound US-101 off-ramp to East Grand Avenue/Poletti Way, a ramp already operating at LOS F under No Project Conditions, resulting in a significant project contribution under Existing Plus Project Conditions.	PS	**MM4.10-8** Add a second off-ramp lane from northbound US-101 at Grand Avenue/Poletti Way to increase capacity of the off-ramp to serve future demand.	LTS
Impact 4.10-4 Implementation of the Specific Plan could conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system under cumulative plus project conditions. This is a potentially significant impact. Implementation of mitigation would reduce impacts to most intersections to *less than significant*, but impacts would remain *significant and unavoidable* for one intersection.	PS	**MM4.10-9** Repurpose the eastbound and westbound approaches to include one left-turn pocket and one through-right shared lane, and retime and optimize the traffic signals at Miller Avenue/Linden Avenue. This lane modification would not require any additional right-of-way. **MM4.10-10** A signal timing adjustment to optimize cycle length and redistribute green time to better serve future vehicle volumes would reduce delay at the intersection, and improve operations at this intersection. **MM4.10-11** A signal timing adjustment to redistribute green time to better serve future vehicle volumes would reduce delay at the intersection, and improve operations at this intersection. This would cause the intersection to operate at an acceptable LOS D during the PM peak hour. **MM4.10-12** Construct an additional northbound right-turn lane, southbound left-turn lane, southbound right-turn pocket, and retime and optimize the traffic signals at E. Grand Avenue/Gateway Boulevard. **MM4.10-13** Convert the westbound approach to include one left-turn lane and one through-right shared lane. **MM4.10-14** Modify the eastbound and westbound approach to each have one left-turn pocket and one through-right shared lane, and retime and optimize the traffic signals at Grand Avenue/Linden Avenue. **MM4.10-15** Modify the eastbound approach to include one left-turn pocket, one through lane, and one right-turn pocket, and retime and optimize the traffic signals at Grand Avenue/Airport Boulevard. This lane modification and signal timing adjustment would reduce vehicle delay at the intersection, and improve operations at #10 Grand Avenue/Airport Boulevard. **MM4.10-16** Retime and optimize the traffic signals at Baden Avenue/Linden Avenue. **MM4.10-17** Construct an additional westbound left-turn lane, provide a northbound right-turn pocket, and retime and optimize the traffic signals at San Mateo Avenue/Airport Boulevard. **MM4.10-18** Construct an additional northbound left-turn lane, and retime and optimize the traffic signals at So. Airport Boulevard/Gateway Boulevard. **MM4.10-19** Modify the eastbound approach to include two left-turn lanes, one through-left shared lane, and one right-turn lane, and retime and optimize the traffic signal at US-101 NB/So. Airport Boulevard Off	SU

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
		Ramp/So. Airport Boulevard to reallocate green time to better serve future volumes.	
Impact 4.10-5 Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on one northbound segment of US-101 and would add traffic greater than 1 percent of the freeway segment volume to a segment already operating at LOS F under No Project Conditions on five northbound segments and five southbound segments of US-101. No feasible mitigation is available to reduce this impact. Therefore, this impact would be *significant and unavoidable* under cumulative conditions.	PS	No feasible mitigation measures would be available.	SU
Impact 4.10-6 Implementation of the Station Area Plan would add traffic greater than 1 percent of the freeway ramp volume and deteriorate LOS from E to F for one southbound US-101 ramp during the PM peak hour. No feasible mitigation is available to reduce this impact. Therefore, the impact would be *significant and unavoidable* under cumulative conditions.	PS	No feasible mitigation measures would be available.	SU
UTILITIES/SERVICE SYSTEMS			
Impact 4.11-1 There would be sufficient water supplies available to serve Specific Plan development from existing entitlements and resources, and new or expanded entitlements would not be necessary. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS

Table 2-1 Summary of Impacts and Mitigation Measures

LTS = less than significant; PS = potentially significant; SU = significant and unavoidable

Impact	*Significance Before Mitigation*	*Mitigation Measures*	*Significance After Mitigation*
Impact 4.11-2 Implementation of the proposed project would not require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.11-3 Implementation of the proposed project would not exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.11-4 Implementation of the proposed project would require additional wastewater to be treated, but would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities. The proposed project would not result in inadequate capacity by the wastewater treatment provider to serve the project's projected demand. This is a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.11-5 The proposed project would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS
Impact 4.11-6 Implementation of the proposed project would not require or result in the construction of new energy production or transmission facilities, or expansion of existing facilities, the construction of which could cause a significant environmental impact. This would be a *less-than-significant* impact.	LTS	No mitigation measures would be required.	LTS

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CHAPTER 3 Project Description

The proposed South San Francisco Downtown Station Area Specific Plan (Specific Plan or proposed project) will guide the City in its planning efforts to create a vibrant, transit-supportive, diverse Downtown, particularly the area surrounding the City's Caltrain commuter rail station. The study area includes approximately thirty-five blocks within 0.5 mile of the existing Caltrain station. The Specific Plan crafts a vision for the Downtown core, and identifies an implementation process to achieve City and community goals, including design standards and regulations for future development. The Specific Plan will support transit-oriented development (TOD); create an open space framework; create pedestrian linkages, lanes, and a pedestrian-priority zone; create a new bicycle network; and employ new parking strategies.

3.1 EXISTING PROJECT SITE CHARACTERISTICS

3.1.1 Project Location

South San Francisco lies at the northern end of San Mateo County and is bordered by the cities of Brisbane, Colma, Daly City, Pacifica, and San Bruno. South San Francisco is 9 miles south of San Francisco and abuts the San Francisco International Airport (SFO) at the south-east boundary.

The area covered by the Specific Plan (study area) is defined by a 0.5-mile radius around the Downtown Caltrain station, which is located slightly north of the Airport Boulevard and Grand Avenue intersection and below the U.S. Highway 101 (US-101)-elevated segment and the Grand Avenue overpass. The 0.5-mile radius was altered somewhat to exclude lower-density/hillside residential areas in the north and west where no change is proposed or appropriate, and to exclude areas east of US-101 where newer commercial uses suggest no change is likely during the time period covered by the Specific Plan. The study area boundary includes the South San Francisco Caltrain station and the majority of commercial and civic development in the City's Downtown neighborhood. A portion of the study area extends east of US-101, encompassing much of the East of 101 neighborhood, but excludes the majority of the existing office development east of US-101 and the Gateway neighborhood. The study area is generally bound by Hillside Boulevard and Linden Avenue to the north; Gateway Boulevard and Dubuque Avenue to the east; Railroad Avenue and Canal Street to the south; and Spruce Avenue and Maple Avenue to the west (refer to Figure 3-1 [Project Location and Regional Vicinity]).

3.1.2 Surrounding Land Uses

The study area west of US-101 includes many vacant parcels or surface parking lots. A number of auto-serving or auto–oriented uses occur along the freeway corridor and south of Grand Avenue. Local- or City-serving retail uses are found scattered throughout the area. Grand Avenue is the primary commercial corridor in the study area. Residential uses exist to the north and immediately south of Grand Avenue, with commercial and light industrial uses located along Airport Boulevard and south of Railroad Avenue. The East of 101 subarea of the City, of which a small portion is included in the study

area, is the largest employment district in northern San Mateo County and is home to three key land uses: Business and Technology Park, Business Commercial, and Mixed Industrial.

The Colma Creek Canal is located south of the study area. The canal traverses the City, generally from east to west, and connects to the San Francisco Bay. The canal is channelized in the vicinity of the study area, but supports wetland and riparian vegetation along some areas of the canal.

3.2 PROJECT OBJECTIVES

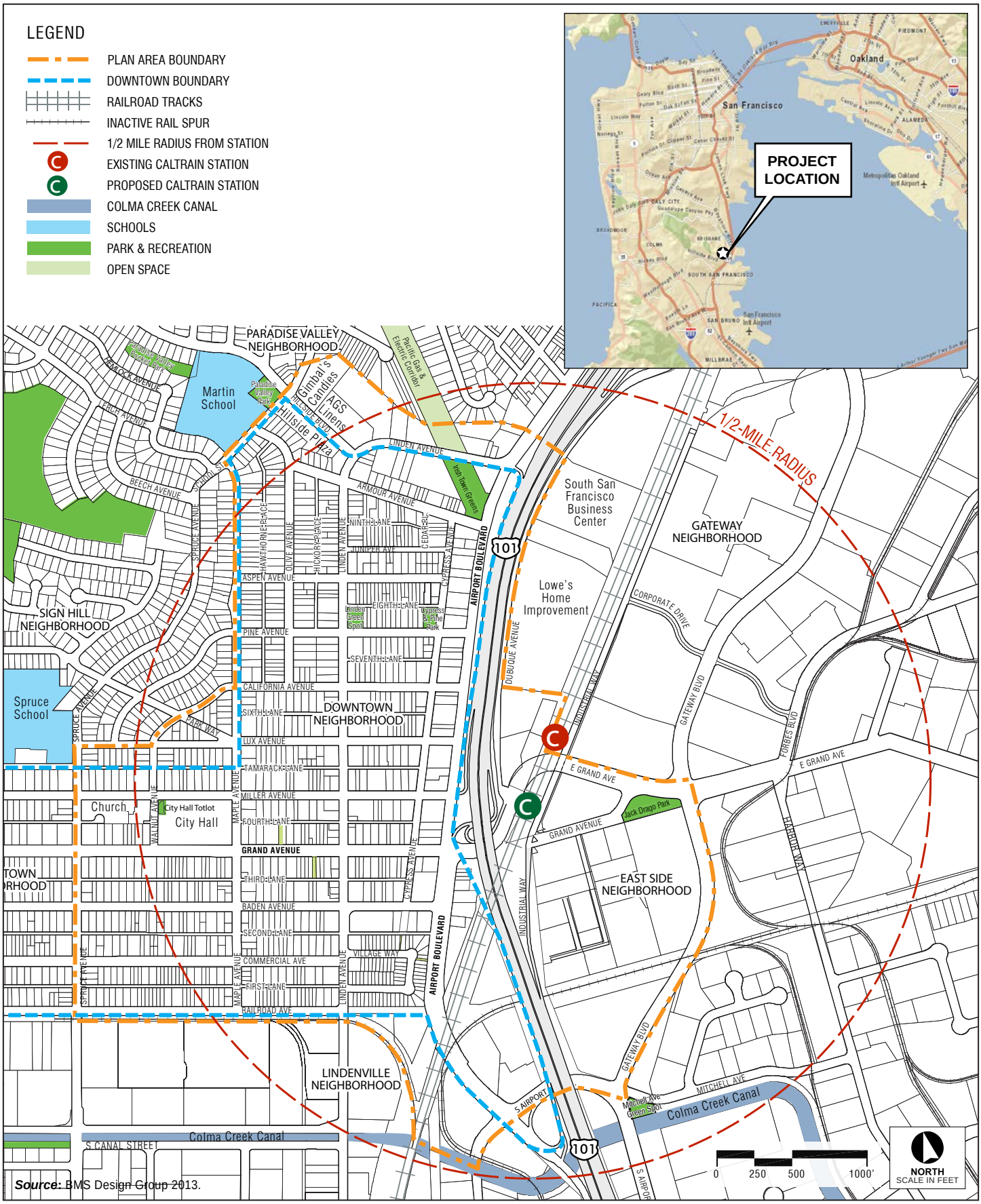
CEQA Guidelines Section 15124 requires that an EIR include a statement of objectives sought by the proposed project. This disclosure assists in developing the range of project alternatives to be investigated in the EIR, as well as providing a rationale for the adoption of a Statement of Overriding Considerations, if one is in fact adopted. Identified below are goals and objectives related to the proposed project as set forth by the City of South San Francisco:

- Revitalize Downtown South San Francisco to be a vibrant and successful community resource and a source of local pride
- Promote new residential, mixed-use and employment uses so as to add a "critical mass" of business patrons and residents to the Downtown, while maintaining a scale and character that are complementary
- Focus new improvements on Grand Avenue to return the historic corridor as the focus of the community and encourage retention of existing and local businesses to protect historic building fabric
- Improve pedestrian and bicycle connections to Caltrain as well as the Downtown with the employment area east of US-101

Community goals and priorities identified during the community outreach process for the Specific Plan identified the following goals:

- Protect and celebrate the historic nature of Downtown
- Improve access to the Caltrain station
- Support local businesses—keep Downtown unique
- Improve east/west connectivity and access to Downtown
- Remove truck traffic from Downtown
- Reduce traffic congestion on Grand Avenue and Airport Boulevard
- Increase the use of alternative travel modes

These community goals and priorities were incorporated into the City's goals and objectives for the Specific Plan.



Source: BMS Design Group 2013.

Figure 3-1
Project Location and Regional Vicinity

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3.3 SPECIFIC PLAN CONTEXT AND BACKGROUND

The City was the recipient of a Metropolitan Transportation Commission/Association of Bay Area Governments Station Area and Land Use Planning (SALUP) grant to support development of the Specific Plan. The process of preparing the Station Area Specific Plan occurred over a 30-month timeframe, starting in February 2012, with a draft made public in summer 2014. Final adoption of the plan is anticipated for late 2014/early 2015.

The draft Specific Plan considered two land use alternatives, labeled Alternative A and Alternative B. Alternative A represented a mixed-use village concept, which would offer a mix of Office/Research and Development (R&D), residential and retail uses in the east neighborhood of the study area and maintain the zoning of the Downtown Core per existing General Plan designations, which would result in very little change. Alternative B was chosen as the preferred alternative and is analyzed as the proposed project in this EIR. Alternative A is analyzed in Chapter 6 (Alternatives to the Proposed Project) as Alternative 2.

As a practical matter, actual development under any area plan is substantially less than the entitlement or theoretical limit of development because of building and zoning restrictions as well as several economic factors and market forces. The Market Demand Analysis[3] determined that a reasonably foreseeable build-out of the Specific Plan over the 20-year planning period would be 25 percent of parcels in the study area. Therefore, this EIR assumes that 25 percent of the parcels within the study area will be redeveloped in this 20-year timeframe.

3.4 PROJECT CHARACTERISTICS

Compared to development under the General Plan, the Specific Plan would yield significant amounts of new residential and employment uses within the study area. However, General Plan amendments and Zoning amendments would be adopted concurrent with the adoption of the Specific Plan.

The following General Plan and Zoning amendments would be required to accommodate the Specific Plan:

<u>General Plan Amendments</u>

- Modify the General Plan Land Use Diagram to reflect the land uses shown on Figure 4.01 (Land Use Plan) of the Specific Plan.
- Modify Tables 2.2-1 and 2.2-2 (Standards for Density and Development Intensity) and land use classification text to reflect changes in intensity and density.
- Modify Figure 2-3 (Special Area Height Limitations) to reflect heights shown on Figure 5.02 of the Specific Plan.
- Modify Table 2.4-1 (Land Use Changes and Intensification; Combined Approved and Additional Development Under the General Plan) to reflect additional development under the Specific Plan.
- Modify Table 2.4-2 (Buildout Population) to reflect additional build-out population.

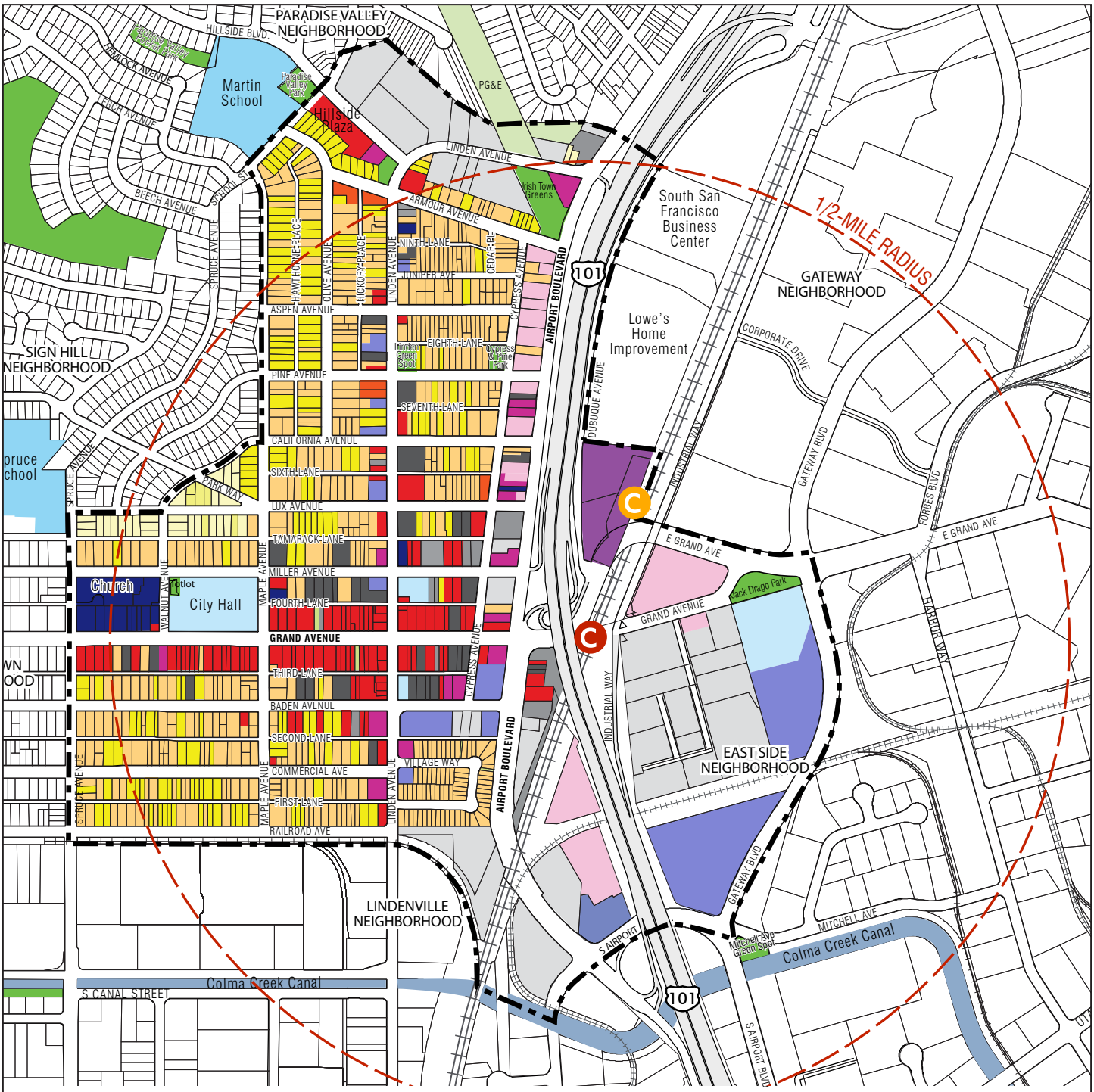
[3] BAE Urban Economics, *South San Francisco Downtown Station Area Plan Market Demand Analysis* (August 24, 2012).

- Modify Table 2.4-3 (Existing and Buildout Employment by Land Use, 1997-Buildout) to reflect additional build-out employment.
- Modify Table 2.4-4 (Jobs/Housing Balance) to reflect updated projected Jobs/Employed Residents ratio.
- Modify Figure 2-7 (Specific Area Plans and Redevelopment Areas) to show the Downtown Station Area Specific Plan boundaries.
- Modify text within Section 2.5 (Area and Specific Plans) to include the Downtown Station Area Specific Plan.
- Modify text within Section 3.1 (Downtown Planning Subarea) to incorporate Specific Plan policies by reference. Also modify Table 3.1-1 (Downtown Development, Population and Employment under the General Plan) to include build-out of Specific Plan.
- Modify Chapter 4 (Transportation) to include recommended street and bikeway improvements in the Specific Plan.

Zoning Amendments

- Zoning District: add the Downtown Station Area Specific Plan District into Division III (Specific and Area Plan Districts).
- District Purpose: add a reference to the Specific Plan in District Purpose to identify the intention regarding the future of the Downtown Station Area.
- Map: include a map of the Specific Plan area that illustrates the land uses within the area.
- Land Use Regulations: Show permitted and conditionally permitted uses and development standards within the land use districts.
- Development and Design Regulations and Standards: include standards for building scale, height, setbacks, and other considerations, including the standards identified in the Specific Plan.

Existing land uses in the study area are provided in Figure 3-2 (Existing Land Uses), and Figure 3-3 (Proposed Land Use Designations) shows the land use designations proposed in the Specific Plan A comparison of existing and proposed land uses is also provided in Table 3-1 (Existing and Proposed Land Uses). As shown in Table 3-1, the types of land uses accommodated in the study area under the Specific Plan would be similar to existing conditions. However, these uses would be intensified, particularly within 0.25 mile of the Caltrain station. Within this zone a Downtown Transit Core Designation is proposed, allowing up to 100 dwelling units per acre and a maximum floor-area ratio (FAR) of 6.0. Grand Avenue would continue to be the historic core of the City and building heights would be limited to about 45 feet directly fronting Grand Avenue to protect the pedestrian and historic scale of Grand Avenue. Heights off Grand Avenue in this zone would be allowed up to 85 feet to allow for higher intensity development. Proposed allowable building heights in the entire study area are provided in Figure 3-4 (Proposed Height Limits).



Source: BMS Design Group 2013.

Figure 3-2
Existing Land Uses

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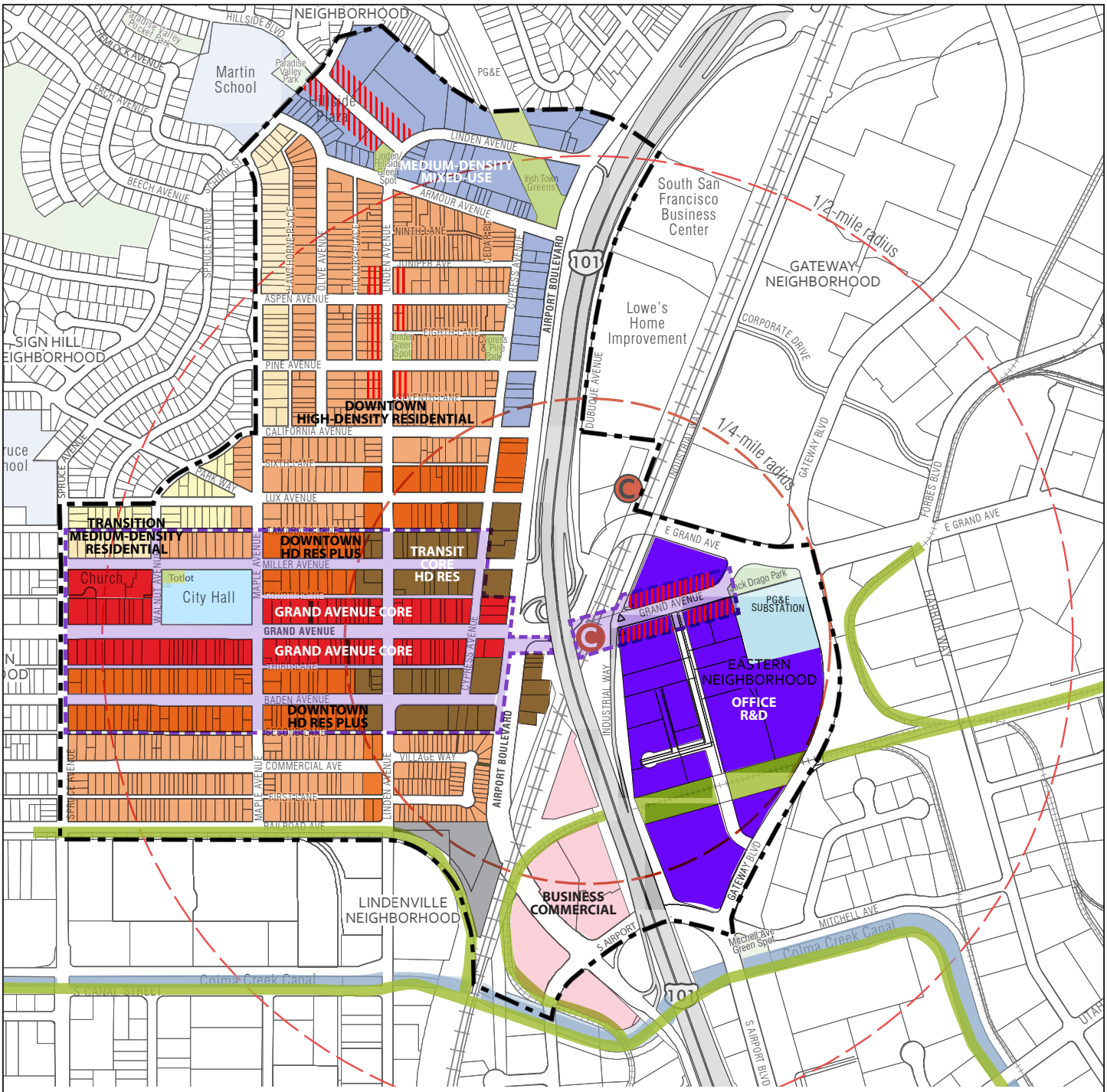

Source: BMS Design Group 2013.

Figure 3-3

Proposed Land Use Designations

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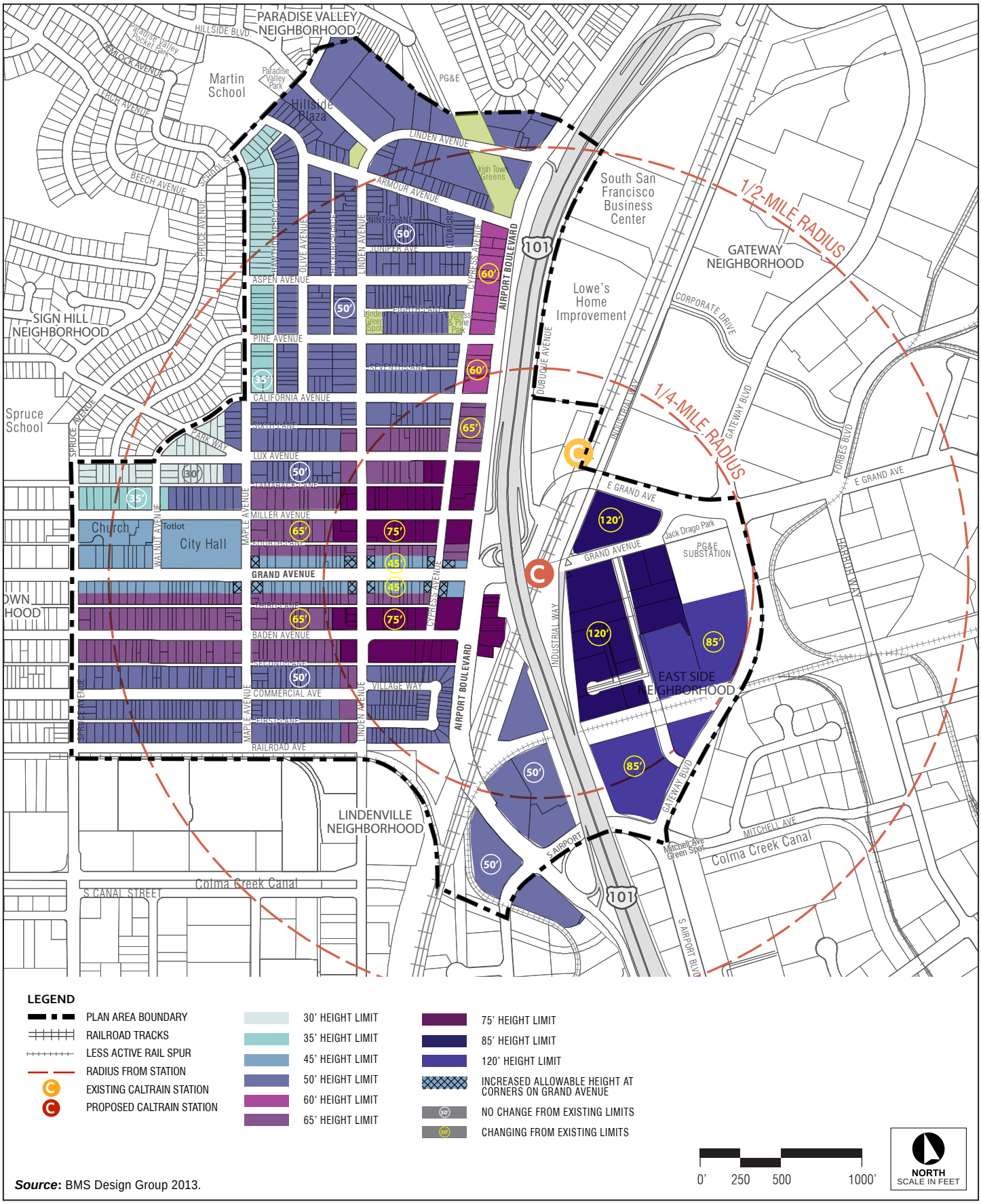

Source: BMS Design Group 2013.

Figure 3-4
Proposed Height Limits

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Table 3-1 Existing and Proposed Land Uses

Land Use Designation	*Existing Conditions*	*Additional Development Under Specific Plan*
Residential	1,400 dwelling units	1,435 dwelling units
Downtown Commercial	602,643 sf	—
Auto-serving Commercial	54,664 sf	—
Business Commercial	129,884 sf	511,780 sf
Hotel	285,165 sf	—
Industrial	797,055 sf	21,250 sf
Institutional	150,142 sf	—
Commercial	—	268,800 sf
Office	—	—
Office/R&D	—	1,185,049 sf

SOURCE: City of South San Francisco, *South San Francisco Downtown Specific Plan*, Draft (2014).
sf = square feet

The remainder of the Downtown area, which includes the Grand Avenue Core and the Downtown Residential Core, from Tamarack Lane south to Second Lane, would provide for higher intensities than currently allowed, up to 65 feet in height and up to 80 dwelling units per acre. Densities of up to 100 would be permitted in the Downtown Residential Core, provided certain specific criteria are met, and for the inclusion of affordable senior housing a density of up to 125 dwelling units would be allowed. This district would have a 3.0 FAR, with incentive-based bonuses for an FAR up to 3.25 for affordable senior housing projects. Along Airport Boulevard and south of Armour Avenue, a new medium-density mixed-use designation will encourage higher-density residential (up to 40 dwelling units per acre) as well as business commercial at up to 0.5 FAR. No land use changes are proposed for the Business Commercial designations currently applied to the zone framed by US-101, the rail tracks, and Airport Boulevard and the area along Airport Boulevard, north of Armour Avenue. The East of US-101 area would continue to be designated a high intensity employment center, and, similar to existing conditions, no residential use would be allowed. However, the maximum allowable density would increase from 2.0 FAR to approximately 3.5 FAR, if specific criteria are met. Assuming that 25 percent of the parcels in the study area would be redeveloped over the lifetime of the plan, the Specific Plan would accommodate a net increase of approximately 1,435 dwelling units, 0.8 million square feet (sf) of commercial uses, 21,000 sf of industrial uses, and 1.2 million sf of new office/research and development uses.

Circulation improvements would also be implemented throughout the study area to balance travel modes, to improve access between Downtown and the East Side neighborhood, improve street connectivity, reduce impacts from regional traffic, and provide transit enhancements from Downtown to BART and the South San Francisco ferry terminal. In order to ensure accessibility to the Caltrain station, the Specific Plan fully endorses plans already developed for the reconfiguration of the station extending the platform south of its current location. This plan also includes a below-grade pedestrian/bicycle underpass that would be constructed to connect Grand Avenue on either side of US-101, as shown in Figure 3-3. This pedestrian/bicycle undercrossing from the Caltrain station would be located at the new

intersection of the Grand Avenue extension and the existing Industrial Way. New roadways are also proposed: Railroad Avenue is proposed to be extended east to connect to Gateway Boulevard, and a new roadway is proposed to connect Grand Avenue to the Railroad Avenue extension and Gateway Boulevard.

As shown in Figure 3-3, a pedestrian-priority area is proposed surrounding Grand Avenue. The zone includes the Downtown Commercial Core from Spruce Avenue to Airport Boulevard and extends to the future Caltrain plaza and to the eastern neighborhood. The zone includes the three major east/west streets: Grand Avenue (both sides of US-101), Miller Avenue, and Baden Avenue, and portions of Linden Avenue, Maple Avenue, Cypress Avenue, and Airport Boulevard. Street trees and pedestrian lighting are encouraged within the pedestrian-priority zone, and intersection safety improvements would be prioritized within the zone.

Three public plaza areas are proposed within the study area. At City Hall, reconfiguration of the grassy areas along Grand Avenue would result in usable flat area that would be furnished with seating. In addition, the block of Grand Avenue facing City Hall would be a periodic event space that could be temporarily closed to through traffic. Special paving and lighting would be used to create an event space. A plaza at the relocated Caltrain station would include landscaping, decorative lighting, seat walls, and an interpretive display. A public space would also be located in the vicinity of the neighborhood center on Linden Avenue around Aspen Avenue and Pine Avenue. This would be a location for local services, cafes, restaurants, with wider sidewalks, special paving in the streets and sidewalks, and lighting to add character and slow traffic in the area.

3.5 PROJECT IMPLEMENTATION

The objectives of the proposed project would be implemented through Specific Plan policies and programs as well as recommendations enacted concurrently with Specific Plan adoption (e.g., zone changes) including a number of long-range programs that are anticipated to be adopted incrementally as funding sources become available. The individual Specific Plan guiding principles and policies can be found in Specific Plan Chapters 4 through 7, and implementation actions are described in Specific Plan Chapter 8.

3.6 INTENDED USES OF THIS EIR

This EIR is a program EIR prepared pursuant to CEQA Guidelines Section 15168. The document is intended to act as an analytical superstructure for subsequent, more detailed analyses associated with individual discretionary project applications consistent with the proposed Specific Plan. One of the City's goals in preparing the current document is to focus new information that would be required in the future at the "project level" of planning and environmental review by dealing with cumulative impacts, regional considerations, and similar big-picture issues as comprehensively as possible in this document. The City recognizes that this document does not include the level of detail necessary to qualify as a project EIR, and anticipates that future projects will require more detailed environmental review at the time they are proposed.

Future site-specific approvals may be evaluated pursuant to the rules for tiering set forth in CEQA Guidelines Section 15152. "[T]iering is a process by which agencies can adopt programs, plans, policies, or ordinances with EIRs focusing on 'the big picture,' and can then use streamlined CEQA review for individual projects that are consistent with such … [first tier decisions] and are … consistent with local agencies' governing general plans and zoning" (*Koster v. County of San Joaquin* [1996] 47 Cal. App.4th 29, 36). Before deciding to rely in part on a first-tier EIR in connection with a site-specific project, a lead agency must prepare an "initial study or other analysis" to assist it in determining whether the project may cause any significant impacts that were not "adequately addressed" in a prior EIR (CEQA Guidelines Section 15152(f), PRC Section 21094(c)). Where this analysis finds such significant impacts, an EIR may be required for the later project. In contrast, a negative declaration or mitigated negative declaration may be prepared where there is no substantial evidence that the project may have significant impacts not adequately addressed in the prior EIR, or where project revisions accepted by the proponent or mitigation imposed by the City avoid any such new significant impacts or mitigate them to a point where they are not significant.

CEQA Guidelines Section 15152 further provides that, where a first-tier EIR has "adequately addressed" the subject of cumulative impacts, such impacts need not be revisited in subsequent documents. Furthermore, subsequent documents may focus the examination of impacts on those that "were not examined as significant effects" in the prior EIR or "[a]re susceptible to substantial reduction or avoidance by the choice of specific revisions in the project, by the imposition of conditions, or other means." In general:

> [s]ignificant environmental effects have been "adequately addressed" if the lead agency determines that:
>
> (A) they have been mitigated or avoided as a result of the prior environmental impact report and findings adopted in connection with that prior environmental impact report; or
>
> (B) they have been examined at a sufficient level of detail in the prior environmental impact report to enable those effects to be mitigated or avoided by site specific revisions, the imposition of conditions, or by other means in connection with the approval of the later project.

Here, as noted above, whenever project proponents within the City submit applications for site-specific approvals in the study area, the City will prepare initial studies in order to determine whether the proposal would cause any significant impacts that were not adequately addressed in this EIR. Thus, the analyses for these site-specific actions will focus on impacts that cannot be "avoided or mitigated" by mitigation measures that either *(i)* were adopted in connection with the proposed Specific Plan or *(ii)* were formulated based on information in this EIR.

3.7 PROPOSED PROJECT ALTERNATIVES

In accordance with CEQA Guidelines Section 15126.6, alternatives to the Specific Plan are analyzed. Detailed information regarding the project alternatives is provided in Chapter 6 (Alternatives to the Proposed Project) of this EIR. These alternatives include the following:

- Alternative 1: No Project/Continuation of Existing General Plan Alternative
- Alternative 2: Mixed Use Village Alternative

3.8 PUBLIC ACTIONS AND APPROVALS REQUIRED

Consistent with CEQA Guidelines Section 15065(b), the City of South San Francisco is the lead agency for the proposed project. As such, this EIR will be used by the City to evaluate the environmental impacts created by implementation of the Specific Plan and to develop conditions of approval that would address those impacts for which mitigation measures are proposed in the EIR. The City of South San Francisco City Council will consider approval of the proposed project and certification of the proposed project's Final EIR, along with any necessary amendments to the General Plan and Zoning Ordinance. In addition, the City Council would consider approval of a Statement of Overriding Considerations, if necessary.

3.8.1 State and Local Agencies

In addition to the City of South San Francisco (lead agency), there may be federal, state, and regional agencies that have discretionary or review authority over the project and/or specific aspects of development pursuant to the proposed project. The responsible agencies will also rely on this EIR when acting on such subsequent specific projects. Those federal, state, or local agencies that would rely upon the information contained in this EIR when considering approval may include, but are not necessarily limited to, the following:

- State Water Resources Control Board (General Construction Activity Stormwater Permit)
- Peninsula Corridor Joint Powers Board (Caltrain)
- California Department of Transportation (Caltrans)
- California Department of Toxic Substances Control (DTSC)
- Regional Water Quality Control Board (RWQCB)
- Bay Area Air Quality Management District (BAAQMD)
- Federal Aviation Administration (FAA)

3.9 CUMULATIVE DEVELOPMENT SCENARIO

CEQA Guidelines Section 15355 defines "cumulative impacts" as "two or more individual effects that, when considered together, are considerable or that compound or increase other environmental impacts." In general, these impacts occur in conjunction with other related developments whose impacts might compound or interrelate with those of the project under review.

In order to analyze the cumulative impacts of the project in combination with existing development and other expected future growth, the amount and location of growth expected to occur (in addition to the proposed project) must be considered. As stated in CEQA Guidelines Section 15130(b), this reasonably foreseeable growth may be based on either of the following, or a combination thereof:

- A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency

- A summary of projections contained in an adopted general plan or related planning document which is designed to evaluate regional or area wide conditions

For the purposes of this EIR, the potential cumulative effects of the proposed project are based upon build-out of the South San Francisco General Plan, including cumulative projects in the East of 101 Area Plan as shown in Table 3-2 (Cumulative Projects—Planned East of 101 Developments by 2035) depending upon the specific impact being analyzed. For some resources, such as geology and aesthetics, where impacts are site-specific, only those cumulative projects in the immediate vicinity of the study area are considered. For other resources, such as hydrology, the entire watershed into which runoff from the City drains is the cumulative geographic context. The geographic context for the cumulative impact analysis is specified in each section. The list of related projects in the East 101 Area Plan is provided in Table 3-2 (Cumulative Projects—Planned East of 101 Development by 2035).

Table 3-2 Cumulative Projects—Planned East of 101 Development by 2035

Land Use	*Type*	*2009 GFA (sf)*	*2015 GFA (sf)*	*2035 GFA (sf)*	*2035–2009 Increase in GFA (sf)*	*2035–2015 Increase in GFA (sf)*
Genentech Overlay Redevelopment Land Use	Office	1,008,801	1,160,801	2,629,395	1,620,594	1,468,594
	Lab	1,012,674	1,455,674	2,002,482	989,808	546,808
	Manufacturing	1,482,213	1,482,213	1,041,668	(440,545)	(440,545)
	Amenities	69,500	69,500	322,000	252,500	252,500
Genentech Triangle Land Use	Hotel	—	350	350	350	—
	R&D	—	372,000	372,000	372,000	—
	Office	—	248,000	248,000	248,000	—
Oyster Point Land Use	Commercial	—	10,000	50,000	50,000	40,000
	Hotel	102	—	350	248	350
	R&D	680,499	1,040,499	1,710,230	1,029,731	669,731
	Office	—	240,000	920,000	920,000	680,000
Rest of East of 101 Land Use	Commercial	238,002	364,502	673,302	435,300	308,800
	Home Center	165,000	290,794	290,794	125,794	—
	Hotel[a]	2,890	3,385	3,385	495	—
	R&D	5,497,772	7,824,074	8,638,902	3,141,130	814,828
	Office	—	360,000	1,230,570	1,230,570	870,570
	Manufacturing	8,033,490	8,019,777	11,291,567	3,258,077	3,271,790
	Quality Restaurant	—	—	20,000	20,000	20,000
Total East of 101 Land Use[b]		***18,187,951***	***22,937,834***	***31,440,910***	***13,252,959***	***8,503,076***

SOURCE: TJKM Transportation Consultants, *Traffic Study for the East of 101 Area* (January 28, 2011).
GFA = gross floor area (in square feet); sf = square feet; (#) = reduction in GFA
Adjusted to exclude Oyster Point Land Use.
a. Hotel Rooms
b. Excluding Hotel Rooms

3.10 REFERENCES

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?NID=360.

TJKM Transportation Consultants. 2011. *Traffic Study for the East of 101 Area*, January 28.

CHAPTER 4 Environmental Analysis

4.0 INTRODUCTION TO THE ANALYSIS

This chapter contains a discussion of the possible environmental effects of the proposed project for the specific issue areas that were identified through the Initial Study/Notice of Preparation (see Appendix A) as having potentially significant impacts. This chapter is the primary component of the EIR, as it provides information the on existing environmental setting, the regulatory framework, the type and magnitude of the proposed project's potential individual and cumulative environmental impacts, and feasible mitigation measures that could reduce or avoid such impacts. The existing environmental setting component of the analysis defines the environmental conditions as they exist on and near the study area, while project impacts are defined as the proposed project's physical effect on the existing environment. Mitigation measures are designed to reduce the proposed project's potential impact. The purpose of this section is to inform readers of the type and magnitude of the project's environmental impacts and how such impacts would affect the existing environment.

A "significant effect" is defined by CEQA Guidelines Section 15382 as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant."

The assessment of each issue area begins with a discussion of the existing environmental setting, as well as a discussion of the regulatory framework relevant to that issue area. Following the setting is a discussion of the proposed project's impacts relative to the issue area. Within the impact analysis, the first subsection identifies the methodologies used and the "Thresholds of Significance," which are those criteria used to determine whether potential effects are significant. The next subsection analyzes each impact of the proposed project against the threshold of significance, identifies feasible mitigation measures proposed for significant impacts, and describes the level of significance after mitigation.

The impact analysis concludes with a discussion of cumulative effects, which evaluates the impacts associated with the proposed project in conjunction with other past, present, and probable future development in areas causing related impacts.

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4.1 AESTHETICS

This section of the EIR analyzes the potential environmental effects on aesthetics from implementation of the proposed project. No comment letters addressing aesthetics were received in response to the notice of preparation (NOP) circulated for the proposed project.

Data for this section were taken from the South San Francisco General Plan (1999) and the East of 101 Area Plan (1994). Full reference-list entries for all cited materials are provided in Section 4.1.5 (References).

4.1.1 Environmental Setting

Visual Character of Study Area

The City of South San Francisco is located within a broad valley in the northern end of San Mateo County with adjoining hillsides formed by the San Bruno Mountains on the north and the Coast Range on the west, both of which slope toward San Francisco Bay. Hills are visible from all parts of the City, and Sign Hill and San Bruno Mountain (which is located outside of City limits) in the distance are visual landmarks. The topography generally increases from the lowlands near San Francisco Bay to the upland zone in the middle of the valley and then increases greatly to the hillside zone on the sides of the valley. The Downtown area is characterized by gently sloping streets, which allows for views of the City and beyond. The City straddles the north/south-running US-101 and Interstate 280 (I-280) freeways on the east and west, respectively. Additionally, two fixed rail lines serve the City: Bay Area Rapid Transit (BART), with a station on El Camino Real, and Caltrain, with a station just east of Downtown.

The Station Area Specific Plan study area (study area) includes approximately thirty-five blocks within a 0.5-mile radius of the South San Francisco Caltrain station and also includes the majority of commercial and civic development in the City's Downtown Neighborhood. A mix of Downtown residential uses (low, medium, and high densities), residential uses (low and medium densities), Downtown commercial use, business commercial use, auto-serving commercial use, auto-oriented commercial use, mixed industrial use, public and institutional uses, parks and recreation uses, vacant parcels, and a transportation center currently exist within the study area. The study area primarily encompasses parts of two planning subareas: Downtown and East of 101. While the two planning subareas that comprise the study area have major differences in terms of visual character, both subareas have many vacant or underutilized parcels and vacant land, which represent opportunities for new development.

Downtown Subarea

The Downtown subarea is the historic core of the City where older buildings, some of historical or architectural interest, dominate. Some of these older buildings date from around the 1900s, while others were developed during the mid-twentieth century. In the Downtown subarea, buildings are generally small in scale, usually one to three stories high and surface parking lots are frequent, which creates discrepancies in the development fabric. In the Downtown landscape, City Hall, which was completed in the 1920s and remains largely in its original configuration, is the center point of the area due to its

impressive scale and high setting above Grand Avenue. Additionally, the Downtown subarea is defined by a street grid network that was established when the City began to grow around the local rail station. This street grid network has facilitated fine-grained, scaled development, with relatively narrow blocks and intermediate lanes in some locations, resulting in a walkable, pedestrian scale.

Development in the Downtown subarea has remained focused around Grand Avenue as the commercial heart of the area, with a focus on retail uses. Aesthetic improvements to Grand Avenue include street trees and large, double acorn lights with historic character. Grand Avenue is the only street within the Downtown subarea to have street trees, while all other streets remain sparse with limited landscaping. Aesthetic themes of the Downtown subarea include brick accent paving on the sidewalks, which adds some consistency throughout the area, as well as brick crosswalks, which define the intersections. However, the overall aesthetic character of the Downtown is varied and lacks cohesive streetscaping.

East of 101 Subarea

The East of 101 subarea is the largest employment district in northern San Mateo County and has been developed more recently with an entirely different pattern than the Downtown subarea. The East of 101 subarea is characterized by a range of business commercial, mixed industrial, and service designations, which include smaller industrial and service buildings, often accompanied with outdoor parking or service areas. However, there is inconsistency between building heights, as the tallest building in this area is 160 feet, while the average building is much shorter. Older industrial areas have transitioned to modern research and office parks with wide curving roadways and minimal pedestrian or bicycle amenities. Additionally, the East of 101 subarea has wide streets, large buildings footprints, and frequent surface parking lots, which create an environment that is not conducive to pedestrian traffic.

US-101 separates the Downtown and East of 101 subareas, as it runs from north to south through the City. The Caltrain station is currently located below a roadway overpass and adjacent to US-101 and its ramps. Due to this location, the existing Caltrain station is difficult to locate and negotiating the complex network of streets and freeway ramps to get to the station is challenging for every mode of transportation. Additionally, the connectivity between the Caltrain station and the Downtown subarea is especially lacking due to the barrier of US-101, which splits the two locations. The location of the existing Caltrain station is the biggest impediment to transit use within the South San Francisco station area.

Surrounding Land Uses

The Station Area Specific Plan is located toward the eastern side of the City and is surrounded by existing urban development. Surrounding uses include the following land use designations:

- **North:** low density residential (the Paradise Valley Neighborhood) and open space uses
- **East:** business commercial and business and technology park uses
- **South:** mixed industrial and business commercial uses
- **West:** Downtown high, medium, and low residential, low-density residential, service, light manufacturing and warehouse, and park and recreation uses

A prominent feature of South San Francisco is Sign Hill. Sign Hill is located approximately 1 mile northwest of the Specific Plan study area. Sign Hill is an open space area that contains approximately 2 miles of hiking trails and contains South San Francisco's most prominent image, signage constructed out of 60-foot-tall concrete lettering that reads "South San Francisco/The Industrial City". Other important visual features of the City include El Camino Real, the San Francisco Bay front, and BART rail line.

Existing Viewsheds

A viewshed is a geographic area composed of land, water, biotic, and/or cultural elements that may be seen from one or more viewpoints and that has inherent scenic qualities and/or aesthetic values as determined by those who view it. Views within and surrounding the Specific Plan study area consist of urban residential and commercial development with associated surface parking areas as well as open space hillside areas, including Sign Hill and San Bruno Mountain from certain areas within the study area.

Light and Glare

The study area and surrounding area is urban in nature, the existing area consistently generates and is exposed to artificial light. A variety of sources of artificial light exist in the study area, including streetlights, automobile headlights, security lights associated with buildings and parking lots, and interior and exterior lighting from commercial and office buildings. These light sources are most noticeable during the nighttime hours.

Glare results from sharply reflected light caused by sunlight or artificial light reflecting from highly finished surfaces such as window glass or brightly colored surfaces. Glare is a common phenomenon in the study area, mainly due to the high proportion of days per year with direct sunlight and the highly urbanized nature of the area, which provides many reflective surfaces. Glare from very bright artificial surfaces can be considered a nuisance and, under very unusual circumstances, even a hazard.

Major sources of light and glare within the study area include light from street and parking lot lights, headlights from vehicles, security lighting, and indoor lighting. The types of land uses that are typically sensitive to excess light and glare include homes, hospitals, senior housing, and other types of uses where excessive light may disrupt sleep. In addition, light and glare may interfere with the vision of drivers.

Shade and Shadow

The existing low- and medium-rise buildings within the study area presently create limited shade and shadow patterns that are contained within close proximity to each building. Additionally, the few high-rise buildings within the study area create more extensive shade and shadow patterns on other buildings in their immediate vicinity and not on open space.

4.1.2 Regulatory Framework

Federal

There are no federal regulations related to aesthetics that apply to the proposed project.

State

The California Department of Transportation (Caltrans) designates scenic highway corridors. The purpose of the Caltrans scenic highway program is to protect and enhance the natural scenic beauty of California highways and adjacent corridors, through special conservation treatment. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been officially designated.

Within the City of South San Francisco, sections of I-280 have been designated as scenic corridors under the State Scenic Highway program; however, these sections are not in the vicinity of the study area, which is not visible from I-280. Additionally, US-101 has not been designated or identified as eligible for designation in the vicinity of the study area.

Local

The City of South San Francisco General Plan Land Use Element (1999) contains policies directly related to visual resources that would apply to the study area. The relevant policies are identified below:

Guiding Policies

Policy 2-G-1 Preserve the scale and character of established neighborhoods, and protect residents from changes in non-residential areas.

Policy 2-G-2 Maintain a balanced land use program that provides opportunities for continued economic growth, and building intensities that reflect South San Francisco's prominent inner bay location and excellent regional access.

Policy 2-G-5 Maintain Downtown as the City's physical and symbolic center, and a focus of residential, commercial, and entertainment activities.

Policy 2-G-7 Encourage mixed-use residential, retail, and office development in centers where they would support transit, in locations where they would provide increased access to neighborhoods that currently lack such facilities, and in corridors where such developments can help foster identity and vitality.

Implementing Policies

Policy 2-I-2 Established height limitations for specific areas as delineated by the Land Use Element (Figure 2-3). For these specific areas, do not regulate heights separately by underlying base district use.

Policy 2-I-3 Undertake planned development for unique projects or as a means to achieve high community design standards, not to circumvent development intensity standards.

Policy 2-I-6 Undertake a comprehensive review of parking standards and establish criteria for reduced parking for mixed-use developments, for development that meets specified TDM criteria, and Medium- and High-Density residential development.

Policy 2-I-7 Establish a comprehensive design standards and guidelines strategy.

Policy 2-I-8 As part of establishment of design guidelines and standards, and design review, improve the community orientation of new development.

Policy 2-I-9 Ensure that any design and development standards and guidelines that are adopted reflect the unique patterns and characteristics of individual neighborhoods.

Policy 2-I-17 Steep hillside areas in excess of a 30 percent grade should be retained in their natural state. Development of hillside sites should follow existing contours to the greatest extent possible. Grading should be kept to a minimum.

Policy 2-I-21 Initiate a study to increase provisions of public art throughout the community through imposition of either on-site improvements or in-lieu fees.

In addition to the City of South San Francisco General Plan Land Use Element, the City of South San Francisco General Plan Planning Sub-Area Element: Downtown (1999) consists of policies related to the redevelopment of the Downtown area. The relevant policies are identified below:

Guiding Policies

Policy 3.1-G-1 Promote Downtown's vitality and economic well-being, and its presence as the city's center.

Policy 3.1-G-1 Encourage development of Downtown as a pedestrian-friendly mixed-use activity center with retail and visitor-oriented uses, business and personal services, government and professional offices, civic uses, and a variety of residential types and densities.

Policy 3.1-G-3 Promote infill development, intensification, and reuse of currently underutilized sites.

Policy 3.1-G-4 Enhance linkages between Downtown and transit centers, and increased street connectivity with the surrounding neighborhoods.

Implementing Policies

Policy 3.1-I-1 Maintain land uses and development intensities in Downtown in accordance with Table 3.1-2 (Planning Sub-Area: Downtown document).

Policy 3.1-I-2 Prohibit manufacturing, warehouses, and marginal uses such as bars or adult entertainment, as well as additional single-room occupancy units in Downtown.

Policy 3.1-I-3 Do not permit any commercial and office uses in areas designated Downtown Residential.

Policy 3.1-I-4 Establish a height overlay zone in the Municipal Code corresponding to the standards depicted in Figure 2-3 (Planning Sub-Area: Downtown document). Do not maintain separate height requirements tied to underlying land uses. (This will help attain heights appropriate to individual corridors, rather than reflecting the variation that will result from the application of height requirements tied to individual land uses).

Policy 3.1-I-5 Establish development standards in the Municipal Code to reinforce Downtown's traditional development pattern. These should include:

- Maximum set-backs or build-to lines for development in the areas designated as Downtown Commercial;
- Reduced set-back and open space requirements for Downtown Residential areas;
- Increased minimum lot-size requirements for Downtown Residential areas;
- Increased minimum lot-size requirements for sites designated as Downtown High and Medium Density Residential; and
- Reduce off-street parking standards.

Policy 3.1-I-7 Undertake a Downtown streetscape improvement program, which would include:

- Signage or banners along the east side of Airport Boulevard to announce Downtown and the auto row from US-101;
- Signage for the new multi-modal transportation center at the southeast corner of Grand Avenue/Airport Boulevard;
- Tree planting, especially along Linden Avenue, Maple Avenue, and Spruce Avenue, and Miller; Grand; and Commercial Avenues; and
- Vegetation along Railroad Avenue to provide a buffer between Downtown residential uses and industrial areas to the south.

Policy 3.1-I-8 Improve pedestrian connections between the new multi-modal transportation center and Downtown through techniques such as sidewalk bulbing, lighting improvements, and signage.

Policy 3.1-I-9 Establish design and signage standards for development along Grand and Linden Avenues.

Policy 3.1-I-10 Require all development in Downtown to either meet the established off-street parking requirements, or contribute an appropriate share to the Downtown Parking District to mitigate impacts associated with the development. (Many recent developments in Downtown have neither provided off-street parking, nor contribute any monies to the Downtown Parking District, because findings that result in exemptions allowed in the City's Zoning Ordinance have been easy to make. Section 20.74.080 of the City's Zoning Ordinance will need to be amended to conform to this policy).

Regarding the East of 101 area, of which the most western portion is included in the study area, the General Plan Land Use Element identifies the following policies:

Guiding Policies

Policy 3.5-G-1 Provide appropriate settings for a diverse range of non-residential uses.

Policy 3.5-G-2 Direct and actively participate in shaping the design and urban character of the East of 101 area.

Policy 3.5-G-3 Promote campus-style biotechnology, high-technology, and research and development uses.

The City of South San Francisco General Plan Parks, Public Facilities, and Services Element (1999) contains policies related to the necessity of parks, recreational facilities, and open spaces within the City's urban environment. The relevant policies are identified below:

Guiding Policies

Policy 5.1-G-1 Develop additional parkland in the city, particularly in areas lacking these facilities, to meet the standards of required park acreage for new residents and employees.

Policy 5.1-G-3 Provide a comprehensive and integrated network of parks and open space; improve access to existing facilities where feasible.

Policy 5.1-G-5 Develop linear parks in conjunction with major infrastructure improvements and along existing public utilities and transportation right-of-ways.

Implementing Policies

Policy 5.1-I-2 Maintain parkland standards of 3.0 acres of community and neighborhood parks per 1,000 new residents, and of 0.5 acres of parkland per 1,000 new employees, to be located in the employment area.

Consistency Analysis

The Specific Plan is intended to facilitate and guide the City of South San Francisco in its planning efforts to create a vibrant, transit-supportive, diverse Downtown. The Specific Plan studies opportunities, crafts a vision for the Downtown core, and identifies an implementation process to achieve the City's goals. The Specific Plan would provide connectivity to the Downtown and Caltrans station area, encourage long-term development that is transit-supportive and provide accessibility for all community members. Design standards would be developed to enable the City to guide further development in the public and private realms within the study area. As shown above, the three General Plan Elements pertaining to the Specific Plan (Land Use, Planning Sub-Area Element: Downtown, East of 101 and Parks, Public Facilities, and Services) state the importance of maintaining the Downtown character while redeveloping the area to be consistent with transit-oriented Downtown standards. Redevelopment would comply with policies related to improving streetscaping, consistent building heights, parking requirements, the development pattern, and building patterns/design. The Specific Plan proposes new land uses within the study area in conjunction with modifications to the General Plan Land Use Element to reflect the new land use designations. In addition, the Zoning Ordinance would provide a detailed account of all allowed uses within the new land use designations, as well as for those land use designations which would not change. The Specific Plan contains policies and standards to improve the development design pattern between the Downtown and East of 101 subarea to ensure one cohesive community with emphasis on the Caltrain station. The Specific Plan focuses on five areas that represent prime opportunities for change: Grand Avenue; transit-oriented Downtown development; eastern Downtown employment district; Caltrain station platform extension and Grand Avenue extension; and Downtown public realm improvements. Four core areas are identified in the proposed land use plan, including the Downtown residential core, the Downtown transit core, the Grand Avenue core, and the Transit office/R&D core, which is located immediately east of the Caltrain station. Compared to the General Plan, with the proposed land use designation changes, the Specific Plan would

yield significant amounts of new residential and employment uses while furthering the policies of the General Plan elements.

4.1.3 Impacts and Mitigation Measures

Analytic Method

A qualitative assessment of visual impacts was prepared by evaluating the existing visual setting and comparing it to visual conditions expected to occur under the proposed project. It is important to note that an assessment of visual impacts is not a quantitative analysis, but is, rather, qualitative and can be largely subjective. The Specific Plan study area and surrounding land uses were observed and photographs reviewed to determine the short- and long-term visual effects of the proposed project.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on aesthetics if it would:

- Have a substantial adverse effect on a scenic vista
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway
- Substantially degrade the existing visual character or quality of the site and its surroundings
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area

Effects Not Found to Be Significant

Threshold	Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

The land uses accommodated under the Specific Plan would have the potential to include sources of light and glare, such as security lighting or new glass panels on office structures. However, the area is currently developed with similar land uses. Redevelopment would not result in a substantial net increase in nighttime lighting or daytime glare sources. The South San Francisco Municipal Code (SSFMC) includes multiple building and construction regulations and zoning requirements that are intended to minimize localized light and glare impacts. Additionally, the Specific Plan Performance Standards state that all new pedestrian light fixtures shall be designed to focus light onto sidewalks and to minimize light spillover into adjacent upper level building windows or into the night sky. Therefore, no new sources of substantial light or glare would result from implementation of the Specific Plan and no further analysis is required in the EIR.

Project Impacts and Mitigation

Threshold	Would the project have a substantial adverse effect on a scenic vista?

Impact 4.1-1 **Implementation of the proposed project would not have a substantial adverse effect on a scenic vista. This would be a *less-than-significant* impact.**

Scenic vistas may generally be described in two ways: panoramic views (visual access to a large geographic area, for which the field of view can be wide and extend into the distance) and focal views (visual access to a particular object, scene, setting, or feature of interest). Panoramic views are typically associated with vantage points that provide a sweeping geographic orientation not commonly available. Examples of panoramic views include urban skylines, valleys, mountain ranges, or large bodies of water. Focal views are generally defined to include views of natural landforms, public art/signs, and visually important structures, such as historic buildings.

Changes to a scenic vista would be considered substantial if the development permitted under the Specific Plan results in obstruction of a publicly accessible scenic view, or removal, alteration, or demolition of existing features or elements that substantially contribute to the valued visual character or image of a neighborhood, community, or localized area as viewed from public vantage points.

Scenic Vistas from within the Study Area

The study area is comprised of the City's Downtown and East of 101 subareas. The Downtown subarea is the historic core of the City where older buildings, some of historical or architectural interest, dominate and are generally smaller in scale, usually one to three stories high, with frequent surface parking lots. The East of 101 subarea is characterized by a range of business commercial, industrial, and service designations, which include smaller industrial and service buildings, often accompanied with outdoor parking or service areas. However, there is inconsistency between building heights, as the tallest building in this area is 160 feet, while the average building is much shorter. Due to the inconsistent development patterns and lack of an urban skyline, the study area does not include any panoramic views of scenic resources.

Scenic Vistas outside the Study Area

The City's General Plan (1999) does not identify any scenic vistas in the study area, nor does the East of 101 Area Plan (1994). However, there are prominent visual landmarks in South San Francisco, which include San Bruno Mountain, Sign Hill Park, the "Wind Harp Tower" at San Bruno Point Hill and the San Francisco Bay. Small portions of the San Bruno Mountains and the Sign Hill Park can be seen from certain locations within the Specific Plan study area while the "Wind Harp Tower" at San Bruno Point Hill and the San Francisco Bay are not visible from within the Specific Plan study area. There are no designated scenic outlooks within the study area and no designated places where people would gather in order to gain a view of San Bruno Mountain or Sign Hill Park. Additionally, all new development under the Specific Plan would have building heights consistent with the land use designations of the development sites. Since the land use designations are approved either by the General Plan or changed with the approval of the Specific Plan, blockage of these views from new development permitted by the

Specific Plan would be consistent with the City's regulations. Therefore, implementation of the Specific Plan would not have a substantial adverse effect on a scenic vista. This impact would be ***less than significant***, and no mitigation is required.

Threshold	Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

Impact 4.1-2 **Implementation of the proposed project would not substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway. This would be a *less-than-significant* impact.**

The California Department of Transportation designates scenic highway corridors. US-101 and I-280 run north/south and transect the City from the east to west, respectively. Within the City, sections of I-280 have been designated as scenic corridors under the State Scenic Highway program; however, these are not in the vicinity of the Specific Plan and the study area is not visible from I-280. Additionally, US-101 has not been designated or identified as eligible for designation in the vicinity of the Specific Plan.

While the Specific Plan study area is not located within a state scenic highway, it does contain historic buildings that could be considered scenic resources. The integrity of such resources would be maintained, however, with adherence to Specific Plan policies and objectives. A main objective of the Specific Plan is to revitalize the Downtown to be a vibrant and successful community resource while protecting the historic building fabric of the area. Grand Avenue is the historic heart of the City, with City Hall at one end of the street and a diverse array of one, two, and three story buildings, examples of interesting architectural periods, dispersed along the street. While Grand Avenue would experience new development and improvements, the scale and character of the street would be maintained under the Specific Plan. Additionally, new development building heights and design guidelines would respect the historic fabric of the Downtown area while providing an updated, refreshed feel to attract more pedestrian and commercial activity within the Specific Plan study area. For example, building heights along Grand Avenue would vary from the front to the rear of the parcel to protect the historic character of the unique one-, two-, or three-story buildings, where taller new buildings would be constructed behind these historic buildings. With the mixed building heights along Grand Avenue, a higher density of residents and employees would be supported while still maintaining the historic street-front character of Grand Avenue, which is unique to this particular street.

Proposed policies and guidelines would protect historic buildings and their visual character within the study area. Therefore, implementation of the proposed project would not substantially damage scenic resources. This impact would be ***less than significant***, and no mitigation is required.

Threshold	Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

Impact 4.1-3 **Implementation of the proposed project would not substantially degrade the existing visual character or quality of the site and its surroundings. This would be a *less-than-significant* impact.**

While new development under the Specific Plan would result in some change in the visual character of the study area, implementation of the Specific Plan would result in an overall improvements, rather than a degradation, of the visual quality of the area. The Specific Plan would implement the overall vision for the Downtown and East of 101 areas by utilizing four major objectives that correspond to the station area issues, opportunities, and goals:

1. Revitalize Downtown South San Francisco to be a vibrant and successful community resource and a source of local pride.
2. Promote new residential, mixed-use and employment uses so as to add a "critical mass" of business patrons and residents to the Downtown, while maintaining a scale and character that is complementary.
3. Focus new improvements on Grand Avenue to return this historic corridor to once again being the focus of the community. Encourage retention of existing and local businesses to the Downtown and protect historic building focus.
4. Improve pedestrian and bicycle connections to Caltrain as well as the Downtown with the east employment area.

The Specific Plan focuses on properties within 0.25 and 0.5 mile of the Caltrain station, with the study area extending 0.5 mile to the west of the Caltrain station and 0.25 mile to the east. To the west of US-101, four sub-areas comprise the Downtown area: Downtown transit core, Grand Avenue core, Downtown residential core, and the Linden Neighborhood center. For this part of the study area, the Specific Plan encourages intensification of land uses while respecting the historic fabric, especially of Grand Avenue. To the east of US-101, the Eastern Neighborhood and the Transit Office/R&D core comprises the other half of the study area. The Specific Plan for the Eastern Neighborhood is designed to utilize this neighborhood's close proximity to the Caltrain station, regional highways, San Francisco and Silicon Valley, and the biotechnology hub for a high-density employment area. The focus for the Transit Office/R&D core is on an area of taller buildings for corporate offices, hotels, and other major facilities due to its high visibility from the airport and various employment centers on the peninsula. In addition to these subareas, the Specific Plan also identifies areas of focus within the study area, which are prime opportunity zones for change. These areas of focus include Grand Avenue, transit-oriented Downtown development, eastern development employment district, Caltrain station platform extension and Grand Avenue extension, and Downtown public realm improvements. Some examples of improvements within these areas of focus include, but are not limited to, revitalizing the Downtown business and public open spaces; supporting transit and Downtown businesses; providing significant residential opportunities in the Downtown area; increasing development opportunities consistent with trends in the East of 101 area; providing significant office/R&D employment opportunities in very close proximity to Downtown and the Caltrain station; improving Downtown and East of 101 connectivity; increasing transit ridership with robust employment and residential development nearby; and revitalizing Grand Avenue as the economically vital historic core of South San Francisco.

The existing Downtown and East of 101 subareas are currently comprised of inconsistent building heights and aesthetic quality and lack a cohesive grid street network. There is little to no streetscaping and both subareas are deteriorated in certain locations and generally not designed for optimal pedestrian and commercial activity. Implementation of the Station Area Specific Plan would establish design guidelines and standards that would improve the overall aesthetic quality of the study area as a whole. The guiding principles from the Specific Plan that are relevant to aesthetics include:

Principle 3 Preserve and enhance the character of existing Downtown neighborhoods while continuing to encourage modest intensification of use as currently allowed.

Principle 7 Focus public investments in the historic core of the City, along Grand Avenue from Airport Boulevard to Spruce, and on adjoining streets- the Pedestrian Priority Zone- to create an attractive pedestrian environment to support businesses Downtown.

Principle 9 Require pedestrian-oriented ground level retail and services uses on Grand Avenue and in the neighborhood center on Linden between California and Juniper Avenues. Encourage ground level retail in other areas, especially in the Downtown Transit Core.

Principle 13 Allow retail uses along the Grand Avenue extension to provide amenities for the office population and a strong visual and physical linkage to the Downtown to the west.

Principle 14 Redesign Grand Avenue to accommodate wider sidewalks and an improved streetscape that will better support the retail environment of the Downtown.

Principle 17 Throughout the Specific Plan area, provide an attractive and accessible public realm of improved sidewalks, streetscapes, pedestrian crossings, plazas and open spaces.

Principle 18 Within the Pedestrian Priority Zone, implement street and intersection improvements to create a safe and attractive environment for pedestrians.

Principle 22 Create a vibrant, safe plaza to serve residents, visitors and Downtown businesses.

Principle 24 Ensure new development in the Eastern Neighborhood provides a significant amount of publicly accessible open space within the development concepts for new office, R&D, or supporting uses.

Principle 25 Improve the public realm of sidewalks and adjoining open spaces throughout the Specific Plan study area and particularly within the Pedestrian Priority Zone to create an attractive pedestrian environment.

Principle 26 Create a street tree plan that responds to the streetscape definition plan to create unique neighborhood streets defined by street tree type.

Principle 27 Provide suitable lighting throughout the study area, with a particular focus on the Downtown, to create a comfortable environment that is suited to a wide array of land uses and retail activities.

Principle 45 Building heights will be greatest within ¼ mile of the Caltrain station, to allow the highest densities of residents and employees within an easy walk of this transit service.

Principle 46 Heights will transition from the Downtown core near the Caltrain station, down to the outer edges of the half mile radius to respect the existing residential neighborhoods surrounding the Downtown.

Principle 47 Heights on the north and south edges of the study area will maintain the allowed heights currently found in the existing regulatory documents.

Principle 48 Within the pedestrian core of Downtown, continue the urban pattern established on Grand Avenue by requiring minimal to no setbacks on key streets.

Principle 49 In the Eastern Neighborhood, require a development pattern similar to the Downtown, with minimum setbacks and active ground floor uses to create an attractive pedestrian environment.

Implementation of the Specific Plan would be beneficial to the study area, as it will create new development opportunities, refresh and update the existing buildings, establish cohesive aesthetic themes, and overall make the study area more attractive to entice pedestrian and commercial activity. Therefore, implementation of the Specific Plan would not degrade the existing visual character or quality of the site and its surroundings. This impact would be ***less than significant***, and no mitigation is required.

4.1.4 Cumulative Impacts

The geographic context for the analysis of cumulative aesthetic impacts includes areas with views of the study area. The analysis accounts for all anticipated cumulative growth within this geographic area; however, the primary contributor to potential visual changes in this area of the City is the proposed project, since it encompasses approximately 300 acres of residential, commercial, business and technology, and mixed industry corridors.

Threshold	Would the project have a substantial adverse effect on a scenic vista?

As described above under Impact 4.1-1, development of the proposed project would not block existing views of San Bruno Mountain, Sign Hill, the "Wind Harp Tower" at San Bruno Point Hill, or the San Francisco Bay.

Focal views are site-specific, and visual impacts are generally limited to the immediate vicinity of a proposed project, where views from the project area are more likely to be experienced. Although it is possible that structures associated with cumulative projects could be built that would block individual focal views in the City, the combination of existing regulations and local design review procedures severely restricts the possibility that future development would substantially block visually important features within the City. Therefore, cumulative impacts on scenic vistas would be ***less than significant***.

Threshold	Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

As described above, no portions of the highways in the vicinity of the study area have been designated as scenic corridors under the State Scenic Highway program. In addition, a main objective of the Specific Plan is to revitalize Downtown to be a vibrant and successful community resource while protecting the

historic building fabric of the area. The Specific Plan proposes policies and guidelines that would protect historic buildings and character within the study area. Other individual cumulative projects would comply with General Plan regulations and policies, which hold all new development to the aesthetic standards throughout the City. Therefore, cumulative impacts on scenic resources within a state scenic highway would be ***less than significant***.

Threshold	Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

The proposed project would not have a substantial adverse effect on the visual quality of the study area. Instead, the Specific Plan is designed to enhance the overall aesthetic character of the City by revitalizing the Downtown area and creating a transit-oriented plan that would improve the aesthetic quality of the study area in order to attract optimal pedestrian and commercial activity. Cumulative development within areas surrounding the study area would constitute further intensification of an already urban area of the City, and generally future projects would be designed to enhance the existing character of a site. However, design review would consider the types and placement of planned development throughout the City such that changes in land use would not substantially degrade the area and the visual character of these areas would be protected and enhanced. Therefore, the cumulative impact on visual character and quality would be ***less than significant.***

4.1.5 References

Brady and Associates. 1994. *East of 101 Area Plan*, Adopted by the City of South San Francisco in July 1994. http://ca-southsanfrancisco.civicplus.com/DocumentCenter/Home/View/779 (accessed November 13, 2013).

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?NID=360.

4.2 AIR QUALITY

This section of the EIR analyzes the potential environmental effects on air quality from implementation of the proposed project. One comment letter addressing air quality was received from the San Mateo County Health System in response to the notice of preparation (NOP) circulated for the proposed project.

Data for this section were taken from the project-specific traffic impact analysis (Fehr & Peers 2014) and the Bay Area Air Quality Management District (BAAQMD) CEQA Air Quality Guidelines (BAAQMD 2010, 2012). Full reference-list entries for all cited materials are provided in Section 4.2.5 (References).

4.2.1 Environmental Setting

South San Francisco enjoys generally good air quality, due largely to the presence of the San Bruno Gap, a break in the Santa Cruz Mountains that allows onshore winds to flow easily into San Francisco Bay and quickly disperse air pollutants. Within South San Francisco, certain areas of the City are more likely to result in pollutant exposure for residents and workers. These areas include the US-101, Interstate 280 (I-280), and El Camino Real corridors, which experience relatively high pollutant concentrations due to heavy traffic volumes, particularly during peak periods. In addition, wind blowing out of the south and southeast exposes the City to emissions from the San Francisco International Airport (SFO) (South San Francisco n.d.).

Climate

South San Francisco and the Downtown South San Francisco Station Area Specific Plan area (study area) are located in San Mateo County, within the nine-county San Francisco Bay Area Air Basin (Basin). Specifically, the study area is located within the Peninsula climatological subregion of the Basin, that extends from northwest of San Jose to the Golden Gate. The location of the Santa Cruz Mountains throughout the center of the Peninsula has great influence on the climate and air quality of the area. The mountains, with elevations exceeding 2,000 feet at the south end, and gradually decreasing to 500 feet elevation in South San Francisco, block the typical high incidence of cool, foggy weather that occurs along the coast. Warmer temperatures and fewer foggy days characterize the southeastern area of the peninsula, where the marine layer is blocked by the ridgeline to the west. However, in the north end the marine layer is able to flow across most of San Francisco due to its low topography. In the South San Francisco area, the marine air is able to penetrate the bay through the lower elevations at the San Bruno Gap.

The large-scale influences of the Bay Area's climate are summarized below, based on meteorological data presented in "Climate, Physiography, and Air Pollution Potential" (BAAQMD 2006).

The San Francisco Bay Area's regional meteorological conditions are dominated by the semi-permanent high pressure area in the eastern Pacific Ocean, which is in large part responsible for the cool, dry summers and mild, moderately wet winters. This pressure system is also responsible for the daytime sea breeze that tends to provide fresh air to the Bay Area.

Region-wide temperature inversions, caused by warm air positioned above the cool daytime surface air, prohibit vertical mixing of air. Thermal inversions may be caused by flows of cool marine air at the surface moving inland from the Golden Gate or by rapid cooling of the surface after sunset, which causes the air close to the surface to rapidly cool. Air pollution potential in the region is highest when inversions are strong and winds are light.

Annual average wind speeds range from 5 to 10 miles per hour (mph) throughout the Peninsula with higher wind speeds in the study area due to the low-lying areas in the mountain ranges. The prevailing winds in the peninsula are westerly and in the study area the winds are in a southwest wind pattern. These winds typically dilute pollutants and transport them away from the area.

Average maximum temperatures during summer in the area are in the mid 60s degrees Fahrenheit (°F), while minimum winter temperatures are approximately low 40s°F.

Criteria Air Pollutants

Air pollutant emissions within the Bay Area are generated by stationary and mobile sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at an identified location and are usually associated with manufacturing and industry. Examples are boilers or combustion equipment that produces electricity or generates heat. Area sources are widely distributed and produce many small emissions. Examples of area sources include residential and commercial water heaters, painting operations, lawn mowers, agricultural fields, landfills, and consumer products such as barbeque lighter fluid and hair spray. Mobile sources refer to emissions from motor vehicles, including tailpipe and evaporative emissions, and are classified as either on-road or off-road. On-road sources may be legally operated on roadways and highways. Off-road sources include aircraft, ships, trains, racecars, and self-propelled construction equipment. Mobile sources account for the majority of the air pollutant emissions within the Basin. Air pollutants can also be generated by the natural environment such as when fine dust particles are pulled off the ground surface and suspended in the air during high winds.

To protect the public health and welfare, the federal and state governments have identified five criteria air pollutants and a host of air toxics and established ambient air quality standards through the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA). The federal and state air quality standards for these pollutants, ozone, CO, PM, SO_2, and lead are shown in the left hand column of Table 4.2-1 (Summary of Ambient Air Quality at San Francisco-Arkansas Street Station) below. These pollutants are described as follows:

- **Ozone**—A gas that is formed when volatile organic compounds (VOCs), which can also be referred to as reactive organic gases (ROG), and nitrogen oxides (NO_X) undergo slow photochemical reactions in the presence of sunlight. Meteorological conditions that are needed to produce high concentrations of ozone are direct sunshine, early morning stagnation in source areas, high ground surface temperatures, strong and low morning inversions, greatly restricted vertical mixing during the day, and daytime subsidence that strengthens the inversion layer. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable.
- **Carbon Monoxide (CO)**—A colorless, odorless gas produced by the incomplete combustion of fuels. CO concentrations tend to be the highest during the winter morning, with little to no wind,

when surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone, motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.

- **Respirable Particulate Matter (PM_{10}) and Fine Particulate Matter ($PM_{2.5}$)**—Extremely small suspended particles or droplets 10 microns and 2.5 microns or smaller in diameter. Some sources of particulate matter, like pollen and windstorms, are naturally occurring. However, in populated areas, most particulate matter is caused by road dust, diesel soot, combustion, abrasion of tires and brakes, and construction activities.
- **Sulfur dioxide (SO_2)**—A colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal, and from chemical processes occurring at plants and refineries. Although sulfur dioxide concentrations have been reduced to levels well below state and national standards, further reductions are desirable because SO_2 is a precursor to sulfates. Sulfates, pollutants that can have adverse effects for both humans and the environment, are a particulate formed through the photochemical oxidation of SO_2.
- **Lead**—Lead occurs in the atmosphere as particulate matter. The combustion of leaded gasoline is the primary source of airborne lead in the Basin. The use of leaded gasoline is no longer permitted for on-road motor vehicles; therefore, most lead combustion emissions are associated with off-road vehicles such as racecars and some airplanes. Other sources of lead occur in the manufacturing and recycling of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters.

Existing Regional Air Quality

Measurements of ambient concentrations of the criteria pollutants are used by the United States Environmental Protection Agency (USEPA) and the California Air Resources Board (ARB) to assess and classify the air quality of each air basin, county, or, in some cases, a specific developed area. The classification is determined by comparing actual monitoring data with federal and state standards. If a pollutant concentration in an area is lower than the standard, the area is classified as being in "attainment." If the pollutant exceeds the standard, the area is classified as a "nonattainment" area. If there are not enough data available to determine whether the standard is exceeded in an area, the area is designated "unclassified."

Air quality in the basin is monitored by the BAAQMD, which operates a regional network of air pollution monitoring stations to determine if the federal and state standards for criteria air pollutants and emission limits of toxic air contaminants are being achieved. The Bay Area Basin is considered "nonattainment" for ozone and fine particulate matter ($PM_{2.5}$) federal standards, and is considered "nonattainment" for state standards for ozone, respirable particulate matter (PM_{10}), and $PM_{2.5}$. It is in "attainment" for the federal standard for PM_{10}, and in "attainment" for both the federal and state ambient air quality standards for SO_2, Pb, and NO_2, which is a form of NO_X.

Existing Local Air Quality

The BAAQMD monitors ambient air pollutant concentrations through a series of monitoring stations located throughout the Bay Area. While there is no monitoring station located in South San Francisco,

BAAQMD samples local air quality from the nearby Arkansas Street station in San Francisco, approximately 8 miles from the study area. Table 4.2-1 (Summary of Ambient Air Quality at San Francisco-Arkansas Street Station) identifies the national and state ambient air quality standards for relevant air pollutants along with the ambient pollutant concentrations that have been measured at the Arkansas Street-San Francisco monitoring station through the period of 2010 to 2012. Monitoring was not conducted at this station for SO_2. The closest site that monitors SO_2 is the Oakland-West 1100 21st Street site, located approximately 14 miles northwest of the project site. SO_2 data from this site is provided in Table 4.2-1.

As shown in Table 4.2-1, ambient PM_{10} and NO_X concentrations violated the state standard once at the Arkansas Street station during the 2010–2012 period. Ambient $PM_{2.5}$ concentrations exceed the federal standard three times in 2010, twice in 2011, and once in 2012. No violations occurred for O_3, CO, or SO_X during the three year period. For carbon monoxide, a product of incomplete combustion, the air in South San Francisco meets state and federal standards; however, concentrations in the vicinity of congested intersections and highway segments would potentially be higher than the monitoring data indicates.

Existing Localized CO Concentrations

Traffic-congested roadways and intersections have the potential to generate localized high levels of CO. Localized areas where ambient concentrations exceed national and/or state standards for CO are termed CO "hotspots." The BAAQMD considers CO as a localized problem requiring additional analysis when a project is likely to subject sensitive receptors to CO hotspots. Land uses such as primary and secondary schools, hospitals, and convalescent homes are considered to be sensitive receptors to poor air quality because the very young, the old, and the infirm are more susceptible to respiratory infections and other air quality-related health problems than the general public. Residential uses are considered sensitive because people in residential areas are often at home for extended periods of time, so they could be exposed to pollutants for extended periods. Recreational areas are considered moderately sensitive to poor air quality because vigorous exercise associated with recreation places a high demand on the human respiratory function. Residences are located throughout the study area, as well as limited recreational areas.

Localized CO concentrations are calculated based on a simplified CALINE4 screening procedure developed by BAAQMD. The simplified model is intended as a screening analysis, which identifies a potential CO hotspot. This methodology assumes worst-case conditions and provides a screening of maximum, worst-case CO concentrations. Under existing conditions, only one intersection that would operate at level of service (LOS) F is analyzed. As all other intersections would operate at LOS D or better, localized CO concentrations at those intersections would be expected to be less. The resulting emissions are compared with adopted federal and state ambient air quality standards in Table 4.2-2 (Existing Localized Carbon Monoxide Concentrations).

Table 4.2-1 Summary of Ambient Air Quality at San Francisco-Arkansas Street Station

Air Pollutants Monitored at the San Francisco-Arkansas Street Monitoring Station	*Year*		
	2010	*2011*	*2012*
Ozone (O_3)			
Maximum 1-hour concentration measured	0.079 ppm	0.07 ppm	0.069 ppm
Days exceeding federal 0.12 ppm 1-hour standard	0	0	0
Days exceeding state 0.09 ppm 1-hour standard	0	0	0
Maximum 8-hour concentration measured	0.051 ppm	0.054 ppm	0.048 ppm
Days exceeding federal 0.08 ppm 8-hour standard	0	0	0
Respirable Particulate Matter (PM_{10})			
Maximum 24-hour concentration measured	39.7 µg/m^3	45.6 µg/m^3	50.6 µg/m^3
No. of days exceeding federal 150 µg/m^3 24-hour standard	0	0	0
Days exceeding state 50 µg/m^3 24-hour standard	0	0	1
Annual arithmetic mean (AAM)	19.3 µg/m^3	19.5 µg/m^3	17.5 µg/m^3
Does measured AAM exceed federal 50.0 µg/m^3 AAM standard?	No	No	No
Does measured AAM exceed state 20.0 µg/m^3 AAM standard?	No	No	No
Fine Particulate Matter ($PM_{2.5}$)			
Maximum 24-hour concentration measured	45.3 µg/m^3	47.5 µg/m^3	35.7 µg/m^3
No. of days exceeding federal 65 µg/m^3 24-hour standard	3	2	1
Federal and state AAM	10.5 µg/m^3	9.5 µg/m^3	8.2 µg/m^3
Does measured AAM exceed federal 15.0 µg/m^3 AAM standard?	No	No	No
Does measured AAM exceed state 12.0 µg/m^3 AAM standard?	No	No	No
Carbon Monoxide (CO)			
Maximum 1-hour concentration measured	1.37 ppm	1.20 ppm	1.19 ppm
Days exceeding federal 35.0 ppm 1-hour standard	0	0	0
Days exceeding state 20.0 ppm 1-hour standard	0	0	0
Maximum 8-hour concentration measured	1.65 ppm	1.46 ppm	1.26 ppm
Number of days exceeding federal and state 9.0 ppm 8-hour standard	0	0	0
Nitrogen Dioxide (NO_2)			
Maximum 1-hour concentration measured	0.09 ppm	0.09 ppm	0.12 ppm
Days exceeding state 0.25 ppm 1-hour standard	0	0	1
AAM	0.013 ppm	0.014 ppm	0.013 ppm
Does measured AAM exceed federal 0.0534 ppm AAM standard?	No	No	No
Sulfur Dioxide (SO_2)			
Maximum 24-hour concentration measured	0.004	*	*
Days exceeding federal 0.14 ppm 24-hour standard	0	N/A	N/A
Days exceeding state 0.04 ppm 24-hour standard	0	N/A	N/A

SOURCE: California Air Resources Board, iADAM: Air Quality Data Statistics (2012).
ppm = parts by volume per million of air; µg/m^3 = micrograms per cubic meter; N/A = no monitoring performed for this standard.
* Indicates there was insufficient data available to determine the value.

Table 4.2-2 Existing Localized Carbon Monoxide Concentrations			
Intersection	*1-Hour CO Concentration (ppm)*	*8-Hour CO Concentration (ppm)*	*Exceeds Standard?*
Air Quality Standard	**20.0 (State) 35.0 (Federal)**	**9.0 (State and Federal)**	**—**
Baden Ave/Linden Ave	1.6	1.1	No

SOURCE: CALINE 4 using EMFAC 2011 emission factors (see Appendix B for model output sheets).
CO = carbon monoxide
Modeling assumptions: One-hour carbon monoxide concentrations were calculated using the worst-case wind angle scenario in the CALINE 4 model. Receptor locations were set 30 feet from the roadway centerline. Carbon monoxide emission factors were generated using the EMFAC 2011 model for year 2012 for the total vehicle mix during conditions in January at a temperature of 40°F and 50 percent relative humidity. The assumed vehicle speed is 5 miles per hour. An ambient 1-hour carbon monoxide concentration of 1.37 ppm was used to reflect ambient conditions. The 8-Hour carbon monoxide concentration is based on a persistence factor of 0.7 for urban uses (BAAQMD 2012).

Existing Sources of Toxic Air Contaminants

The Title V Program under the CAA requires the BAAQMD to issue comprehensive operating permits to facilities that emit significant amounts of air pollutants. The study area includes industrial land uses, which may be sources of TACs. However, there are currently no Title V permitted facilities in South San Francisco. The BAAQMD maintains an inventory of substantial stationary sources of TAC emissions in the Bay Area. According to the South San Francisco General Plan, as of 1999, there are seventeen such sources that exceeded trigger threshold listed within South San Francisco, fourteen of which are dry cleaners. The remaining sources include the South San Francisco-San Bruno Wastewater Treatment Plant, the Shell Oil Company Distribution Plant, and the Superior Aluminum Body Corporation.

4.2.2 Regulatory Framework

Federal

USEPA is the federal agency responsible for setting and enforcing the federal ambient air quality standards for atmospheric pollutants. USEPA regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain locomotives.

As part of its enforcement responsibilities, USEPA requires each state with nonattainment areas to prepare and submit a State Implementation Plan (SIP) that describes a strategy for the means to attain the federal standards for ozone and particulate matter. The SIP must integrate federal, state, and local plan components and regulations to identify specific measures to reduce pollution, using a combination of performance standards and market-based programs.

Clean Air Act

The CAA, as amended, establishes air quality standards for several pollutants. These standards are divided into primary standards and secondary standards. Primary standards are designed to protect public health, and secondary standards are intended to protect public welfare from effects such as visibility reduction, soiling, nuisance, and other forms of damage. The CAA requires that regional plans be prepared for nonattainment areas illustrating how the federal air quality standards could be met.

Regulation of TACs is achieved through federal and state controls on individual sources. The 1990 CAA Amendments offered a comprehensive plan for achieving significant reduction in both mobile and stationary source emissions of certain designated Hazardous Air Pollutants, with a goal of achieving USEPA's less than one in 1 million cancer risk from TACs.

State

The California ARB, a part of the California Environmental Protection Agency (Cal/EPA), is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, the California ARB conducts research, sets state ambient air quality standards, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. The California ARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

California Clean Air Act

The CCAA of 1988 requires nonattainment areas to achieve and maintain the state ambient air quality standards by the earliest practicable date. Local air districts are responsible for developing plans for attaining the state ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide standards. The California ARB has primary responsibility for the development of California's SIP, for which it works closely with the federal government and the local air districts. The SIP identifies measures that will be implemented to reduce ozone and fine particulate matter ($PM_{2.5}$) emissions to meet federal standards.

Air Toxics Hot Spots Information and Assessment Act of 1987

Regulation of TACs is achieved through federal and state controls on individual sources. The Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588), California Health and Safety Code Sections 44300 et seq. provide for the regulation of over 200 air toxics and is the primary air contaminant legislation in the state. California ARB has published the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles. This plan identifies diesel particulate matter as the predominant TAC in California and identifies methods for reducing diesel emissions from mobile, stationary, and area-wide sources. California ARB has also prepared an informational document, Air Quality and Land Use Handbook: A Community Health Perspective (2005), with recommended guidelines for siting sensitive land uses near sources of mobile TAC emissions such as diesel particulate matter (DPM).

Regional

Bay Area Air Quality Management District

The BAAQMD is the primary agency responsible for comprehensive air pollution control in the entire San Francisco Bay Area Air Basin. To that end, the BAAQMD, a regional agency, works directly with the Association of Bay Area Governments (ABAG), the Metropolitan Transportation Commission (MTC), and local governments and cooperates actively with all federal and state government agencies. The

BAAQMD develops rules and regulations, establishes permitting requirements for stationary sources, inspects emissions sources, and enforces such measures through educational programs or fines, when necessary.

In 1991, the Bay Area 1991 Clean Air Plan was developed to address the state requirements of the CCAA. The Plan has been updated three times, in 1994, 1997, and 2010, with the continued goal of improving air quality through tighter industry controls, cleaner fuels, and combustion in cars and trucks, and increased commute alternatives.

The BAAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources. It has responded to this requirement by preparing a sequence of Ozone Attainment Plans, or the Bay Area Ozone Strategy, and Clean Air Plans that comply with the CAA and the CCAA, accommodate growth, reduce the pollutant levels in the Bay Area, meet federal and state ambient air quality standards, and minimize the fiscal impact that pollution control measures have on the local economy. The Ozone Strategies are prepared for the federal ozone standard, and the Clean Air Plans are prepared for the state ozone standards. The most recent Bay Area Ozone Strategy was adopted by the BAAQMD Board of Directors in January 2006 and demonstrates how the Bay Area will fulfill CCAA planning requirements for the State one-hour ozone standard and transport mitigation requirements through the proposed control strategy. The control strategy includes stationary source control measures to be implemented through Air District regulations; mobile source control measures to be implemented through incentive programs and other activities; and transportation control measures to be implemented through transportation programs in cooperation with Metropolitan Transportation Commission, local governments, transit agencies and others. The current regional Clean Air Plan was adopted by the Board of Directors on September 15, 2010. It defines a control strategy that the BAAQMD and its partners will implement to (1) reduce emissions and decrease ambient concentrations of harmful pollutants; (2) safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily impacted by air pollution; and (3) reduce greenhouse gas (GHG) emissions to protect the climate. The Clean Air Plan addresses ozone and its precursors, $PM_{2.5}$, air toxics, and GHGs.

The BAAQMD's New Source Review Rule, Regulation 2, Rule 2, and Air Toxics Risk Management Policy require that new or modified stationary sources of air pollutants constructed and operated undergo permit review for Best Available Control Technology (BACT) and/or Best Available Control Technology for Toxics (TBACT) when certain thresholds are exceeded. Mobile sources of TACs are also regulated indirectly through vehicle emissions standards and fuel specifications. Under BAAQMD rules, BACT is defined as the most stringent emissions control which, for a given class of air pollutant source, has been achieved in practice, identified in a State Implementation Plan, or has been found by the BAAQMD to be technologically achievable and cost-effective.

To minimize the emissions of TACs, the BAAQMD requires laboratory facilities to either demonstrate that the health risk resulting from emissions of TACs is less than one additional cancer risk in one million or follow Responsible Laboratory Management Practices (RLMPs). Because of the varied nature of research, estimating TAC emissions and demonstrating low risk is difficult, while following the RLMPs is fairly straightforward. Moreover, the RLMPs are based on risk analyses using information from Stanford University and the University of California, San Francisco.

Local

South San Francisco General Plan

Local jurisdictions, such as the City of South San Francisco, have the authority and responsibility to reduce air pollution through their police power and decision-making authority. Specifically, the City is responsible for the assessment and mitigation of air emissions resulting from its land use decisions. The City of South San Francisco is also responsible for the implementation of transportation control measures as outlined in the Clean Air Plan. Examples of such measures include bus turnouts, energy-efficient streetlights, and synchronized traffic signals.

City of South San Francisco environmental plans and policies recognize community goals for air quality. Chapter 7.3 of the South San Francisco General Plan identifies goals and policies that help the City contribute to regional air quality improvement efforts, and are consistent with the Clean Air Plan. These are outlined as follows:

- Continue to work toward improving air quality and meeting all federal and state ambient air quality standards by reducing the generation of air pollutants from stationary and mobile sources, where feasible.
- Encourage land use and transportation strategies that promote use of alternatives to the automobile for transportation, including bicycling, bus transit, and carpooling.
- Minimize conflicts between sensitive receptors and emissions generators by distancing them from one another.
- Cooperate with the BAAQMD to achieve emissions reductions for nonattainment pollutants and their precursors, including CO, ozone, and PM_{10}, by implementation of air pollution control measures as required by federal and state statutes.
- Use the City's development review process and the CEQA regulations to evaluate and mitigate the local and cumulative effects of new development on air quality.
- Adopt the standard construction dust abatement measures included in BAAQMD's CEQA Guidelines.
- Require new residential development and remodeled existing homes to install clean-burning fireplaces and wood stoves.
- In cooperation with local conservation groups, institute an active urban forest management program that consists of planting new trees and maintaining existing ones.

In accordance with CEQA requirements and the CEQA review process, the City assesses the air quality impacts of new development projects, requires mitigation of potentially adverse air quality impacts by conditioning discretionary permits, and monitors and enforces the implementation of such mitigation. The City does not, however, have the expertise to develop plans, programs, procedures, and methodologies to ensure that air quality within the City and region will meet federal and state standards. Instead, the City relies on the expertise of the BAAQMD and utilizes the BAAQMD CEQA Guidelines as the guidance document for the environmental review of plans and development proposals within its jurisdiction.

Consistency Analysis

City of South San Francisco environmental plans and policies recognize community goals for air quality. South San Francisco General Plan Chapter 7.3 identifies goals and policies that help the City contribute to regional air quality improvement efforts and that are consistent with the Clean Air Plan. As identified in Impact 4.2-1, the proposed project would result in less-than-significant impacts related to air quality violations with implementation of mitigation measure MM4.2-2 and the applicable control measures of the 2010 Clean Air Plan, and would not hinder implementation of any control measure. Therefore, the proposed project would not conflict with the goals and policies of the City of South San Francisco General Plan.

4.2.3 Impacts and Mitigation Measures

Analytic Method

Although the BAAQMD is responsible for regional air quality planning efforts, it does not have the authority to directly regulate the air quality issues associated with plans and new development projects within the Bay Area. Instead, the BAAQMD has used its expertise and prepared the BAAQMD CEQA Guidelines to indirectly address these issues in accordance with the projections and programs of the Ozone Attainment Plan and Clean Air Plan. The purpose of the BAAQMD CEQA Guidelines is to assist lead agencies, as well as consultants, project proponents, and other interested parties, in evaluating potential air quality impacts of projects and plans proposed in the Bay Area.

Specifically, the BAAQMD CEQA Guidelines explain the procedures that the BAAQMD recommends be followed during environmental review processes required by CEQA. The BAAQMD CEQA Guidelines provide direction on how to evaluate potential air quality impacts, how to determine whether these impacts are adverse, and how to mitigate these impacts. The BAAQMD intends that by providing this guidance, the air quality impacts of plans and development proposals will be analyzed accurately and consistently throughout the Bay Area, and adverse impacts will be minimized. The 2012 BAAQMD CEQA Guidelines (2012 Guidelines) are applied to the analysis of air quality impacts in this section, with the exception of quantification of criteria pollutant emissions, as described below.

The 2012 Guidelines do not include significance thresholds for criteria pollutant emissions. The BAAQMD most recently updated its thresholds in May 2010 (adopted June 2010 and updated in May 2011) in the 2010 BAAQMD CEQA Guidelines document (2010 Guidelines). On March 5, 2012, the Alameda County Superior Court issued a judgment finding that the BAAQMD had failed to comply with CEQA when it adopted the significance thresholds. The court did not determine whether the thresholds were valid on the merits, but found that the adoption of the thresholds was a project under CEQA. In view of the court's order, BAAQMD is no longer recommending that the significance thresholds identified in the 2010 Guidelines be used as a generally applicable measure of a project's significant air quality impacts, although lead agencies may rely on the 2012 Guidelines (updated May 2012) for assistance in calculating air pollution emissions, obtaining information regarding the health impacts of air pollutants, and identifying potential mitigation measures. Lead agencies are directed to determine appropriate air quality thresholds of significance based on substantial evidence in the record. The BAAQMD states that lead agencies may continue to rely on the Air District's 1999 Thresholds of

Significance. Based on these recommendations, the City of South San Francisco has reviewed the 1999 Thresholds of Significance and the 2010 Guidelines Thresholds of Significance and has determined that the significance thresholds outlined in the 2010 Guidelines are the appropriate thresholds for the proposed project for the following reasons: (1) the 2010 Guidelines face a court order because they were not analyzed as a project under CEQA, not because of any deficiency or inaccuracy in the document itself; (2) the 2010 Guidelines represent the best and most recently available data and thresholds for assessing air quality impacts in the region; and (3) the thresholds of significance in the 2010 Guidelines are more conservative than the Air District's 1999 Thresholds of Significance. As such, a project that complies with the Thresholds of Significance identified in the 2010 Guidelines would also be below the 1999 Air District thresholds.

Construction and operational emissions associated with the proposed project are estimated using the CalEEMod Version 2013.2.2 computer model, the information provided in Chapter 3 (Project Description), and trip generation rates from the project traffic study, included in its entirety as Appendix B. CalEEMod is a statewide program that estimates air pollution emissions in pounds per day or tons per year for various land uses, area sources, construction projects, and project operations. The model uses the ARB's motor vehicle emissions model, EMFAC 2007, to calculate motor vehicle emissions. Operational emissions would be comprised of mobile source emissions and area source emissions. Mobile source emissions are generated by the increase in motor vehicle trips to and from the Specific Plan associated with operation of the land uses accommodated by the Specific Plan. Area source emissions generated will include the following: the increase in natural gas consumption for space and water heating, utilities operations (including diesel-powered emergency generators), an increase in TAC emissions associated with operation of additional development in the study area, and the increase in landscape maintenance equipment. To determine if an air quality impact would occur, the net increase in emissions compared to existing land use operations will be compared with the significance thresholds identified in the 2010 Guidelines.

Localized CO Concentrations for Operation

The ambient air quality effects of traffic emissions were evaluated using the BAAQMD'S simplified CALINE4 screening model. This methodology assumes worst-case conditions and provides a screening of maximum worst-case CO concentrations. The evaluation will utilize traffic volumes provided in the project traffic study, which assumed 25 percent build-out of the study area. The traffic analysis is included in its entirety as Appendix B. For this analysis, CO concentrations from the six roadway intersections determined to operate at a LOS F under existing plus project conditions, with F representing the heaviest level of traffic congestion, were analyzed. All other roadway intersections are expected to operate at LOS E or better, and would therefore generate lower CO concentrations.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on air quality if it would do any of the following:

- Conflict with or obstruct implementation of the applicable air quality plan

- Violate any air quality standard or contribute substantially to an existing or projected air quality violation
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)
- Expose sensitive receptors to substantial pollutant concentrations
- Create objectionable odors affecting a substantial number of people

Project Impacts and Mitigation

Threshold	Would the project conflict with or obstruct implementation of the applicable air quality plan?

Impact 4.2-1 **Implementation of the proposed project has the potential to conflict with or obstruct implementation of the applicable air quality plan. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level. Therefore, this would be a *significant and unavoidable* impact.**

The applicable air quality plan to the proposed project is the BAAQMD's 2010 Clean Air Plan. According to the BAAQMD CEQA Guidelines, a project that would result in less-than-significant operational impacts related to air quality violations, would implement the applicable control measures of the 2010 Clean Air Plan, and would not hinder implementation of any control measure would be consistent with the Clean Air Plan.

The project's potential to result in air quality violations is addressed below under Impact 4.2-2. As discussed in this section, operation of the land uses accommodated by the Specific Plan would have the potential to exceed significance criteria for air quality violations. Because there is no guarantee that the implementation of mitigation measure MM4.2-2 would be feasible for all projects requiring emissions reductions, this impact would remain significant and unavoidable.

Table 4.2-3 (Project Consistency with Clean Air Plan Control Measures) compares the proposed Specific Plan to the applicable Clean Air Plan Control Measures. Applicable Control Measures include those that may be encouraged at a land use planning level, such as encouraging land use patterns that would reduce vehicle trips. The project's consistency with applicable plans and policies to reduce GHG are addressed in Section 4.4 (Greenhouse Gas Emissions). Therefore, only control measures that relate to criteria pollutants and toxic are contaminants are included in Table 4.2-3. Additionally, measures that would be implemented through adoption of new BAAQMD programs and regulations, such as those that apply to stationary emissions sources or individual consumer choices, do not apply to the proposed project because implementation of the project would not help or hinder development of these regulations. The proposed project does not specifically propose any new stationary sources of emissions and cannot mandate individual consumer choices, such as the decision to purchase a zero-emissions vehicle. Future development would be required to comply with all applicable BAAQMD regulations as adopted at the time a specific project is proposed. Therefore, these control measures are not included in Table 4.2-3. As shown in Table 4.2-3, the proposed project would be consistent with all applicable Clean Air Plan

Control Measures and Implementation Actions and would not hinder implementation of the any implementation actions. However as emissions have the potential to exceed regulatory thresholds, the proposed project also has the potential to conflict with the achievement of emission reduction requirements under the Clean Air Plan.

Table 4.2-3 Project Consistency with Clean Air Plan Control Measures

2010 Clean Air Plan Control Measure	*Applicable Implementation Actions*	*Proposed Project Consistency*
TCM C-1—Voluntary Employer-Based Trip Reduction Programs: This measure will support voluntary efforts by Bay Area employers to encourage their employees to use alternative commute modes, such as transit, ridesharing, bicycling, walking, telecommuting, etc.	Local governments are encouraged to require mitigation of vehicle travel as part of new development approval, adopt transit benefits ordinances in order to reduce out-of-pocket transit costs to employees, and develop innovative ways to encourage rideshare, transit, cycling and walking for work trips.	Specific Plan Section 5 (Circulation and Parking) contains guiding principles and policies to encourage rideshare, transit, cycling and walking trips. New and improved bicycle and pedestrian improvements are proposed throughout the area, including a new Grand Avenue Extension that would provide direct pedestrian and bicycle access to the Caltrain station. The plan implements and builds on the City's Bicycle Master Plan. Bicycle and pedestrian improvements are described in greater detail in the analysis of the Control Measures below. The Specific Plan also includes policies to work with employers to develop shuttle connections and expand transit in the study area. Therefore, the proposed project would be consistent with this Control Measure.
TCM C-2—Safe Routes to Schools and Safe Routes to Transit Programs: This measure will facilitate safe routes to schools and transit by providing funds and working with transportation agencies, local governments, schools, and communities to implement safe access for pedestrians and cyclists. Likely projects will include implementation of bicycle facilities, such as lanes, routes, paths, and parking, and improvements to pedestrian facilities, such as sidewalks/paths, benches, reduced street width, reduced intersection turning radii, crosswalks with activated signals, curb extensions/bulbs, buffers between sidewalks and traffic lanes and streets trees.	Local governments to work with MTC to implement safe access for pedestrians and cyclists to schools and transit.	The Specific Plan includes extensive bicycle and pedestrian improvements to improve safety in the area. Proposed safety features include new bicycle lanes, buffered bicycle lanes to provide additional separation with vehicular traffic, the Grand Avenue Extension that would provide protected pedestrian and bicycle access to the Caltrain station, conversion of angled parking to parallel parking, and a new bikeway along the Colma Creek Canal. Pedestrian improvements would include a pedestrian priority area on Grand Avenue where curb cuts would be prohibited, limiting vehicular access points on several streets, and pedestrian-only pathways. Therefore, the proposed project would be consistent with this Control Measure.

Table 4.2-3 Project Consistency with Clean Air Plan Control Measures

2010 Clean Air Plan Control Measure	*Applicable Implementation Actions*	*Proposed Project Consistency*
TCM D-1—Bicycle Access and Facilities Improvements: TCM D-1 will expand bicycle facilities serving employment sites, educational and cultural facilities, residential areas, shopping districts, and other activity centers. Typical improvements include bike lanes, routes, paths, and bicycle parking facilities. This TCM also includes improving bicycle access to transit and supporting the annual Bike to Work event.	Cities and counties should implement their bicycle plans, provide a comprehensive network of bicycle lanes, routes, and pathways, and provide secure bicycle parking. Caltrans, Congestion Management Agencies and local governments should implement "complete streets" policies to ensure that cyclists and pedestrians are safely accommodated on all streets and roads.	The Specific Plan builds on the City Bicycle Master Plan. The Specific Plan proposes new bicycle paths and lanes throughout the study area, including off-street facilities at the Grand Avenue extension and along the Colma Canal. The Specific Plan also includes bicycle parking requirements for residential, commercial, and office uses. As described under the previous Control Measures, the Specific Plan includes improved pedestrian and bicycle safety to encourage complete streets. Therefore, the proposed project would be consistent with this Control Measure.
TCM D-2—Pedestrian Access and Facilities Improvements: TCM D-2 will improve pedestrian facilities and encourage walking by funding projects that improve pedestrian access to transit, employment and major activity centers. Improvements may include sidewalks/paths, benches, reduced street width, reduced intersection turning radii, crosswalks with activated signals, curb extensions/bulbs, buffers between sidewalks and traffic lanes, and street trees.	Cities and counties should provide a comprehensive network of facilities, including sidewalks, pathways and provide for pedestrian access in their development plans. Local governments are encouraged to require pedestrian access and amenities as a condition of approval of new development projects, such as street trees, furniture, lighting, shelter for transit patrons and inviting environments for walking. Local governments should adopt land use policies that support more compact, infill development to make neighborhoods more walkable. Caltrans, Congestion Management Agencies and local governments should implement "complete streets" (aka "routine accommodation") policies to ensure that cyclists and pedestrians are safely accommodated on all streets and roads.	The Specific Plan proposes pedestrian facility improvements throughout the area to encourage pedestrian trips and improve safety. Pedestrian Priority Streets and Alleys are designated along major roadways to provide enhanced pedestrian access to the Caltrain Station and amenities throughout the area. Improvements would be made to increase pedestrian visibility to vehicle, such as sidewalk bulb-outs, and encourage pedestrian-oriented development to create inviting walkways. Amenities such as furniture are encouraged to clearly delineate pedestrian areas. As previously described, the Specific Plan includes improved pedestrian and bicycle safety to encourage complete streets. The study area is currently developed, and it is the vision of the plan to promote infill development and compact, intensified development to promote a vibrant, pedestrian oriented community. Therefore, the proposed project would be consistent with this Control Measure.
TCM D-3—Local Land Use Strategies: TCM D-3 will support and promote land use patterns, policies, and infrastructure investments that support higher density mixed-use, residential and employment development near transit in order to facilitate walking, bicycling and transit use.	Local governments are encouraged to update general plans and area plans to promote infill development and support land use that allows residents and workers to walk, bicycle, and take transit to reach destinations, instead of relying on private automobiles. Local governments are encouraged to revise parking standards required for new development and update parking policies. (See TCM E-2)	As described under previous Control Measures, the proposed project would support infill development and encourage nonvehicular trips. The Specific Plan includes parking policies specific to the area that would allow for reduced parking requirements in areas supported by transit. Other parking policies include metered parking, parking fees, and parking time limits. Parking maximums and shared parking are also encouraged to avoid excessive parking. Therefore, the proposed project would be consistent with this Control Measure.

Table 4.2-3 Project Consistency with Clean Air Plan Control Measures

2010 Clean Air Plan Control Measure	*Applicable Implementation Actions*	*Proposed Project Consistency*
TCM E-2—Promote Parking Policies to Reduce Motor Vehicle Travel: Parking policies and practices have a profound impact on vehicle travel and mode choice, as well as land use patterns and the quality of the built environment. Parking policies are also an important tool in implementing focused growth strategies. This control measure outlines how the Air District, in cooperation with its regional agency partners, will (1) take actions at the regional level to implement parking policies that will benefit air quality, and (2) encourage and support local agency parking policies to reduce motor vehicle travel and promote focused growth.	Local agencies are encouraged to adopt innovative parking strategies, including: ■ Eliminate or reduce minimum parking requirements. ■ Limit the supply of off-street parking in transit-oriented areas. ■ Encourage developers and property owners to unbundle the price of parking spaces from rents and purchase prices. ■ Promote shared parking by different users. ■ Implement market-rate pricing for off-street parking and consider residential permit programs to alleviate spillover concerns. ■ Implement performance-based pricing for curb parking in high-use areas. ■ Implement parking assessment districts that use revenue from street parking to fund pedestrian and streetscape improvements. ■ Adopt design guidelines and policies to minimize surface area for parking. ■ Implement car-sharing and bike-sharing programs in appropriate locations in exchange for reduced parking requirements, and provide as a benefit to renters. ■ Encourage a coordinated parking policy approach among jurisdictions to minimize spillover to other jurisdictions and fears of unfair competition.	As discussed in the previous Control Measure, the Specific Plan includes innovative parking strategies. In addition to those described above, the Specific Plan encourages residential permit parking, unbundled parking, car sharing programs, and bike sharing programs. Therefore, the proposed project would be consistent with this Control Measure.

SOURCE: BAAQMD, *Bay Area 2010 Clean Air Plan. Final Clean Air Plan*, Volume II (September 15, 2010).

The proposed project would implement the applicable control measures of the 2010 Clean Air Plan and would not hinder implementation of any control measure. However, the proposed project would result in significant and unavoidable long-term operational impacts related to air quality violations even with implementation of mitigation measure MM4.2-2. Therefore, this impact is considered ***significant and unavoidable***. No additional mitigation is feasible.

Threshold	Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Impact 4.2-2 **Implementation of the proposed project would violate an air quality standard or contribute substantially to an existing or projected air quality violation. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level for construction activities. Therefore, this would be a *significant and unavoidable* impact.**

Implementation of the proposed project would result in both construction and operational air pollutant emissions. Construction emissions include those associated with the construction of new land uses, demolition of old buildings and structures for redevelopment, and construction of infrastructure improvements to support new land uses. Operational emissions include those associated with traffic generated by new development and operation of land uses, including residential, commercial, office, and industrial development, that would be accommodated by the proposed plan.

Construction Emissions

Construction activities would result in temporary increases in air pollutant emissions. These emissions would be generated in the form of fugitive dust emissions from earth disturbance during site grading and building demolition, and exhaust emissions from operation of heavy equipment and vehicles during construction. Paving activities would emit ROGs during off-gassing.

For the purposes of modeling a worst-case construction scenario, it was assumed that development associated with the Specific Plan would take place over a 20-year period, with an equal amount of construction occurring each year. At the end of 20-year time frame, up to 1,435 new residential units, 511,780 sf of new business commercial, 21,250 sf of new industrial, 268,800 sf of commercial, and 1,185,049 of new research and development are anticipated to be developed within the study area. Additionally, existing land uses would be demolished and redeveloped. To account for construction emissions from redevelopment as well as new development, an area-wide average of approximately 25 percent of existing development is assumed to be demolished and reconstructed over the same time period. Using this approach, it is assumed that 90 dwelling units and a total of 124,589 sf of nonresidential uses would be constructed every year for 20 years. A detailed breakdown of land uses is provided in Appendix B. Model defaults were used to estimate emissions associated with construction equipment. Construction emission estimates include compliance with the BAAQMD Basic Construction Mitigation Measures that are recommended for all projects.

Table 4.2-4 (Construction Daily Maximum Air Pollutant Emissions) presents a summary of estimated maximum daily air pollutant emissions for each construction phase associated with estimated annual construction under the proposed project. It is assumed that each phase of construction would generally occur consecutively.

Table 4.2-4 Construction Daily Maximum Air Pollutant Emissions

Construction Phase	*Maximum Daily Emissions (pounds/day)*					
	ROG	*NO_x*	*CO*	*SO_X*	*PM_{10}*	*$PM_{2.5}$*
Demolition	5	50	38	<1	3	2
Fine Grading[a]	9	**108**	95	<1	10	6
Trenching	2	17	12	<1	1	1
Building	5	34	29	<1	3	2
Paving	2	25	16	<1	2	1
Architectural Coating	**74**	3	3	<1	<1	<1
Significance Threshold	**54**	**54**	**—**	**—**	**82[b]**	**54[b]**
Significant Impact?	**Yes**	**Yes**	—	—	No	No

SOURCE: CalEEMod Version 2013.2.2 (see Appendix for model output).
Emission quantities are rounded to the nearest whole number. Exact values are provided in Appendix B.

a. Includes watering twice daily and an on-site speed limit of 15 miles per hour in compliance with BAAQMD Basic Construction Mitigation Measures. Assumes that the entire development acreage would be graded, and approximately 10 percent of the area would be excavated to a depth of 5 feet and exported offsite.

b. BAAQMD applies these thresholds only to exhaust emissions. For the purposes of this programmatic analysis, the thresholds are conservatively applied to total emissions from fugitive dust and exhaust.

The estimate of construction emissions indicates that development allowed under the proposed project would result in significant emissions of ROGs and NO_X during construction. Therefore, a potentially significant impact would occur. Mitigation measure MM4.2-1 requires implementation of the BAAQMD Additional Construction Mitigation Measures as necessary for individual projects to reduce construction emissions to below significance thresholds. Emissions reductions associated with these mitigation measures was quantified using CalEEMod based on the methodology outlined in the BAAQMD CEQA Guidelines. Reductions are provided in Table 4.2-5 (Mitigated Maximum Daily Construction Emissions). As shown in Table 4.2-5, implementation of the Additional Construction Mitigation Measures would reduce ROG emissions to below a level of significance, but NO_X emissions would still potentially exceed the threshold. However, it is useful to keep in mind that these results reflect the assumption of equal amounts of development occurring each year. Realistically, construction emissions for all pollutants may be greater or lower depending on how development is implemented.

Table 4.2-5 Mitigated Maximum Daily Construction Emissions

Scenario	*Maximum Daily Emissions (pounds/day)*					
	ROG	*NO_X*	*CO*	*SO_X*	*PM_{10}*	*$PM_{2.5}$*
Worst-Case Maximum Daily Emissions	74	108	95	<1	10	6
Worst-Case Maximum Daily Emissions with Implementation of MM4.2-1	41	**100**	95	<1	9	5
Significance Threshold	**54**	**54**	**—**	**—**	**82**	**54**
Significant Impact?	No	**Yes**	—	—	No	No

SOURCE: CalEEMod Version 2013.2.2 (see Appendix B for model output).
Emission quantities are rounded to the nearest whole number. Exact values are provided in Appendix B.

MM4.2-1 *Construction emissions for all future development under the Specific Plan shall be quantified prior to the start of construction. For projects where construction emissions are anticipated to exceed the most recent City-adopted thresholds, in addition to the BAAQMD Basic Construction Mitigation Measures, construction activities shall implement the BAAQMD Additional Construction Mitigation Measures to reduce construction emissions of criteria air pollutants to below significance criteria. Mitigation reductions shall be quantified prior to the start of construction to demonstrate that adequate measures have been identified to reduce project emissions. The Additional Construction Mitigation Measures include the following:*

1. *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.*
2. *All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.*
3. *Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.*
4. *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.*
5. *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.*
6. *All trucks and equipment, including their tires, shall be washed off prior to leaving the site.*
7. *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.*
8. *Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than 1 percent.*
9. *Minimizing the idling time of diesel powered construction equipment to two minutes.*
10. *The project 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 NO_X reduction and 45 percent PM reduction compared to the most recent California ARB 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 such become available.*
11. *Use low-ROG coatings beyond the local requirements (i.e., Regulation 8, Rule 3: Architectural Coatings).*
12. *All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of NO_X and PM.*
13. *All contractors shall use equipment that meets California ARB's most recent certification standard for off-road heavy-duty diesel engines.*

Operational Emissions

Development under the Specific Plan would result in operational emissions of air pollutants from area and vehicular sources, as described below. Impacts associated with implementation of the proposed project are based on the net increase in development between existing conditions and a 20-year redevelopment timeframe. Existing development within the study area and additional development that

would be accommodated under the plan are shown in Table 4.2-6 (Existing and Proposed Land Uses). Existing operational emissions are shown in Table 4.2-7 (Operational Daily Maximum Emissions—Existing).

Table 4.2-6 Existing and Proposed Land Uses

Land Use Designation	*Existing Conditions*	*Additional Development Under Specific Plan*
Residential	1,426 dwelling units	1,435 dwelling units
Downtown Commercial	602,643 sf	—
Auto-serving Commercial	54,664 sf	—
Business Commercial	129,884 sf	511,780 sf
Hotel	285,165 sf	—
Industrial	797,055 sf	21,250 sf
Institutional	150,142 sf	—
Commercial	—	268,800 sf
Office	—	—
Office/R&D	—	1,185,049 sf
Institutional (sf)	150,142	—

Table 4.2-7 Operational Daily Maximum Emissions—Existing

Emission Source	*Maximum Daily Emissions (pounds/day)*					
	ROG	*NO_x*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Area Sources						
Natural Gas	4	39	25	<1	3	3
Landscape	4	1	122	<1	1	1
Consumer Products	86	—	—	—	—	—
Architectural Coatings	13	—	—	—	—	—
Hearths	506	7	625	<1	89	89
Area Source Subtotal	*613*	*47*	*772*	*1*		
Vehicular Sources	236	576	2,110	3	217	64
Total Existing	***849***	***623***	***2,882***	***4***	***310***	***157***

SOURCE: CalEEMod, Version 2013.2.2.
Emission quantities are rounded to the nearest whole number. Exact values are provided in Appendix B.

The CalEEMod air quality model was used to estimate operational emissions associated with area and vehicular sources. The net change in emissions that would occur as a result of the project was calculated by subtracting the emissions associated with existing development from the total emissions associated with the 20-year build-out of the proposed project. Area sources of air pollutant emissions associated with the proposed project include fuel combustion emissions from space and water heating, fuel combustion emissions from landscape maintenance equipment, fuel and wood burning in hearths, and

ROG emissions from periodic repainting of interior and exterior surfaces. Increased volumes of vehicles associated with the operation of the land uses accommodated by the Specific Plan would also contribute to regional emissions of NO_X, ROG, CO, sulfur oxide (SO_X), $PM_{2.5}$, and PM_{10} from fuel combustion.[4] The net increase in estimated operational air pollutant emissions from the 20-year build-out of the Specific Plan is shown in Table 4.2-8 (Operational Daily Maximum Emissions—Proposed Project).

Table 4.2-8 Operational Daily Maximum Emissions—Proposed Project

Emission Source	*Maximum Daily Emissions (pounds/day)*					
	ROG	*NO_x*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Area Sources						
Natural Gas	8	73	46	<1	6	6
Landscape	7	3	238	<1	1	1
Consumer Products	159	—	—	—	—	—
Architectural Coatings	24	—	—	—	—	—
Hearths	508	7	625	<1	90	90
Area Source Subtotal	*706*	*83*	*909*	*0*	*97*	*97*
Vehicular Sources[a]	197	409	1,746	5	323	91
Total Specific Plan Build-Out	***903***	***492***	***2,655***	***6***	***420***	***188***
Existing Conditions (2012 baseline)	849	623	2,882	4	310	157
Net Change from Baseline	***54***	***-131***	***-227***	***2***	***110***	***31***
Significance Threshold	**54**	**54**	**—**	**—**	**82**	**54**
Significant Impact?	No	No	No	No	**Yes**	No

SOURCE: CalEEMod, Version 2013.2.2.

Emission quantities are rounded to the nearest whole number. Exact values are provided in Appendix B.

a. Vehicular emissions would decrease over time due to increasingly stringent emissions requirements. A vehicle model year of 2022 was used for the analysis to average the near-term vehicular emission that would be similar to existing conditions (2012) with the reduced vehicular emissions that would be anticipated in 2032.

As shown in Table 4.2-8, development under the proposed project would result in increased ROG, PM_{10}, and $PM_{2.5}$ emissions over the 20-year planning horizon. Area source emissions of NO_X and CO would also result from anticipated maximum development under the plan (25 percent of parcels in the study area). However, the anticipated increases in vehicle efficiencies by 2022 would result in a reduction in NO_X and CO emissions from vehicles compared to existing conditions even though there is an overall increase in vehicle use. Implementation of the Specific Plan would not result in significant ROG, NO_X, CO, SO_2, and $PM_{2.5}$ emissions because emissions of NO_x and CO would be reduced at the planning horizon of the plan compared to existing conditions, and emissions of ROG, SO_2, and $PM_{2.5}$ would not exceed the significance threshold. However, the proposed project would result in a level of PM_{10}

[4] Trip generation used in the model was based on the Fehr & Peers, *South San Francisco Station Area Land Use Plan: EIR Transportation Analysis assumptions* (February 14 2014). The transportation analysis uses internal project information such as land use mix, project area, intersection density, and transit stop placement, as well as local and regional demographic data such as average household size and vehicle ownership, employment within 1 mile of the site, and employment within a 30-minute transit trip to determine the trip rates for each land use type.

emissions that would exceed the significance thresholds. Currently, no information pertaining to the land use and overall size of individual projects under the Specific Plan is available. As such, individual operational emissions cannot be quantified at the planning level. Projects proposed under the Specific Plan would be required to determine whether an individual project would substantially increase particulate matter emissions to a level that would exceed the significance thresholds as part of the CEQA process. Therefore, impacts related to emissions of PM_{10} during project operation are potentially significant.

The BAAQMD recommends mitigation measures for reducing operational emissions of criteria air pollutant in its CEQA Guidelines. The recommended mitigation measures focus on land use strategies to reduce vehicle trips, including a mix of land uses, providing retail uses near residences, transit service, and bicycle and pedestrian facilities. These measures have already been incorporated into the plan and are accounted for in the traffic analysis for the project. The BAAQMD also recommends measures that cannot be implemented at a program level, but are available as options for future individual development projects to reduce particulate matter emissions. Mitigation measure MM4.2-2 recommends implementation of these recommendations as necessary to reduce individual project emissions to below a significant level. Reductions associated with these measures were quantified using the CalEEMod model and are provided in Table 4.2-9 (Mitigated Maximum Daily Operational Emissions). As shown in Table 4.2-9, the BAAQMD recommended mitigation measures would reduce operational impacts to a less than significant level.

Table 4.2-9 Mitigated Maximum Daily Operational Emissions

Scenario	*Maximum Daily Emissions (pounds/day)*					
	ROG	*NO_X*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Mitigated Total Specific Plan Emissions	897	452	2,516	5	378	177
Existing Conditions (2012 baseline)	849	623	2,882	4	310	157
Net Change from Baseline	***48***	***-171***	***-366***	***1***	***68***	***20***
Significance Threshold	**54**	**54**	**—**	**—**	**82**	**54**
Significant Impact?	No	No	No	No	No	No

SOURCE: CalEEMod, Version 2013.2.2.
Emission quantities are rounded to the nearest whole number. Exact values are provided in Appendix B.

MM4.2-2 *Prior to issuance of a building permit for future development projects under the Specific Plan, the applicant shall demonstrate implementation of recommended BAAQMD operational mitigation measures as necessary to reduce operational emissions of criteria air pollutants to below significance criteria. Operational emissions and mitigation reductions will be quantified prior to issuance of the building permit to demonstrate that adequate measures have been identified to reduce project emissions. The recommended measures include, but are not limited to, any of the following:*

1. *Increase on-street parking fees.*
2. *Daily parking charge for employees.*
3. *Provide a parking "cash-out" incentive for employees who use alternative transportation to commute.*
4. *Provide subsidized or free transit passes to employees.*

5. *Encourage alternative compressed work schedules and telecommuting.*
6. *Provide a ridesharing program.*

Construction and operations emissions of criteria air pollutants from the proposed project are considered a potentially significant impact. Implementation of mitigation measure MM4.2-2 has the potential to reduce operational emissions to a less-than-significant level; however, as it is unknown if each individual project developed under the Specific Plan would be able to implement mitigation to successfully reduce all criteria pollutant impacts to less-than-significant levels, as a conservative determination, this impact is considered potentially significant. While implementation of mitigation measure MM4.2-1 and MM4.2-1 have the potential to reduce air pollutant emissions from construction by requiring compliance with BAAQMD construction mitigation measures, and operation through the reduction of project-related trips, they cannot guarantee that emissions would be lessened to below a significance level. Therefore, even with implementation of mitigation, construction and operational emissions would be ***significant and unavoidable*** impacts.

Threshold	Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?

Impact 4.2-3 **Implementation of the proposed project would result in a cumulatively considerable net increase of a criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors). This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.**

The Bay Area Basin is considered "nonattainment" for ozone and $PM_{2.5}$ federal standards, and is considered "nonattainment" for state standards for ozone, PM_{10}, and $PM_{2.5}$. According to the BAAQMD, a project would be cumulatively significant if operational-related criteria pollutant emissions would exceed the lead agency's significance thresholds for operational emissions. As discussed under Impact 4.2-2, and shown in Table 4.2-8 (Operational Daily Maximum Emissions—Proposed Project), operation of the proposed project would have the potential to result in significant emissions of PM_{10}. This is considered a potentially significant impact. However, implementation of mitigation measure MM4.2-2 would reduce this impact to ***less than significant*** by reducing operational emissions to below the significance thresholds.

Threshold	Would the project expose sensitive receptors to substantial pollutant concentrations?

Impact 4.2-4 **Implementation of the proposed project would expose sensitive receptors to substantial pollutant concentrations. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.**

Sensitive receptors include day care centers, schools, retirement homes, hospitals, medical patients in residential homes, or other facilities that may house individuals with health conditions that would be

adversely impacted by changes in air quality. The two primary pollutants of concern regarding health effects for land development projects are carbon monoxide and TACs. Impacts related to these pollutants are described below.

Localized CO Concentrations

The CALINE4 model was used to predict CO concentrations with project traffic at Specific Area intersections that would operate at a LOS F with implementation of the project. CO concentrations were modeled at 30 feet from the roadway. The results of these calculations are presented in Table 4.2-10 (Future Carbon Monoxide Concentrations). Future CO concentrations along the intersections that would operate at LOS F with implementation of the project would not exceed the national and state 1-hour and 8-hour ambient air quality standards for CO. Therefore, implementation of the project would not expose any sensitive receptors located in close proximity to these intersections to substantial pollutant concentrations. This impact would be ***less than significant***.

Table 4.2-10 Future Carbon Monoxide Concentrations

Intersection	*1-Hour CO Concentration (ppm)*	*8-Hour CO Concentration (ppm)*	*Impact?*
Significance Threshold	**20.0 (State) 35.0 (Federal)**	**9.0 (State and Federal)**	**—**
East Grand Ave/Gateway Blvd	1.9	1.3	No
Grand Ave/Linden Ave	1.7	1.2	No
Grand Ave/Airport Blvd	1.8	1.3	No
Baden Ave/Linden Ave	1.6	1.1	No
San Mateo Ave/Airport Blvd	1.8	1.3	No
Airport Blvd/Gateway Blvd	1.8	1.3	No

SOURCE: CALINE 4 using EMFAC 2011 emission factors (see Appendix B for model output sheets)

CO = carbon monoxide

Modeling assumptions: One-hour carbon monoxide concentrations were calculated using the worst-case wind angle scenario in the CALINE 4 model. Receptor locations were set 30 feet from the roadway centerline. Carbon monoxide emission factors were generated using the EMFAC 2011 model for year 2012 for the total vehicle mix during conditions in January at a temperature of 40°F and 50 percent relative humidity. The assumed vehicle speed is 5 miles per hour. An ambient 1-hour carbon monoxide concentration of 1.37 ppm was used to reflect ambient conditions. The 8-Hour carbon monoxide concentration is based on a persistence factor of 0.7 for urban uses (Caltrans 1998).

Toxic Air Contaminants (TAC)

According to the BAAQMD CEQA Guidelines, common stationary sources of TAC emissions include gasoline stations, dry cleaners, and diesel backup generators, which are subject to BAAQMD permit requirements. Industrial operations may also result in permitted TAC emissions. However, the most common source of TACs in communities is diesel particulate matter (DPM) emissions from on-road motor vehicles on freeways and roads such as trucks and cars, and off-road sources such as construction equipment, ships and trains.

Potential stationary sources of TACs in the study area include mixed industrial uses south of Railroad Avenue, along the northern edge of the study area along the PG&E corridor, and east of the Caltrain

line. With implementation of the Specific Plan, these areas would continue to be designated for nonresidential use. No residential land uses or other sensitive receptors are proposed east of the Caltrain Station. As such, a significant increase in exposure of sensitive receptors to TACs would not occur in this area. The proposed Downtown High Density Residential area proposes increased residential density adjacent to the existing industrial avenue located south of Railroad Avenue, and new mixed-use residential development may be accommodated north of Armour Avenue. However, industrial operations that are stationary sources of TACs are subject to permitting by the BAAQMD. Residences are already present adjacent to Railroad Avenue and industrial uses at the northern edge of the study area; therefore, existing industrial sources are permitted to minimize risks to existing sensitive receptors. Any new industrial land uses south of Railroad Avenue would be required to demonstrate compliance with BAAQMD emissions requirements in order to obtain a permit to operate. The area along the PG&E corridor would be redesignated for commercial use. Therefore, the proposed project would not result in a substantial increase in risk of exposure to TAC emissions from industrial operations.

Gas stations and dry cleaners are located throughout the area. The ARB recommends that sensitive receptors not be sited within 300 feet of any dry cleaning operation or large gas station with a throughput of 3.6 million gallons per year. A 50 foot separation is recommended for typical gas dispensing facilities. The Specific Plan proposes to increase the density of residences and commercial uses in the study area. Therefore, new sensitive receptors may be located within the screening distances of existing dry cleaning and gas station operations. Likewise, new gas stations and dry cleaning operations may be proposed within the screening distances of existing sensitive receptors. Additional health risk assessment would be required at the time new land uses are specifically proposed in order to determine whether a significant risk would occur. A requirement for future health risk assessments is required as mitigation for the project in order to reduce potential impacts to less than significant.

No large distribution centers exist in the area or would be accommodated by the Specific Plan. Existing and new commercial and industrial operations would require intermittent truck trips for deliveries. However, the ARB determined that ARB limits on unnecessary idling of diesel-fueled commercial vehicles, combined with increasingly more stringent exhaust standards would reduce localized impacts from DPM emissions so that a significant health risk would not occur as a result of typical commercial and industrial operations. The ARB limits are state regulation and not required as mitigation for future projects.

Mobile sources of DPM with the potential to result in significant health risks include major roadways and the Caltrain rail line. The California ARB Air Quality and Land Use Handbook lists freeways and urban roads with 100,000 vehicles per day as a potential source of significant DPM.

Caltrain locomotives are currently diesel powered. The Peninsula Corridor Electrification Project is projected to be operational by 2019 and would replace existing diesel-powered trains with electric powered trains (Caltrain 2013). With implementation of the electrification project, no DPM emissions would result from Caltrain operations. The ARB does not identify operation of rail lines as a significant source of DPM, only rail yards, although the BAAQMD does recommend plantings at sensitive receptors adjacent to rail lines to reduce DPM exposure. An area of the Downtown Transit Core is located adjacent to the rail line and may accommodate new high-density residential development. In accordance with BAAQMD guidelines, landscaping should be planted between the rail line and new

residences to minimize DPM exposure. Mitigation is required to ensure compliance with this recommendation.

According to Caltrans data (2012), traffic volumes on US-101 in the study area exceed 200,000 vehicles per day. The ARB recommends that sensitive land uses should not be located within 500 feet of a freeway with more than 100,000 vehicles per day. The Specific Plan would accommodate new residential uses within 500 feet of US-101. Mitigation is required to ensure that new residents are not exposed to substantial concentrations of DPM.

Another source of DPM is construction equipment. Construction would occur temporarily throughout the study area as build-out of the Specific Plan occurs. As shown in Table 4.2-4, implementation of the proposed project would not result in potentially significant PM_{10} or $PM_{2.5}$ emissions during construction. Additionally, DPM is considered to contribute to long-term health effects, while construction activities would be short-term events. Construction would be spread throughout the study area and the same receptors would not be continually exposed to DPM from construction. Therefore, construction emissions would not result in a significant long-term health risk to nearby sensitive receptors.

Impacts related to TAC emissions from US-101, gas stations, and dry-cleaning facilities are considered a potentially significant impact. Additionally, mitigation is required to ensure compliance with BAAQMD recommendations related to the proximity of residential uses to the rail line. However, implementation of mitigation measures MM4.2-3 through MM4.2-5 would reduce this impact to a ***less-than-significant*** level.

MM4.2-3 Siting Sensitive Receptors near Potential TAC Source. *A Health Risk Assessment (HRA) shall be prepared by a qualified air quality professional for development of a project that would introduce new sensitive receptors in the study area within the siting distance for any use listed in ARB Air Quality and Land Use Handbook Table 1-1 (reproduced here as Table 4.2-11 [Recommendations on Siting New Sensitive Land Uses]). Sensitive receptors include day care centers, schools, retirement homes, hospitals, medical patients in residential homes, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. Such a project shall not be considered for approval until an HRA has been completed and approved by the City. The methodology for the HRA shall follow the Office of Environmental Health Hazard Assessment and BAAQMD guidelines for the preparation of HRAs. If a potentially significant health risk is identified, the HRA shall identify appropriate measures to reduce the potential health risk to below a significant level or the sensitive receptor shall be sited in another location.*

Table 4.2-11 Recommendations on Siting New Sensitive Land Uses

Source Category	*Advisory Recommendations*
Freeways and High-Traffic Roads	Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.
Distribution Centers	Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week) Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points.
Rail Yards	Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard. Within 1 mile of a rail yard, consider possible siting limitations and mitigation approaches.
Ports	Avoid siting new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the ARB on the status of pending analyses of health risks.
Refineries	Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult local air districts or the ARB on the status of pending analyses of health risks.
Chrome Platers	Avoid siting new sensitive land uses within 1,000 feet of a chrome plater.
Dry Cleaners Using Perchloroethylene	Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines provide 500 feet. For operations with three or more machines consult with the local air district. Do not site new sensitive land uses in the same building with perchloroethylene dry cleaning operations.
Gasoline Dispensing Facilities	Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50-foot separation is recommended for typical gas dispensing facilities.

SOURCE: California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective* (April 2005).

These recommendations are advisory. Land use agencies have to balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues.

Recommendations are based primarily on data showing that the air pollution exposures addressed here (i.e., localized) can be reduced as much as 80% with the recommended separation.

The relative risk for these categories varies greatly. To determine the actual risk near a particular facility, a site-specific analysis would be required. Risk from diesel PM will decrease over time as cleaner technology phases in.

These recommendations are designed to fill a gap where information about existing facilities may not be readily available and are not designed to substitute for more specific information if it exists. The recommended distances take into account other factors in addition to the available health risk data.

Site-specific project design improvements may help reduce air pollution exposures and should also be considered when siting new sensitive land uses.

This table does not imply that mixed residential and commercial development in general is incompatible. Rather it focuses on known problems like dry cleaners using perchloroethylene that can be addressed with reasonable preventative actions.

MM4.2-4 Siting of New Toxic Air Contaminant Sources Near Sensitive Receptors. *Prior to approval of any project that includes potential sources of significant TAC emissions that is not subject to a BAAQMD permit, that is proposed in a close proximity to a sensitive receptor, a Health Risk Assessment (HRA) shall be prepared by a qualified air quality professional. The land uses listed in ARB Air Quality and Land Use Handbook Table 1-1 (reproduced above as Table 4.2-11*

[Recommendations on Siting New Sensitive Land Uses]), shall be considered potentially significant sources of TAC emissions. Such a proposed project will be considered in close proximity to a sensitive receptor if it would be located within the siting distance outline for the use in Table 1-1 of the ARB Air Quality and Land Use Handbook. Sensitive receptors include day care centers, schools, retirement homes, hospitals, medical patients in residential homes, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. Such a project shall not be considered for approval until an HRA has been completed and approved by the City. The methodology for the HRA shall follow the Office of Environmental Health Hazard Assessment and BAAQMD guidelines for the preparation of HRAs. If a potentially significant health risk is identified, the HRA shall identify appropriate measures to reduce the potential health risk to below a significant level, or the proposed facility shall be sited in another location.

Threshold	Would the project create objectionable odors affecting a substantial number of people?

Impact 4.2-5 **Implementation of the proposed project would create objectionable odors affecting a substantial number of people. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.**

Construction associated with implementation of the Specific Plan could result in minor amounts of odor compounds associated with diesel heavy equipment exhaust; however, because the construction equipment would be operating at various locations throughout the Specific Plan boundary, construction would not take place all at once, and because any operations near existing receptors would be temporary, impacts associated with odors during construction are not considered significant.

The California ARB's Air Quality and Land Use Handbook and BAAQMD CEQA Guidelines include lists of the most common sources of odor complaints. Typical sources of odor complaints include facilities such as sewage treatment plants, landfills, composting stations, food manufacturing plants, recycling facilities, waste transfer stations, petroleum refineries, biomass operations, automobile body shops, coating operations, fiberglass manufacturing, foundries, rendering plants, and livestock operations. The proposed project would accommodate the construction of commercial, retail, office, and residential land uses that do not typically result in a source of nuisance odors associated with operation. However, the Specific Plan would also accommodate some new industrial land uses that would have the potential to produce objectionable odors during industrial processes and manufacturing. The California ARB and BAAQMD do not recommend separation distances for sources of odor; however, the development of new industrial uses within one mile of sensitive uses would have the potential to expose offsite receptors to objectionable odors.

With implementation of the Specific Plan, new industrial uses would be limited to the area south of Railroad Avenue and west of Airport Boulevard. This entire area may be located within one mile of odor sensitive receptors in residential and commercial areas. Not all industrial land uses produce objectionable odors. However, it is currently unknown what new industrial processes would be proposed under the Specific Plan. Industrial and manufacturing land uses that would result in air emissions generally require permitting from the BAAQMD. However, permitting would generally cover emissions that present health risks and may not eliminate odors. Therefore, impacts related to industrial land uses would be

potentially significant. However, implementation of mitigation measure MM4.2-6 would reduce this impact to a ***less-than-significant*** level.

MM4.2-6 *Prior to issuance of a certificate of occupancy for new industrial land uses identified in the BAAQMD CEQA Guidelines or ARB Air Quality and Land Use Handbook as a typical source of odors, the applicant shall demonstrate implementation of best management practices to minimize odors. Best management practices vary by industrial type. In all cases, exhaust vents should be located as far from sensitive receptors as possible. Best management practices recommended by the BAAQMD in the CEQA Guidelines shall be implemented as applicable, and may include the following:*

- *Vapor Recovery Systems*
- *Injection of masking odorants into process streams*
- *Thermal oxidation*
- *Carbon absorption*
- *Scrubbers*
- *Catalytic oxidation*

4.2.4 Cumulative Impacts

The geographic scope of cumulative impact analysis for air quality is the Bay Area Basin.

Threshold	Would the project conflict with or obstruct implementation of the applicable air quality plan?

Cumulative projects located in the Basin would have the potential to result in a cumulative impact to air quality plans if, in combination, they would conflict with or obstruct implementation of the Clean Air Plan. Cumulative projects located in the Bay Area Basin would generally be consistent with the Clean Air Plan Control Measures because projects would be required to demonstrate consistency with the Clean Air Plan as part of the project review process. However, cumulative growth in the region would have the potential to result in an increase in criteria pollutant emissions that would exceed BAAQMD or local lead agency thresholds, which the BAAQMD considers to be a conflict with the Clean Air Plan. Therefore, a potentially significant cumulative impact could occur. As discussed under Impact 4.2-1, the proposed project has the potential to hinder implementation of the Clean Air Plan and, therefore, could result in significant operational emissions even with implementation of mitigation measure MM4.2-2. Therefore, the proposed project would result in a cumulatively considerable contribution with respect to conflicts with air quality plans.

Threshold	Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?
Threshold	Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?

Cumulative impacts related to criteria pollutants are addressed above Impact 4.2-3. As discussed in this section, the Air Basin is in nonattainment for ozone, PM_{10}, and $PM_{2.5}$. Therefore, there is an existing significant cumulative impact. Even with implementation of mitigation measures MM4.2-1 and MM4.2-2, the construction and operation of the proposed project has the potential to exceed significance criteria for criteria pollutants. Therefore, the proposed project would result in a cumulatively considerable contribution to a potentially significant cumulative impact associated with criteria pollutants.

Threshold	Would the project expose sensitive receptors to substantial pollutant concentrations?

Carbon Monoxide

A cumulative impact related to CO hotspots would occur if the CO emissions from traffic generated by cumulative project development in the region would combine to create a CO hotspot. The traffic analysis (Fehr & Peers 2014) prepared for the proposed project analyzed potential traffic impacts associated with build-out of the Specific Plan planning horizon and existing cumulative development in the study area. Table 4.2-10 shows the maximum carbon monoxide concentration that would result from the most congested intersections with implementation of the proposed project. As shown in this table, a CO hotspot would not occur at the most congested intersections that would operate at LOS F with implementation of the proposed project. The bulk of traffic within the study area in the future would result from the anticipated land uses and has been accounted for in the project traffic analysis. Some additional traffic from regional growth may occur; however, CO concentrations are predicted to be well below significance thresholds, even at the most congested intersections. Therefore, a significant cumulative impact associated with CO hotspots would not occur.

Toxic Air Contaminants

Cumulative projects located in the Bay Area would have the potential to result in a significant cumulative impact associated with sensitive receptors if, in combination, they would expose sensitive receptors to a substantial concentration of TACs that would significantly increase cancer risk. Impacts would generally be localized and not cumulative in nature because impacts related to a particular source of TACs would be limited to the proximity of the source. However, implementation of cumulative projects would have the potential to generate diesel particulate matter from truck trips, which would not be limited to the close proximity of the individual project. Cumulative projects with the potential to generate substantial pollutant concentrations would be required to comply with the federal National Emissions Standards for Hazardous Air Pollutants (NESHAPS) program as well as ARB programs to reduce diesel emissions. Similar to the proposed project, cumulative projects located in adjacent jurisdictions would be required to comply with the California ARB's recommendations for siting new sensitive receptors and requirements for reducing diesel emissions. Stationary sources would be required to obtain operating permits from the

BAAQMD and comply with emission thresholds for TACs. Therefore, the proposed project, in combination with other cumulative projects in the region would result in a less significant cumulative impact associated with sensitive receptors.

Threshold	Would the project create objectionable odors affecting a substantial number of people?

Odor impacts are localized in nature and cumulative projects would not combine to result in a cumulative odor impact because odors are limited to the area immediately surrounding its source. Similar to what is required for the proposed project in MM4.2-6, cumulative projects would be reviewed and compared to BAAQMD CEQA Guidelines and implement odor reducing recommendations as applicable. Therefore, the proposed project, in combination with other cumulative projects, would result in a less than significant cumulative impact associated with objectionable odors.

4.2.5 References

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4.3 CULTURAL RESOURCES

This section of the EIR analyzes the potential environmental effects on cultural resources from implementation of the proposed project. One comment letter addressing cultural resources was received in response to the notice of preparation (NOP) circulated for the proposed project.

Data used for the preparation of this section were taken from the City of South San Francisco General Plan Open Space and Conservation Element (South San Francisco 1999) and other relevant documents. Full reference-list entries for all cited materials are provided in Section 4.3.5 (References).

4.3.1 Environmental Setting

Cultural resources are frequently defined in terms of tangible materials attributed to a culture. These include districts, sites, structures, artifacts, and other evidence of human use considered important to a culture or community for scientific, traditional, religious, or other reasons. Cultural resources may be historical, archaeological, architectural, or archival in nature.

The study area has been highly disturbed by urban development, including the construction of US-101 in 1926 and the expansion of the Downtown area originating from Grand Avenue. The study area includes a wide variety of land uses, including commercial, residential, business commercial, parking, and transportation uses, as well as a small number of vacant parcels. The City was established in 1827 as a portion of the Old Rancho Buri Buri, which was provisionally granted by the Mexican Government to Jose Antonio Sanchez and grew due to strong industrial presence until the City became the central distribution point for the entire peninsula by the 1930s. The City of South San Francisco was incorporated on September 19, 1908, with 1,989 residents and fourteen major industries.

As illustrated in Figure 3-1 (Project Location and Regional Vicinity), the proposed Specific Plan study area is generally bounded by the Sign Hill and Downtown Neighborhoods on the west, Paradise Valley Neighborhood to the north, business and technology park land uses to the east, and the Lindenville Neighborhood to the south. The Colma Creek Canal is located in the southern portion of the study area.

The 1986 Historic Resources Inventory recommended designation of the Downtown South San Francisco Historical Commercial District. The proposed district extends along Grand Avenue from Airport Boulevard to Maple Street, just below City Hall and also includes Linden Avenue to a distance of one block from Grand Avenue. The district is comprised of late 19th and early mid-20th century one-, two-, and three-story commercial buildings, with a pattern of large or architecturally prominent buildings at street corners. Several structures have residential apartments above the street level. Formal designation of the Historical District would be an important economic development initiative in generating interest and support for efforts to revitalize the commercial area.

Prehistoric Setting

The first survey of archaeological sites in the San Francisco Bay region was led by N.C. Nelson for the University of California at Berkeley between 1906 and 1908, documenting 425 shell mounds. These shell mounds typified Bay Area archaeology and reflected its economic unity, which relied heavily on marine

resources. Cultural materials discovered at the University Village Complex (SMA-227) in San Mateo County indicate that the San Francisco Peninsula Region was inhabited between circa 3500 and 2500 B.C. Excavation and analysis of that site showed that the complex is earlier than "middle Horizon", yet unlike "Early Horizon" deposits, which has led excavators to believe that a pre-Costanoan or Early Bay culture once existed (Dyett & Bhatia 2011).

Historical Setting

Native American Period

The open exposure, easy slope, availability of fresh water, and location along one of only two easy routes up and down the Peninsula made the current location of South San Francisco an attractive settlement area for the Ohlone Indians prior to the European invasion. Several villages were located in the territory of the Urebure tribelet when the Spanish arrived, including occupations along Colma Creek (Dyett & Bhatia 2011).

Spanish Period

The first Europeans to reach the San Francisco area were Spanish explorers. An expedition lead by Juan Bautista de Anza in 1776 resulted in the establishment of Mission San Francisco de Asís (Mission Delores). A few months later, Mission Santa Clara de Asís was founded to the south. The El Camino Real (which is just west of the study area) became a heavily traveled route between the two missions and their outposts (Dyett & Bhatia 2011).

Mexican Period

During the Mexican rule of California (1822 through 1848), large tracts of land were issued to private individuals, usually cattle ranchers and hide and tallow traders. The study area was part of the 1820s' Mexican "Rancho Buri Buri" Land Grant, one of the largest on the peninsula (Dyett & Bhatia 2011).

Early American Period

The present City of South San Francisco was the general location for the early, never-incorporated nineteenth century agricultural community of "Baden". The early agricultural/pastoral community of Baden was the location of the "12 Mile House" stage stop and public house on Mission Road as early as 1853.

Baden came into being when cattleman Charles Lux bought 1,500 acres of Rancho Buri Buri in 1856 and built a large house near the creek and study area. Two years later, he and rancher Henry Miller founded a cattle company, which supplied San Francisco stockyards for the next 30 years with the cattle being driven up El Camino to Baden and then into San Francisco.

The first local railroad ran through Baden when it began regular service down the Peninsula in 1863. After Lux died in 1888, meatpacking titans Swift and Armour joined forces to form the South San Francisco Land and Improvement Company and bought Lux's land plus 2,000 acres more to begin the City of South San Francisco.

City of South San Francisco

The meat industry played an important role in South San Francisco's evolution as the industry influenced the growth and organization of the City. The Gustavus Swift meat packing plant, established on Point San Bruno in 1888, was the City's first industrial development and later organized a "beef trust" with other Midwestern meat packing companies to join in building a community of stockyards and packing plants on Point San Bruno, which laid the foundation for the development of the industrial town.

In 1890, the South San Francisco Land and Improvement Company purchased 3,400 acres on the former site of the Rancho Buri Buri for development of the town. The arrangement of residential and industrial uses intentionally took advantage of stable ground and Bay access at Point San Bruno, as well as the prevailing winds from San Bruno Gap that blew offensive odors away from residential areas and over the Bay. The town continued to grow with the construction of the Southern Pacific Railroad (SPRR) in 1904–1907, which connected San Francisco and San Jose and expanded opportunities for goods shipping. The steel industry began to take advantage of the City's abundant land and excellent transportation offered by the SPRR, which resulted in a lack of housing and services within the City. Some of the City's major establishments included Bethlehem Steel, U.S. Steel, and the Edwards Wire Rope Factory, which helped to construct California's modern transportation and communication infrastructure. The City was incorporated on September 19, 1908, which allowed the City to control its industrial future and provided the services needed to attract resident workers.

Grand Avenue was, and continues to be, the spine of the City's commercial core, extending west from the industrial areas, and almost reached El Camino Real by incorporation in 1908. Due to Sign Hill to the north and marshlands to the south, city growth was limited to expand with a strong east-west orientation. The east-west orientation was further reinforced by a directional city grid pattern of 950 by 300 foot blocks. After incorporation, the City's civic improvements kept pace with the growing industries, with the opening of City Hall in 1920 and the development of Orange Memorial Park in 1925.

The City continued to grow through the century as industrial expansion occurred on Point San Bruno as the steel industry continued to locate in South San Francisco in the 1920s. The city grid continued to evolve to conform to the topography and pre-existing roadways but southern expansion was limited by marshlands. Industrial growth during and after the Second World War fueled unprecedented expansion within the City, where fill and drainage projects opened many areas for development. By the end of the century, few pockets of undeveloped land remained as infill development continued along the Bayshore Freeway and El Camino Real. Other major developments included Interstate 280 (I-280), which opened up the Westborough area for development, and bay filling projects at the airport, Oyster Point, and Sierra Point (South San Francisco 1999).

Recorded Resources within South San Francisco

California Historical Resources Information System (CHRIS) Records Search

A records search was performed by an Atkins archaeologist at Northwest Information Center (NWIC) located at Sonoma State University, Rohnert Park (Atkins 2014). The records search included a review of previous cultural resources surveys and documented resources for the study area and all lands found within 0.50-mile radius. The search also included a review of historic building surveys, archival maps, and

various current inventories, including the National Register of Historic Places (NRHP), California Register of Historic Resources (CHCR), California Historical Landmarks (CHL), California Points of Interest (CPHI), and the California State Historic Resources Inventory (HRI).

The results of the record search indicated that twenty-five previous studies have been completed within the Specific Plan study area; seven cultural resources (four dating to the historic era and three to the prehistoric era) have been recorded within the study area (as shown in Table 4.3-1), and another twelve cultural resources have been identified within 0.50 mile of the study area. Additionally, it was identified that only 50 percent of the study area has been surveyed for the presence of cultural resources; however, many of these studies are dated ten years or older. The seven previously identified cultural resources within the study area include three prehistoric deposits, including potential shell mounds, historic buildings, and historic infrastructure elements, such as rail lines and transmission lines.

Table 4.3-1 Known Cultural Resources within Study Area

Site Number	*Resource Description*
41-000045	Possible Shell Mound
41-000050	Prehistoric site of unknown characteristics
41-000406	Spruce School
41-000497	C-San Francisco South-3 Rail Alignment (built in the late 1800's)
41-002147	Historic era refuse scatter (possibly destroyed)
41-002207	Prehistoric shell midden deposits located under pavement
41-002318	Historic transmission line tower circa 1956

Historic Resources

The Historic Preservation Commission was appointed by the City Council in 1986 to identify South San Francisco's most important historic sites and structures. The Commission was charged with protecting these resources from needless neglect, exterior alteration that might destroy historic and architectural value, or demolition. These goals are accomplished by designating landmarks as historic resources, which have a special status and recognition in the community as these structures are important representatives of the past and present spirit of the City. In 2011, Ordinance 1440 was approved by the City Council amending the Historic Preservation Commission ordinance to transfer the role and responsibilities of the Historic Preservation Commission to the Planning Commission. Presently, the City has designated twenty-one structures as historic resources, including City Hall, the Grand Avenue Library, the State Building, and the Sign Hill Letters. Eight of these twenty-one historic resources are located within the study area.

Twelve historic resources were identified within the Specific Plan study area from the CHRIS records search and the City's list of Historic Resources. The CHRIS records search identified four historic resources, which include the Spruce School, the C-San Francisco South-3 Rail Alignment, which was originally constructed in the late 1800s, a historic era refuse scatter, which possibly no longer remains, and a historic transmission line tower originally constructed circa 1956. The City's List of Historic Resources identified eight additional historical resources, which have not been added to the CHRIS

database. These historical resources include the Bertucelli House, the "Enterprise Journal Building," Donors Sidewalk, Carnegie Library, City Hall/Civic Center, "Bank of South San Francisco," Giffa Building, and the Metropolitan Hotel. However, due to the lack of complete surveying of the study area and the strong industrial history of South San Francisco, the study area still holds the potential to have historic structures and other infrastructure that could prove to meet the eligibility criteria for the California Register of Historic Resources.

Archaeological Resources

Three archaeological resources sites have been identified within the study area, which includes a possible shell mound, a prehistoric site of unknown characteristics, and a prehistoric shell midden deposit located under pavement. Due to the rich prehistoric habitation history of the region, and the City's history as a center of industry, combined with the lack of complete surveying of the study area, the study area still holds the potential to have historic and prehistoric archaeological deposits.

Paleontological Setting

Paleontological resources include fossil remains, as well as fossil localities and rock or soil formations that have produced fossil material. Fossils are the remains or traces of prehistoric animals and plants. Fossils are important scientific and educational resources because of their use in documenting the presence and evolutionary history of particular groups of now extinct organisms, reconstructing the environments in which these organisms lived, determining the relative ages of the strata in which they occur and of the geologic events that resulted in the deposition of the sediments that formed these strata, and in their subsequent deformation.

The City of South San Francisco is located on the South San Francisco Bay Block, which is underlain by the Whiskey Hill Formation (USGS n.d.). This formation has the potential to contain significant fossils (California PUC 2003). The University of California Museum of Paleontology (UCMP) specimens list contains more than 300 localities where fossils have been found in San Mateo County. At least one locality is located within the City of South San Francisco. The locality contains records for the genus Equus, which includes horses, donkeys, and zebras. The genus Equus also includes numerous extinct species known only from fossils. The UCMP does not provide the exact location of where the Equus fossil was found in South San Francisco, but the lithology of the fossil is identified as mudstone, which is located in areas near the Bay and in the San Bruno Mountains. In addition, due to the built out nature of the study area, it is unlikely that the locality of the fossil is in the study area.

4.3.2 Regulatory Framework

Federal, state, and local governments have developed laws and regulations designed to protect significant cultural resources that may be affected by actions that they undertake or regulate. The National Historic Preservation Act of 1966 (NHPA) and CEQA are the basic federal and state laws governing the preservation of historic and archaeological resources of national, regional, state, and/or local significance.

Federal

The National Historic Preservation Act of 1966

Federal regulations for cultural resources are primarily governed by NHPA Section 106, which applies to actions taken by federal agencies. The goal of the Section 106 review process is to offer a measure of protection to sites that are determined eligible for listing on the NRHP. The criteria for determining NRHP eligibility are found in 36 Code of Federal Regulations (CFR) Part 60. NHPA Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties and affords the federal Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The Council's implementing regulations, "Protection of Historic Properties," are found in 36 CFR Part 800. The NRHP criteria (contained in 36 CFR 60.4) are used to evaluate resources when complying with NHPA Section 106. Those criteria state that eligible resources comprise districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and any of the following:

(a) Are associated with events that have made a significant contribution to the broad patterns of our history
(b) Are associated with the lives of persons significant in our past
(c) Embody the distinctive characteristics of a type, period, or method of construction, or that possess high artistic values, or that represent a significant distinguishable entity whose components may lack individual distinction
(d) Have yielded or may be likely to yield, information important to history or prehistory

Eligible properties must meet at least one of the criteria and exhibit integrity. Historical integrity is measured by the degree to which the resource retains its historical properties and conveys its historical character, the degree to which the original fabric has been retained, and the reversibility of changes to the property. Three of the four criteria are meant to apply to historic structures; however, Criterion D is also sometimes associated with archaeological and paleontological materials.

Archaeological site evaluation assesses the potential of each site to meet one or more of the criteria for NRHP eligibility based upon visual surface and subsurface evidence (if available) at each site location, information gathered during the literature and records searches, and the researcher's knowledge of and familiarity with the historic or prehistoric context associated with each site.

The American Indian Religious Freedom Act, Title 42 United States Code, Section 1996, protects Native American religious practices, ethnic heritage sites, and land uses.

State

The California Register of Historic Resources (Public Resources Code Sections 5020 et seq.)

Under CEQA, public agencies must consider the effects of their actions on both "historical resources" and "unique archaeological resources." Pursuant to Public Resources Code (PRC) Section 21084.1, a "project that may cause a substantial adverse change in the significance of an historical resource is a

project that may have a significant effect on the environment." Section 21083.2 requires agencies to determine whether proposed projects would have effects on "unique archaeological resources."

"Historical resource" is a term with a defined statutory meaning (refer to PRC Section 21084.1 and CEQA Guidelines Section 15064.5(a) and (b)). The term embraces any resource listed in or determined to be eligible for listing in the CRHR. The CRHR includes resources listed in or formally determined eligible for listing in the NRHP, as well as some California State Landmarks and Points of Historical Interest.

Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be "historical resources" for purposes of CEQA unless a preponderance of evidence indicates otherwise (PRC Section 5024.1 and California Code of Regulations Title 14, Section 4850). Unless a resource listed in a survey has been demolished, lost substantial integrity, or there is a preponderance of evidence indicating that it is otherwise not eligible for listing, a lead agency should consider the resource to be potentially eligible for the CRHR.

In addition to assessing whether historical resources potentially impacted by a proposed project are listed or have been identified in a survey process, lead agencies have a responsibility to evaluate them against the CRHR criteria prior to making a finding as to a proposed project's impacts to historical resources (PRC Section 21084.1 and CEQA Guidelines Section 15064.5(a)(3)). In general, an historical resource, under this approach, is defined as any object, building, structure, site, area, place, record, or manuscript that:

(a) Is historically or archeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political or cultural annals of California; and
(b) Meets any of the following criteria:
    1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage
    2) Is associated with the lives of persons important in our past
    3) 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
    4) Has yielded, or may be likely to yield, information important in prehistory or history

    (CEQA Guidelines Section 15064.5(a)(3))

Archaeological resources can sometimes qualify as "historical resources" (CEQA Guidelines Section 15064.5(c)(1)). In addition, PRC Section 5024 requires consultation with the Office of Historic Preservation when a project may impact historical resources located on State-owned land.

For historic structures, CEQA Guidelines Section 15064.5(b)(3), indicates that a project that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, or the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings shall mitigate impacts to a level of less than significant. Potential eligibility also rests upon the integrity of the resource. Integrity is defined as the retention of the resource's physical identity that existed during its period of

significance. Integrity is determined through considering the setting, design, workmanship, materials, location, feeling, and association of the resource.

As noted above, CEQA also requires lead agencies to consider whether projects will impact "unique archaeological resources." PRC Section 21083.2(g), states that "'unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

  (PRC Section 21083.2(g))

Treatment options under Section 21083.2 include activities that preserve such resources in place in an undisturbed state. Other acceptable methods of mitigation under Section 21083.2 include excavation and curation or study in place without excavation and curation (if the study finds that the artifacts would not meet one or more of the criteria for defining a "unique archaeological resource").

Advice on procedures to identify cultural resources, evaluate their importance, and estimate potential effects is given in several agency publications such as the series produced by the California Governor's Office of Planning and Research (OPR). The technical advice series produced by OPR strongly recommends that Native American concerns and the concerns of other interested persons and corporate entities, including but not limited to, museums, historical commissions, associations and societies, be solicited as part of the process of cultural resources inventory.

California Health and Safety Code Sections 7050.5, 7051, and 7054

California Health and Safety Code Section 7050.5(b) specifies protocol when human remains are discovered. The code states:

> In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Chapter 10 (commencing with section 27460) of Part 3 of Division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of section 27492 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in section 5097.98 of the Public Resources Code.

CEQA Guidelines Section 15064.5(e)

CEQA Guidelines Section 15064.5(e) requires that excavation activities be stopped whenever human remains are uncovered and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the Native American Heritage Commission (NAHC) must be contacted within 24 hours. At that time, the lead agency must consult with the appropriate Native Americans, if any, as timely identified by the NAHC. Section 15064.5 directs the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

Senate Bill 18

As of March 1, 2005, Senate Bill 18 (Government Code Sections 65352.3 and 65352.4) requires that, prior to the adoption or amendment of a general plan proposed on or after March 1, 2005, a city or county must consult with Native American tribes with respect to the possible preservation of, or the mitigation of impacts to, specified Native American places, features, and objects located within that jurisdiction. The City has begun tribal consultation as required under SB 18 and letters were sent to five tribes per the consultation list provided by the Native American Heritage Commission. The letters were dated May 12, 2014, and began the 90-day comment period. No comments were received.

Local

South San Francisco General Plan

The Historic and Cultural Resources Element of the City's General Plan indicates historic and local landmarks, historical resources, and archaeological resources within the City. The primary objective of the element is to identify the historic and cultural resources within the City in order to protect, preserve, and conserve the City's unique heritage. The following policies are applicable to historical and cultural resources.

Guiding Policies

Policy 7.5-G-1 Conserve historic, cultural, and archaeological resources for the aesthetic, educational, economic, and scientific contribution they make to South San Francisco's identity and quality of life.

Policy 7.5-G-2 Encourage municipal and community awareness, appreciation, and support for South San Francisco's historic, cultural, and archaeological resources.

Implementing Policies

Policy 7.5-I-1 Explore the feasibility of establishing a Downtown South San Francisco Historical Commercial District, as designated in Figure 7-3, to promote the revitalization and redevelopment of the area.

[The 1986 Historic Resources Inventory recommended designation of the Downtown South San Francisco Historical Commercial District. As described above in the Environmental Setting section, the Historical Commercial District would be an important economic development initiative in generating interest and support for efforts to revitalize the commercial area.]

Policy 7.5-I-2 Institute Downtown urban design guidelines, and require a design review of developments in the proposed Downtown South San Francisco Historical Commercial District to ensure that the heights, massing, and design of the buildings furthers Downtown's character.

Policy 7.5-I-3 Explore mechanisms to incorporate South San Francisco's industrial heritage in historic and cultural preservation.

[An inventory of industrial buildings in the city would identify important reminders of South San Francisco's industrial history. Without historic designation, these buildings are at risk of being demolished as new industrial and commercial uses expand. The adaptive reuse of these buildings would encourage an architecturally diverse and historic texture in South San Francisco's industrial areas. However, the need to preserve the city's industrial history must be balanced with the economic considerations of industrial operations.]

Policy 7.5-I-4 Ensure the protection of known archaeological resources in the city by requiring a records review for any development proposed areas of known resources.

[South San Francisco's known archaeological resources are located within areas undergoing development: Terrabay and the El Camino Real corridor. The East of 101 area, which is a likely location for new development, has the potential to contain additional resources due to the extensive marshlands that existed prior to landfill activities. Adequate policies and measures for protection of known and unknown archaeological resources that can supplement CEQA requirements may need to be incorporated into future plans and development activities.]

Policy 7.5-I-5 In accordance with State law, require the preparation of a resource mitigation plan and monitoring program by a qualified archaeologist in the event that archaeological resources are uncovered.

[CEQA requires the evaluation of any archaeological resource on the site of a development project. State law also protects these resources. City involvement in the identification, mitigation, and monitoring of project impacts on these resources will ensure the protection of South San Francisco's cultural heritage.]

Consistency Analysis

The records search conducted at NWIC indicated that historical and archaeological resources are present within the Specific Plan study area as well as within a 0.50-mile radius. Additionally, due to the history of the region and the City, the study area is considered to be sensitive for the presence of historic and archaeological resources. Mitigation measures included in this section would ensure that if historical, archaeological or paleontological materials are encountered during subsequent project development, these materials would be identified, assessed as to significance, and, if necessary, appropriate action taken. Therefore, the proposed project would not conflict with the goals and policies of the City of South San Francisco General Plan.

4.3.3 Impacts and Mitigation Measures

Analytic Method

The following analysis considers the presence and absence of known cultural resources within the study area. It also considers the potential for significant cultural resources to occur within the study area boundaries, against the potential impacts on such resources from implementation of the proposed Specific Plan. The impacts on cultural resources from implementation of the Specific Plan were evaluated qualitatively based on the general information about the study area conditions, the South San Francisco General Plan (1999), and the South San Francisco Historic Preservation Survey (1985–1986).

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on cultural resources if it would:

- Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature
- Disturb any human remains, including those interred outside of formal cemeteries

Project Impacts and Mitigation

Threshold	Would the project cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5?

Impact 4.3-1 **Implementation of the proposed project could cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level. Therefore, this would be a *significant and unavoidable* impact.**

Presently, there are twelve historical sites located within the Specific Plan study area and an additional twelve sites within 0.5 mile of the study area boundaries. As discussed above, the 1986 Historic Resources Inventory recommended designation of the Downtown South San Francisco Historical Commercial District. The proposed district extends along Grand Avenue from Airport Boulevard to Maple Street, just below City Hall and also includes Linden Avenue to a distance of one block from Grand Avenue. The district is comprised of late 19th and early mid-20th century one-, two-, and three-story commercial buildings, with a pattern of large or architecturally prominent buildings at street corners. However, the Downtown South San Francisco Historical Commercial District has not been formally designated as a historical district at this time.

Implementation of the Specific Plan would not change any of the existing regulations governing historic resources and it is unlikely that any future development under the Specific Plan would be proposed on sites where designated historic resources are presently located. The plan recognizes that Grand Avenue is the historic core for the City and that it includes buildings of architectural interest. The Specific Plan emphasizes retaining the unique historic character of this historic core and that new development in this area shall respect this character. The Land Use and Urban Design Chapter includes Guiding Principal 7, which calls for focusing public investments in the historic core of the City, along Grand Avenue from Airport to Spruce, and on adjoining streets—the Pedestrian Zone—to create an attractive pedestrian environment to support businesses Downtown. In addition, the Specific Plan further emphasizes retention of historically significant buildings wherever possible and includes design guidelines that would protect the existing historical character of the Downtown area. Therefore, implementation of the Specific Plan would require future development projects to be aesthetically compatible with the existing character of the historic district and would visually support the existing historic buildings, which would still allow for potential formal designation as a Historic District.

However; the Specific Plan would not preclude the possibility that previously unrecorded historic-period resources could be adversely affected by future development of the study area (e.g., demolition, relocation, or alteration of historic-period buildings or structures). Impacts on historical resources from the Specific Plan, therefore, are considered potentially significant.

Implementation of mitigation measure MM4.3-1 would require a qualified professional to conduct site-specific historical resource evaluation for future developments within the study area that would demolish or otherwise physically affect buildings or structures 45 years old or older or would otherwise affect their historic setting. While the historic resource evaluation would include a general area overview on the history of the community, the evaluation need only evaluate the historic significance of the specific building being modified or demolished. Nonetheless, development within the study area could result in demolition or removal of significant historical resources, which would result in a significant impact. While implementation of site-specific mitigation measures, such as written and photographic documentation of significant historical resources, would reduce the magnitude of this impact, the impact would remain significant due to the potential for future physical demolition of a historical resource. Consequently, impacts on historical resources would be ***significant and unavoidable***.

MM4.3-1 *Prior to development activities that would demolish or otherwise physically affect buildings or structures 45 years old or older, the project applicant shall retain a cultural resource professional who meets the Secretary of the Interior's Professional Qualifications Standards for Architectural History to determine if the project would cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5. The investigation shall include, as determined appropriate by the cultural resource professional and the City of South San Francisco, the appropriate archival research, including, if necessary, an updated records search of the Northwest Information Center (NWIC) of the California Historical Resources Information System and a pedestrian survey of the proposed development area to determine if any significant historic-period resources would be adversely affected by the proposed development. The results of the investigation shall be documented in a technical report or memorandum that identifies and evaluates any historical resources within the development area and includes recommendations and methods for eliminating or reducing impacts on historical resources. The technical report or memorandum shall be submitted to the City of South San Francisco for approval. As determined necessary by the City, environmental*

documentation (e.g., CEQA documentation) prepared for future development within the project site shall reference or incorporate the findings and recommendations of the technical report or memorandum. The project applicant shall be responsible for implementing methods for eliminating or reducing impacts on historical resources identified in the technical report or memorandum.

Threshold	Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5?

Impact 4.3-2 **Implementation of the proposed project could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.**

According to the City's General Plan, South San Francisco's coastal location and its rich history as a center of industry make the existence of prehistoric and historic archaeological resources likely (South San Francisco 1999). As stated above, the CHRIS records search identified three archaeological sites located within the study area. Although the study area has already been subject to extensive disturbance from previous urban development and may contain artificial fill materials, there is the potential for archaeological sites that contain intact, undisturbed cultural deposits to be located below the level of previous disturbance. As such, significant previously unidentified archaeological resources could exist within the study area. The potential exists that construction activities associated with ground disturbance within the Specific Plan study area may unearth undocumented archaeological resources. This could result in a potentially significant impact. However, development projects under the Specific Plan would be required through mitigation measure MM4.3-2 through MM4.3-4, if applicable, to conduct preconstruction surveys of previously undisturbed soils; to retain an archaeologist to document any cultural resources within the development area; require that earth-moving activities by halted if an archeological resource is discovered; and require that all construction personnel receive environmental awareness training. Therefore, implementation of these mitigation measures would reduce this impact to ***less than significant***.

MM4.3-2 *Prior to any earth-disturbing activities (e.g., excavation, trenching, grading) that could encounter previously undisturbed soils, the project applicant shall retain a City approved archaeologist to determine if the project could result in a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5. The results of the cultural resources investigation shall be documented in a technical report or memorandum that identifies and evaluates any archaeological resources within the development area and includes recommendations and methods for avoiding impacts on archaeological resources or reducing impacts to a less-than-significant level. The technical report or memorandum shall be submitted to the City of South San Francisco for approval. The project applicant shall be responsible for implementing methods for avoiding or reducing impacts on archaeological resources identified in the technical report or memorandum. Projects under the Specific Plan that would not encounter previously undisturbed soils and would therefore not be required to retain an archaeologist shall demonstrate non-disturbance to the City through the appropriate construction plans or geotechnical studies prior to any earth-disturbing activities. Projects that would include any earth disturbance (disturbed or undisturbed soils) shall comply with mitigation measure MM4.3-3.*

MM4.3-3 *If evidence of an archaeological site or other suspected historical resource as defined by CEQA Guidelines Section 15064.5, are discovered during any project-related earth-disturbing activities (including projects that would not encounter undisturbed soils), all earth-disturbing activity within 100 feet of the find shall be halted and the City of South San Francisco shall be notified. The project applicant shall retain a City-approved archaeologist to assess the significance of the find. Impacts to any significant resources shall be mitigated to a less-than-significant level through methods determined adequate by the archaeologist as approved by the City.*

MM4.3-4 *Prior to start of construction, all construction personnel involved in ground-disturbing activities and the supervision of such activities will undergo worker environmental awareness training. The archaeological resources training components will be presented by a City-approved cultural resources consultant. The training will describe the types of archaeological resources that may be found in the proposed study area and how to recognize such resources; the protocols to be followed if archaeological resources are found, including communication protocols; and the laws relevant to the protection of archaeological resources and the associated penalties for breaking these laws. Additionally, prior to construction, City-approved archaeological resources consultants will meet with the applicant's grading and excavation contractors to provide comments and suggestions concerning monitoring plans and to discuss excavation and grading plans.*

Threshold	Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Impact 4.3-3 **Implementation of the proposed project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.**

The City of South San Francisco is located on the South San Francisco Bay Block, which is underlain by the Whiskey Hill Formation (USGS n.d.). This formation has the potential to contain significant fossils (California PHC 2003). Unique geologic features are not site specific and have the potential to be identified in a variety of geologic formations. The Specific Plan is located in the Downtown and East of 101 subareas. Ground-disturbing construction activities from development projects under the proposed Specific Plan would have the potential to uncover and potentially destroy unknown paleontological resources or an unknown unique geologic feature. This is considered a potentially significant impact. However, implementation of mitigation measures MM4.3-5 and MM4.3-6, which require construction working training, preconstruction studies within areas containing previously undisturbed soils, and a halting of construction be should a paleontological deposit or unique geologic feature be discovered, would reduce this impact to ***less than significant***.

MM4.3-5 *Prior to any earth-disturbing activities (e.g., excavation, trenching, grading) that could encounter undisturbed soils, the project applicant shall retain a professional paleontologist to determine if the project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. The results of the investigation shall be documented in a technical report or memorandum that identifies the paleontological sensitivity of the development area and includes recommendations and methods for avoiding or reducing impacts to a less-than-significant level for paleontological resources or unique geologic features. The technical report or memorandum shall be submitted to the City for approval. The project applicant shall be responsible for implementing methods for avoiding or reducing impacts on paleontological resources or unique geologic features identified in the technical*

report or memorandum. Projects that would not encounter undisturbed soils and would therefore not be required to retain a paleontologist shall demonstrate non-disturbance to the City through the appropriate construction plans or geotechnical studies prior to any earth-disturbing activities. Projects that would include any earth disturbance (disturbed or undisturbed soils) shall comply with mitigation measure MM4.3-6.

MM4.3-6 *Should paleontological resources (i.e., fossil remains) or unique geologic features be identified at a particular site during project construction, construction shall cease within 100 feet of the find and the City of South San Francisco shall be notified. The project applicant shall retain a City approved paleontologist to assess the significance of the find. Impacts to any significant resources shall be mitigated to a less-than-significant level through methods determined adequate by the paleontologist, and as approved by the City.*

In considering any suggested mitigation proposed by the consulting paleontologist, the City of South San Francisco staff shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, applicable regulations, policies and land use assumptions, and other considerations. If avoidance is unnecessary or infeasible, other appropriate measures (e.g., monitoring and/or data recovery) shall be instituted.

Threshold	Would the project disturb any human remains, including those interred outside of formal cemeteries?

Impact 4.3-4 **Implementation of the proposed project could disturb human remains, including those interred outside of formal cemeteries. This is considered a potentially significant impact. However, compliance with standard regulations would reduce this impact to a *less-than-significant* level.**

South San Francisco's coastal location and its rich history as a center of industry make the existence of prehistoric and historic archaeological resources likely (South San Francisco 1999); those archaeological resources could include human remains. According to the General Plan Land Use Element (1999), no formal cemeteries are located within the City boundaries, and no land use designations allowing cemeteries are located within the study area. Although the potential to disturb any human remains interred outside of formal cemeteries within the study area is low due to previous urban development, given the level of past human activity it is possible that unknown human remains could be located within the Specific Plan study area and that future development could encounter these remains (if present in the subsurface). In the event of the inadvertent discovery or recognition of any human remains during future, project-related ground disturbing activities, California Health and Safety Code Section 7050.5 requires that no further disturbances shall occur until the County Coroner has made the necessary findings as to the origin and disposition of the remains pursuant to PRC Section 5097.98. PRC Section 5097.98 outlines the NAHC notification process and the required procedures if the County Coroner determines the human remains to be Native American. Compliance with this standard regulation would protect unknown and previously unidentified human remains, and impacts related to unknown human remains would be ***less than significant***; and no mitigation would be required.

4.3.4 Cumulative Impacts

The geographic context for the analysis of cumulative cultural resource impacts is the City of South San Francisco, as represented by full build-out of the City's General Plan. The City is largely built out, and cumulative development would focus upon development of vacant parcels and intensified redevelopment of infill parcels within the City.

Threshold	Would the project cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5?

New development projects within the City would have the potential to impact historical resources through impacts from construction and operation activities. However, the City's General Plan includes guiding and implementing policies to protect and conserve historical resources within the City. Due to the nature of all cultural resources being unique and non-renewable members of finite classes, all adverse effects or negative impacts erode a dwindling resource base. Federal, state, and local laws protect cultural resources in most instances, such as listing eligible historical resources on the NRHP. Even so, it is not always feasible to protect historical resources, particularly when preservation in place would frustrate implementation of new development projects. For this reason, the cumulative effects of new development within the City are considered cumulatively significant.

As discussed above, there are twelve historical resources identified within the Specific Plan study area. Since comprehensive studies of the study area have not been conducted, there is a possibility more historic resources would be identified on a project-by-project basis. Each project developed under the Specific Plan would be required to comply with CEQA. Implementation of mitigation measure MM4.3-1 would require qualified professionals to conduct an updated records search of the NWIC of the CHRIS and a pedestrian survey of the proposed development area to determine if any significant historic-period resources would be adversely affected by the proposed development and implement appropriate mitigation of significant impacts. However, because it is currently infeasible to definitively determine whether future development under the proposed Specific Plan would result in demolition or removal of historical resources within the study area boundaries, the project's incremental contribution to these cumulative effects could be cumulatively considerable (i.e., the project could contribute to the loss of historical resources in South San Francisco). Therefore, this cumulative impact would be ***significant and unavoidable***.

Threshold	Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5?

New development within the City has the potential to result in a substantial adverse effect to archaeological resources caused by construction activities, such as grading or trenching. Because all cultural resources are unique and nonrenewable members of finite classes, all adverse effects or negative impacts erode a dwindling resource base. Therefore, the cumulative effects of new development within the City are considered cumulatively significant for archaeological resources.

Based on the archaeological sensitivity and history of the study area, there is the possibility that ground-disturbing activities during construction may uncover previously unknown archaeological artifacts,

deposits, or features. Adherence to existing federal, state, and local regulations as well as the implementation of mitigation measures MM4.3-2 through MM4.3-4 for the proposed Specific Plan would ensure project impacts to archaeological resources are reduced to a less-than-significant level. Therefore, when considered in the context of regional present and reasonably foreseeable projects, the cumulative impact would be ***less than significant***.

Threshold	Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Based on the geologic mapping and the paleontological sensitivity of the study area, there is the possibility that ground-disturbing activities during construction may uncover previously unknown paleontological sites or unique geologic features. For this reason, the cumulative effects of new development within the City are considered cumulatively significant. Adherence to existing federal, state, and local regulations, as well as the implementation of mitigation measures MM4.3-5 and MM4.3-6 composed for the proposed project would ensure that project impacts to paleontological resources are reduced to less than significant. Therefore, when considered in the context of regional present and reasonably foreseeable projects, the cumulative impact would be ***less than significant***.

Threshold	Would the project disturb any human remains, including those interred outside of formal cemeteries?

Impacts related to disturbing human remains are site specific and are not cumulative in nature. There is the possibility that ground-disturbing activities during construction may uncover previously unknown buried human remains. Treatment of human remains is covered under standard regulatory requirements as set forth in CEQA Guidelines Section 15064.5(e) and PRC Section 5097.98. Implementation of these regulations would ensure that any impacts to human remains from the proposed Specific Plan would be reduced to ***less than significant*** and, therefore, not cause cumulative impacts to human remains within the City of South San Francisco.

4.3.5 References

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University of California Museum of Paleontology (UCMP). n.d. UCMP Specimen Search. http://ucmpdb.berkeley.edu/ (accessed November 20, 2013).

4.4 GREENHOUSE GAS EMISSIONS

This section of the EIR analyzes the potential environmental effects on greenhouse gas emissions from implementation of the proposed project. No comment letters addressing greenhouse gas emissions were received in response to the notice of preparation (NOP) circulated for the proposed project.

Data for this section were taken from CalEEMod software, trip generation data from the project traffic analysis (Fehr & Peers 2014), emissions factors from the California Climate Action Registry, the Climate Action Plan (CAP) adopted by the City of South San Francisco in February 2014, and other sources. Full reference-list entries for all cited materials are provided in Section 4.4.5 (References).

4.4.1 Environmental Setting

Background

Global climate change refers to changes in the normal[5] weather of the earth measured by alterations in wind patterns, storms, precipitation, and temperature relative to historical averages. Such changes vary considerably by geographic location. Over time, the earth's climate has undergone periodic ice ages and warming periods, as observed in fossil isotopes, ice core samples, and through other measurement techniques. Recent climate change studies use the historical record to predict future climate variations and the level of fluctuation that might be considered statistically normal given historical trends.

Temperature records from the Industrial Age (ranging from the late eighteenth century to the present) deviate from normal predictions in both rate and magnitude. Most modern climatologists predict an unprecedented warming period during the next century and beyond, a trend that is increasingly attributed to human-generated greenhouse gas emissions resulting from the industrial processes, transportation, solid waste generation, and land use patterns of the twentieth and twenty-first centuries. According to the Intergovernmental Panel on Climate Change (IPCC), greenhouse gas emissions associated with human activities have grown since pre-industrial times, increasing by 70 percent between 1970 and 2004 (IPCC 2007b). Increased greenhouse gas emissions are largely the result of increasing fuel consumption, particularly the incineration of fossil fuels.

The IPCC modeled several possible emissions trajectories to determine what level of reductions would be needed worldwide to stabilize global temperatures and minimize climate change impacts. Regardless of the analytic methodology used, global average temperature and sea level were predicted to rise under all scenarios (IPCC 2007b). In other words, there is evidence that emissions reductions can minimize climate change effects but cannot reverse them entirely. On the other hand, emissions reductions can reduce the severity of impacts, resulting in lesser environmental impacts. For example, the IPCC predicted that the range of global mean temperature change from year 1990 to 2100, given different emissions-reduction scenarios, could range from 1.1°C to 6.4°C.

[5]"Normal" weather patterns include statistically normal variations within a specified range.

Greenhouse Gases

Parts of the Earth's atmosphere act as an insulating blanket of just the right thickness, trapping sufficient solar energy to keep the global average temperature in a suitable range. The "blanket" is a collection of atmospheric gases called "greenhouse gases" based on the idea that these gases trap heat like the glass walls of a greenhouse. These gases, mainly water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and chlorofluorocarbons (CFCs), all act as effective global insulators, reflecting visible light and infrared radiation back to earth. Human activities, such as producing electricity and driving internal combustion vehicles, have contributed to the elevated concentration of these gases in the atmosphere. This in turn is causing the Earth's temperature to rise. A warmer Earth may lead to changes in rainfall patterns, smaller polar ice caps, a rise in sea level, and a wide range of impacts on plants, wildlife, and humans.

The relationships of water vapor and ozone as GHGs are poorly understood. It is unclear how much water vapor acts as a GHG. The uncertainty is due to the fact that water vapor can also produce cloud cover, which reflects sunlight away from Earth and can counteract its effect as a GHG. Also, water vapor tends to increase as the Earth warms, so it is not well understood whether the increase in water vapor is contributing to or rather a result of climate change. Ozone tends to break down in the presence of solar radiation but is not understood well enough for evaluation. For these reasons, methodologies approved by the IPCC, United States Environmental Protection Agency (USEPA), and the California Air Resources Board (ARB) focus on carbon dioxide, nitrous oxide, methane, and chlorofluorocarbons. The following provides a brief description of each of these GHGs.

Carbon Dioxide

The natural production and absorption of carbon dioxide occurs through the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, trees and wood products, and as a result of other chemical reactions, such as those required to manufacture cement. Globally, the largest source of CO_2 emissions is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, and industrial facilities. A number of specialized industrial production processes and product uses, such as mineral or metal production, and the use of petroleum-based products, leads to CO_2 emissions.

CO_2 is removed from the atmosphere (or sequestered) when it is absorbed by plants as part of the biological carbon cycle. Natural sources of CO_2 occur within the carbon cycle where billions of tons of atmospheric CO_2 are removed by oceans and growing plants and are emitted back into the atmosphere through natural processes. When in balance, total CO_2 emissions and removals from the entire carbon cycle are roughly equal. Since the Industrial Revolution in the 1700s, human activities, including burning of oil, coal, and gas and deforestation, increased CO_2 concentrations in the atmosphere by 35 percent as of 2005.

Methane

Methane is emitted from a variety of both human-related and natural sources. CH_4 is emitted during the production and transport of coal, natural gas, and oil, from livestock and other agricultural practices, termites, and from the decay of organic waste in municipal solid waste landfills. It is estimated that 60 percent of global CH_4 emissions are related to human activities. Natural sources of CH_4 include

wetlands, gas hydrates,[6] permafrost, termites, oceans, freshwater bodies, nonwetland soils, and wildfires. CH_4 emission levels from a particular source can vary significantly from one country or region to another. These variances depend on many factors, such as climate, industrial and agricultural production characteristics, energy types and usage, and waste management practices. For example, temperature and moisture have a significant effect on the anaerobic digestion process, which is one of the key biological processes resulting in CH_4 emissions from both human and natural sources. Also, the implementation of technologies to capture and utilize CH_4 from sources such as landfills, coal mines, and manure management systems affects the emission levels from these sources.

Nitrous Oxide

Concentrations of nitrous oxide also began to rise at the beginning of the Industrial Revolution reaching 314 parts per billion (ppb) by 1998. Microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen, produce nitrous oxide. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to the atmospheric load of N_2O.

Chlorofluorocarbons

Chlorofluorocarbons have no natural source, but were synthesized for uses as refrigerants, aerosol propellants, and cleaning solvents. Since their creation in 1928, the concentrations of CFCs in the atmosphere have been rising. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken, and levels of the major CFCs are now remaining static or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years. Since they are also a GHG, along with such other long-lived synthesized gases as carbontetrafluoride (CF_4) and sulfurhexafluoride (SF_6), they are of concern. Another set of synthesized compounds called hydrofluorocarbons (HFCs) are also considered GHGs, though they are less stable in the atmosphere and therefore have a shorter lifetime and less of an impact. CFCs, CF_4, SF_6 and HFCs have been banned and are no longer available. Therefore, these GHGs are not included further in this analysis.

Global Warming Potential

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), and is expressed as a function of how much warming would be caused by the same mass of CO_2. Thus, GHG emissions are typically measured in terms of pounds or tons of CO_2 equivalents (CO_2e), and are often expressed in metric tons (MT CO_2e) or millions of metric tons of CO_2 equivalents (MMT CO_2e). Table 4.4-1 (Global Warming Potentials for Greenhouse Gases) shows the GWPs over a 100-year time horizon for the GHGs used analyzed in this analysis (BAAQMD 2010).

[6] Gas hydrates are crystalline solids that consist of a gas molecule, usually methane, surrounded by a "cage" of water molecules (USGS 1992).

Table 4.4-1 Global Warming Potentials for Greenhouse Gases	
Gas	*GWP*
CO_2	1
CH_4	21
N_2O	310

SOURCE: BAAQMD, *Source Inventory of Bay Area Greenhouse Gas Emissions*. Base Year 2007 (February 2010).

Greenhouse Gas Inventory

The burning of fossil fuels, such as coal and oil, especially for the generation of electricity and powering of motor vehicles, has led to substantial increases in CO_2 emissions (and thus substantial increases in atmospheric concentrations). In 1994, atmospheric CO_2 concentrations were found to have increased by nearly 30 percent above pre-industrial (c. 1860) concentrations. Current state, regional, and local emissions of GHGs are estimated as follows:

Statewide Inventory

In 2004, California emitted approximately 483 MMT CO_2e, 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 what it would have been otherwise. Another factor that has reduced California's fuel use and GHG emissions is its mild climate compared to that of many other states. In 2008, California's GHG emissions were approximately 478 MMT CO_2e, generally attributed to the reduced travel and therefore transportation emissions (USEPA 2007).

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).

Regional Inventory

In February of 2010 the BAAQMD updated their regional emissions document. This document presents the GHG emissions for the Bay Area using 2007 as the base year (BAAQMD 2010).According to the emissions inventory, in 2007 the San Francisco Bay area emitted 95.8 MMT CO_2e. Direct emissions within the BAAQMD jurisdiction were 88.7 MMT CO_2e with remaining 7.1 MMT CO_2e resulting from indirect emissions from imported electricity.

The greatest emissions source within the BAAQMD jurisdiction is fossil fuel emissions from transportation which represented 36.41 percent of total emissions. Industrial and commercial sources resulted in 36.4 percent of the total emissions. Energy production, residential fuel consumption, off-road equipment, and agriculture and farming comprise the rest of the emission source areas and resulted in 15.9 percent, 7.1 percent, 3 percent, and 1.2 percent of total emissions respectively.

South San Francisco Inventory

The City Council adopted the Climate Action Plan (CAP) on February 13, 2014. The CAP provides an inventory for the existing emissions within the City using a 2005 baseline (South San Francisco 2013). According to the CAP, existing GHG emissions were 548,600 MT CO_2e in 2005.

The greatest emissions source within the City is from energy use which represented 48 percent of total emissions. Transportation emissions were the second largest source representing 36 percent. Stationary sources, off-road, solid waste, landfill, and water and wastewater emit the remainder of the City's GHG emissions contributing 6 percent, 4, percent, 3 percent, 2 percent and less than 1 percent respectively.

Study Area Inventory

Currently, the area encompassed by the Specific Plan in South San Francisco consists of 1,436 dwelling units and 2,019,553 square feet (sf) of nonresidential land uses. The operation of these existing uses, including energy and water consumption, wastewater and solid waste generation, and mobile sources, contribute to the generation of GHGs within the City. Existing sources of GHG emissions within the study area result in annual emissions of approximately 60,554 MT CO_2e. Table 4.4-2 (Existing Specific Plan GHG Emissions) details these emissions by source.

Table 4.4-2 Existing Specific Plan GHG Emissions

Sources	*CO_2*	*CH_4*	*N_2O*	*CO_2e[a]*
Area[b]	78.93	0.06	0.00	80.85
Electricity	10467.34	0.4733	0.0979	10507.64
Natural Gas	7,996.42	0.15	0.15	8,045.09
Transportation	35,440.11	1.73	0.00	35,476.53
Waste	2,348.26	138.78	0.00	5,262.61
Water	866.82	11.02	0.27	1,180.96
Total				***60,553.68***

SOURCE: Atkins (2014) (taken from the CalEEMod Model).

a. In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O).The conversion is not shown in the table and therefore the rows will not add across.

b. Area sources are widely distributed and produce many small emissions. Examples of area sources include hearths, architectural coatings, landscaping equipment, and consumer products such as barbeque lighter fluid and hair spray.

Potential Effects of Climate Change

Climate change could have a number of adverse effects. Although these effects would have global consequences, in most cases they would not disproportionately affect any one site or activity. In other words, many of the effects of climate change are not site-specific. Emission of greenhouse gases would contribute to the changes in the global climate, which would in turn, have a number of physical and environmental effects. A number of general effects are discussed below.

Sea Level Rise and Flooding

The California Climate Change Center (CCCC) predicts that sea level in California would rise between 10.9 to 71.6 centimeters (cm) (0.36 to 2.3 feet) above existing mean sea level (MSL) by 2099 as a result of climate change (CCCC 2006).Measurements taken in the City of Alameda indicate that the current rate of sea level rise is about 0.29 foot per century. Therefore, projected climate change effects on sea level would increase the existing rate of sea level rise by 4 to 35 inches per century (CCCC 2006). Some areas of the study area would be impacted by sea level rise of 16 inches by mid century and 55 inches by the end of the century (SFBCDC 2008). Figure 4.4-1 (Sea Level Rise) shows the areas of potential impact.

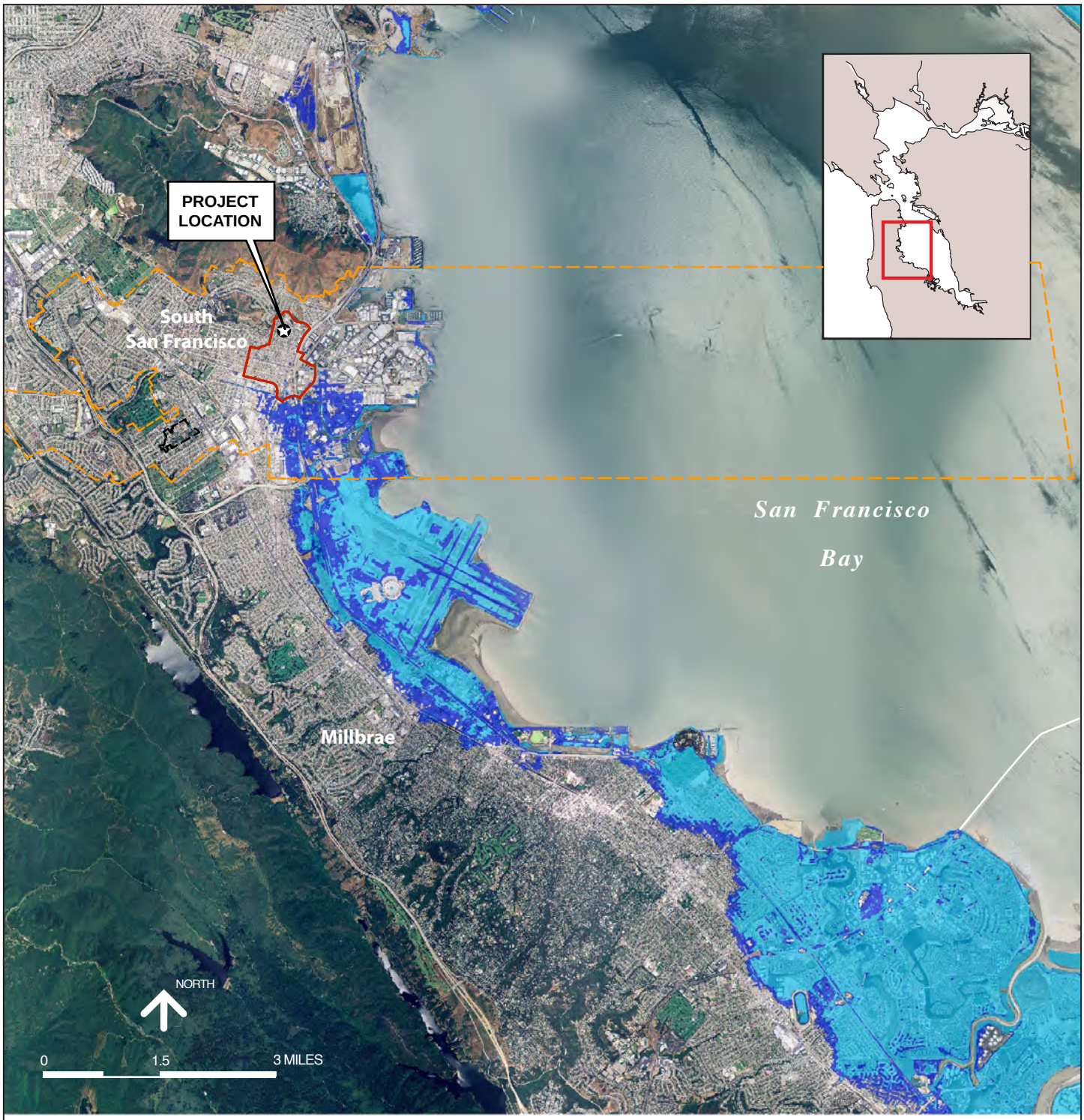
Water Supply

California Health and Safety Code Section 38501(a) recognizes that climate change "poses a serious threat to the economic well-being, public health, natural resources, and the environment of California," and notes, "the potential adverse impacts of [climate change] include…reduction in the quality and supply of water to the state from the Sierra snowpack." As most of the state, including the City of South San Francisco, depends on surface water supplies originating in the Sierra Nevada, this water supply reduction is a concern.

Most of the scientific models addressing climate change show that the primary effect on California's climate would be a reduced snow pack and a shift in stream-flow seasonality. A higher percentage of the winter precipitation in the mountains would likely fall as rain rather than as snow in some locations, reducing the overall snowpack. Further, as temperatures rise, snowmelt is expected to occur earlier in the year. As a result, peak runoff would likely come a month or so earlier. The end result of this would be that the state may not have sufficient surface storage to capture the early runoff, and so, absent construction of additional water storage projects, a portion of the current supplies would flow to the oceans and be unavailable for use in the State's water delivery systems.

Water Quality

Climate change could have adverse effects on water quality, which would in turn affect the beneficial uses (habitat, water supply, etc.) of surface water bodies and groundwater. The changes in precipitation discussed above could result in increased sedimentation, higher concentration of pollutants, higher dissolved oxygen levels, increased temperatures, and an increase in the amount of runoff constituents reaching surface water bodies. Sea level rise, discussed above, could result in the encroachment of saline water into freshwater bodies.



LEGEND

PLAN AREA BOUNDARY

CITY BOUNDARY

AREA POTENTIALLY EXPOSED TO AN APPROXIMATE 16-INCH SEA LEVEL RISE

AREA POTENTIALLY EXPOSED TO AN APPROXIMATE 55-INCH SEA LEVEL RISE

NORTH
SCALE IN MILES

Source: USGS 2002; Knowles, N. 2008. Siegel, S.W. and P. A. M. Bachand, 2002.

100027545 | South SF Downtown Specific Plan and EIR

Figure 4.4-1
Sea Level Rise

ATKINS

Ecosystems and Biodiversity

Climate change is expected to have effects on diverse types of ecosystems, from alpine to deep sea habitat. As temperatures and precipitation change, seasonal shifts in vegetation will occur, and could affect the distribution of associated flora and fauna species. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species. The IPCC states (IPCC 2007a) that "20 percent to 30 percent of species assessed may be at risk of extinction from climate change impacts within this century if global mean temperatures exceed 2 to 3°C (3.6 to 5.4°F) relative to pre-industrial levels." Shifts in existing biomes[7] could also make ecosystems vulnerable to invasive species encroachment. Wildfires, which are an important control mechanism in many ecosystems, may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate. In general terms, climate change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity.

Human Health Impacts

Climate change may increase the risk of vector-borne infectious diseases, particularly those found in tropical areas and spread by insects—malaria, dengue fever, yellow fever, and encephalitis (USEPA 2008).While these health impacts would largely affect tropical areas in other parts of the world, other health effects would also be felt in California. Warming of the atmosphere would be expected to increase smog and particulate pollution, which could adversely affect individuals with heart and respiratory problems, such as asthma. Extreme heat events would also be expected to occur with more frequency, and could adversely affect the elderly, children, and the homeless. Finally, the water supply impacts and seasonal temperature variations expected as a result of climate change could affect the viability of existing agricultural operations, making the food supply more vulnerable.

4.4.2 Regulatory Framework

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 and 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 significant agencies, conventions, and programs focused on global climate change are discussed below.

■ Federal

U.S. Environmental Protection Agency

The USEPA is responsible for implementing federal policy to address global climate change. The federal government administers a wide array of public-private partnerships to reduce GHG intensity generated by the United States. These programs focus on energy efficiency, renewable energy, methane and other non-CO_2 gases, agricultural practices, and implementation of technologies to achieve GHG reductions.

[7] A biome is a major ecological community classified by the predominant vegetation and hence animal inhabitants.

Federal Mandatory Greenhouse Gas Reporting Rule

On September 22, 2009, USEPA released its final Greenhouse Gas Reporting Rule (Reporting Rule). The Reporting Rule is a response to the fiscal year (FY) 2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110–161), which required USEPA to develop "mandatory reporting of greenhouse gasses above appropriate thresholds in all sectors of the economy …" The Reporting Rule would apply to most entities that emit 25,000 MT CO_2e or more per year. Starting in 2010, facility owners were required to submit an annual GHG emissions report with detailed calculations of facility GHG emissions. The Reporting Rule also mandates recordkeeping and administrative requirements in order for the USEPA to verify annual GHG emissions reports. In November 29, 2013, the USEPA published a final rule document (78 FR 71904) that amends the Greenhouse Gas Reporting Rule by implementing some technical corrections and clarifying revisions on other amendments.

Endangerment and Cause and Contribute Findings

On December 7, 2009, USEPA signed the Endangerment and Cause or Contribute Findings for GHGs under Clean Air Act (CAA) Section 202(a). Under the Endangerment Finding, USEPA finds that the current and projected concentrations of the six key well-mixed GHGs—CO_2, CH_4, N_2O, perfluorinated carbons (PFCs), SF_6, and HFCs—in the atmosphere threaten the public health and welfare of current and future generations. Under the Cause or Contribute Finding, USEPA found that the combined emissions of these well-mixed GHGs from new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare. These findings did not by themselves impose any requirements on specific industries or other entities. However, this action was a prerequisite to finalizing the USEPA's CAA Title V permitting regulations known as the "Tailoring Rule" under the for new, large point source emitters and corporate average fuel economy (CAFE) standards for light-duty vehicles for future years.

Clean Air Act Permitting (Tailoring Rule) for GHG Emissions

On January 2, 2011, the USEPA required states to implement new pollution control measures designed to reduce GHG emissions from new large emission sources such as power plants and refineries. The new GHG standards fall under CAA Title V; while the USEPA oversees compliance with the CAA, individual states are in control of issuing CAA Title V air permits. All states have adapted their air permit programs to comply with the GHG standards of the CAA except for Arizona and Texas. For these two states, the USEPA will take over the issuing of air permits until such a time that the state can resume compliance. The final rule, called the "Tailoring Rule," established a phased schedule that focuses the GHG permitting programs on the largest sources with the most CAA permitting experience in the first step. Then, in step two, the rule expands to cover large sources of GHGs that may not have been previously covered by the CAA for other pollutants. The rule also describes the USEPA's commitment to future rulemaking that will include subsequent steps for GHG permitting. The "Tailoring Rule" requires all new sources or modifications of existing sources subject to the New Source Review Prevention of Significant Deterioration (PSD) for another regulated air pollutant under the CAA to also provide Best Available Contract Technology (BACT) if the source has a potential to emit (PTE) at least 75,000 MT CO_2e /year. In addition new sources that are not regulated under the CAA for other air pollutants, but have a PTE of at least 100,000 MT CO_2e/year must provide BACT for GHG emissions.

Updated Corporate Average Fuel Economy (CAFE Standard)

The current Federal CAFE standards (for model years 2011 to 2016) incorporate stricter fuel economy requirements promulgated by the federal government and the state of California into one uniform standard. Additionally, automakers are required to cut GHG emissions in new vehicles by roughly 25 percent by 2016 (resulting in fleet average of 35.5 miles per gallon [mpg] by 2016). Rulemaking to adopt these new standards was completed in 2010. California agreed to allow automakers who show compliance with the national program to also be deemed in compliance with state requirements. The federal government issued new standards in summer 2012 for model years 2017 to 2025, which will require a fleet average of 54.5 mpg in 2025.

State

California Air Resources Board

California ARB, a part of the California EPA, is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, California ARB conducts research, sets state ambient air quality standards, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. California ARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. California ARB has primary responsibility for the development of California's State Implementation Plan (SIP), for which it works closely with the federal government and the local air districts.

Executive Order S-3-05

California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following GHG emission reduction targets:

- By 2010, California shall reduce GHG emissions to 2000 levels
- By 2020, California shall reduce GHG emissions to 1990 levels
- By 2050, California shall reduce GHG emissions to 80 percent below 1990 levels

Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006

In 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006. AB 32 focuses on reducing GHGs in California. California ARB has determined the statewide levels of GHG emissions in 1990 to be 427 MMT CO_2e. California ARB has adopted the Climate Change Scoping Plan, which outlines the state's strategy to achieve the 2020 GHG limit set by AB 32. This Scoping Plan proposes a comprehensive set of actions designed to reduce overall greenhouse gas emissions in California, improve the environment, reduce dependence on oil, diversify energy sources, save energy, create new jobs, and enhance public health.

Part of California's strategy for achieving GHG reductions under AB 32 are the early action greenhouse gas reduction measures, which include the following: a low carbon fuel standard; reduction of emissions

from nonprofessional servicing of motor vehicle air conditioning systems; and improved landfill methane capture (California ARB 2007).

Assembly Bill 1493—Pavley Rules

Known as "Pavley I," AB 1493 standards were the nation's first GHG standards for automobiles. AB 1493 requires the California ARB to adopt vehicle standards that will lower GHG emissions from new light-duty autos to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (referred to previously as "Pavley II," now referred to as the "Advanced Clean Cars" measure) has been proposed for vehicle model years 2017 to 2025. Together, the two standards are expected to increase average fuel economy to roughly 43 mpg by 2020 (and more for years beyond 2020) and reduce GHG emissions from the transportation sector in California by approximately 14 percent. In June 2009, USEPA granted California's waiver request enabling the state to enforce its GHG emissions standards for new motor vehicles beginning with the current model year. USEPA and the California ARB have worked together on a joint rulemaking to establish GHG emissions standards for model-year 2017–2025 passenger vehicles. As noted above, the federal government completed rulemaking in summer 2012 resulting in adoption of new standards that would lead to fleet average of 54.5 mpg in 2025.

Senate Bill (SB) 1078, SB107, and SB2—Renewable Portfolio Standard

SB 1078 and SB 107, California's Renewable Portfolio Standard (RPS), obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure an additional 1 percent of retail sales per year from eligible renewable sources until 20 percent is reached, no later than 2010. The California Public Utilities Commission (CPUC) and California Energy Commission (CEC) are jointly responsible for implementing the program. SB 2 (2011) set forth a longer-range target of procuring 33 percent of retail sales by 2020.

Executive Order S-01-07—Low Carbon Fuel Standard

Executive Order S-01-07 mandates (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 and (2) that an LCFS for transportation fuels be established in California. The executive order initiated a research and regulatory process at California ARB. California ARB developed the LCFS regulation pursuant to the authority under AB 32 and adopted it in 2009. In late 2011, a federal judge issued a preliminary injunction blocking enforcement of the LCFS, ruling that the LCFS violates the interstate commerce clause (Georgetown Climate Center 2012). The injunction was lifted in April 2012 so that California ARB can continue enforcing the LCFS pending California ARB's appeal of the federal district court ruling.

Senate Bill 375

SB 375, which establishes mechanisms for the development of regional targets for reducing passenger vehicle greenhouse gas emissions, was adopted by the State on September 30, 2008. On September 23, 2010, California ARB adopted the vehicular greenhouse gas emissions reduction targets that had been developed in consultation with the metropolitan planning organizations (MPOs); the targets require a 7 to 8 percent reduction by 2020 and between 13 to 16 percent reduction by 2035 for each MPO. SB 375

recognizes the importance of achieving significant greenhouse gas reductions by working with cities and counties to change land use patterns and improve transportation alternatives. Through the SB 375 process, MPOs, such as the Association of Bay Area Governments (ABAG) will work with local jurisdictions in the development of sustainable communities strategies (SCS) designed to integrate development patterns and the transportation network in a way that reduces greenhouse gas emissions while meeting housing needs and other regional planning objectives. ABAG's reduction target for per capita vehicular emissions is 7 percent by 2020 and 15 percent by 2035 (California ARB 2010).

Senate Bill 97

SB 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. In March 2010, the California Office of Administrative Law codified into law CEQA amendments that provide regulatory guidance with respect to the analysis and mitigation of the potential effects of GHG emissions, as found in CEQA Guidelines Section 15183.5. To streamline analysis, CEQA provides for analysis through compliance with a previously adopted plan or mitigation program under special circumstances.

Executive Order S-13-08

Executive Order S-13-08, the Climate Adaptation and Sea Level Rise Planning Directive, provides clear direction for how the state should plan for future climate impacts. The first result is the 2009 California Adaptation Strategy (CAS) report which summarizes the best known science on climate change impacts in the state to assess vulnerability and outlines possible solutions that can be implemented within and across state agencies to promote resiliency.

California Code of Regulations (CCR) Title 24

CCR Title 24, Part 6 (California's Energy Efficiency Standards for Residential and Nonresidential Buildings) (Title 24) were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to increase the baseline energy efficiency requirements. Although it was not originally intended to reduce GHG emissions, electricity production by fossil fuels results in GHG emissions and energy efficient buildings require less electricity. Therefore, increased energy efficiency results in decreased GHG emissions. The 2008 standards are the most recent version, which went into effect in January 1, 2010. The 2013 standards go into effect as of July 1, 2014.

CCR Title 24, Part 11 (California's Green Building Standard Code) (CALGreen) was adopted in 2010 and went into effect January 1, 2011. CALGreen is the first statewide mandatory green building code and significantly raises the minimum environmental standards for construction of new buildings in California. The mandatory provisions in CALGreen will reduce the use of VOC-emitting materials, strengthen water conservation, and require construction waste recycling. As with CCR Title 24, Part 6, the 2013 standards go into effect as of July 1, 2014.

Greenhouse Gas Cap-and-Trade Program

On October 20, 2011, California ARB adopted the final cap-and-trade program for California. The California cap-and-trade program created a market-based system with an overall emissions limit for

affected sectors. The program is currently proposed to regulate more than 85 percent of California's emissions and will stagger compliance requirements according to the following schedule: (1) electricity generation and large industrial sources (2012) and (2) fuel combustion and transportation (2015). The Cap and Trade regulation took effect on January 1, 2012, and enforceable compliance began January 1, 2013.

Regional

Bay Area Air Quality Management District

The BAAQMD is the primary agency responsible for comprehensive air pollution control in the entire San Francisco Bay Area Air Basin. To that end, the BAAQMD, a regional agency, works directly with the Association of Bay Area Governments, the Metropolitan Transportation Commission, and local governments and cooperates actively with all federal and state government agencies. The BAAQMD develops rules and regulations, establishes permitting requirements for stationary sources, inspects emissions sources, and enforces such measures through educational programs or fines, when necessary.

In 1991, the Bay Area 1991 Clean Air Plan was developed to address the state requirements of the California Clean Air Act. The Plan has been updated three times, in 1994, 1997, and 2010, with the continued goal of improving air quality through tighter industry controls, cleaner fuels, and combustion in cars and trucks, and increased commute alternatives.

The BAAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources. It has responded to this requirement by preparing a sequence of Ozone Attainment Plans, the Bay Area Ozone Strategy, and Clean Air Plans that comply with the federal Clean Air Act and the California Clean Air Act, accommodate growth, reduce the pollutant levels in the Bay Area, meet federal and state ambient air quality standards, and minimize the fiscal impact that pollution control measures have on the local economy. The Ozone Strategies are prepared for the federal ozone standard, and the Clean Air Plans are prepared for the state ozone standards. The most recent Bay Area Ozone Strategy was adopted by the BAAQMD Board of Directors in January 2006 and demonstrates how the Bay Area will fulfill CCAA planning requirements for the State one-hour ozone standard and transport mitigation requirements through the proposed control strategy. The control strategy includes stationary source control measures to be implemented through Air District regulations; mobile source control measures to be implemented through incentive programs and other activities; and transportation control measures to be implemented through transportation programs in cooperation with Metropolitan Transportation Commission, local governments, transit agencies and others. The current regional Clean Air Plan was adopted by the Board of Directors on September 15, 2010. It defines a control strategy that the BAAQMD and its partners will implement to (1) reduce emissions and decrease ambient concentrations of harmful pollutants; (2) safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily impacted by air pollution; and (3) reduce greenhouse gas (GHG) emissions to protect the climate. The Clean Air Plan addresses ozone and its precursors, PM2.5, air toxics, and GHGs.

The BAAQMD's New Source Review Rule, Regulation 2, Rule 2, and the District's Air Toxics Risk Management Policy require that new or modified stationary sources of air pollutants constructed and

operated undergo permit review for Best Available Control Technology (BACT) and/or Best Available Control Technology for Toxics (TBACT) when certain thresholds are exceeded. Mobile sources of TACs are also regulated indirectly through vehicle emissions standards and fuel specifications. Under BAAQMD rules, BACT is defined as the most stringent emissions control which, for a given class of air pollutant source, has been achieved in practice, identified in a State Implementation Plan, or has been found by the BAAQMD to be technologically achievable and cost-effective.

To minimize the emissions of TACs, the BAAQMD requires laboratory facilities to either demonstrate that the health risk resulting from emissions of TACs is less than one additional cancer risk in 1 million or follow Responsible Laboratory Management Practices (RLMPs). Because of the varied nature of research, estimating TAC emissions and demonstrating low risk is difficult while following the RLMPs is fairly straightforward. Moreover, the RLMPs are based on risk analyses using information from Stanford University and the University of California, San Francisco.

Bay Area Regional Transportation Plan and Sustainable Communities Strategy (Plan Bay Area)

ABAG and the Metropolitan Transportation Commissions (MTC) adopted Plan Bay Area in July of 2013. Plan Bay Area combines the Bay Area's 2040 Regional Transportation Plan (RTP) and SCS, and is a long-range transportation and land use strategy through 2040 for the Bay Area. The plan demonstrates how the Bay Area will achieve the requirements of Senate Bill 375 to reduce GHG emissions from passenger vehicles and light-duty trucks by 7 percent below the 2005 per-capita emissions by 2020, and 15 percent below 2005 per-capita emissions by 2035.

Local

City of South San Francisco General Plan

The City of South San Francisco is responsible for the assessment and mitigation of GHG emissions resulting from its land use decisions. The City of South San Francisco is also responsible for the implementation of transportation control measures as outlined in the Clean Air Plan. Examples of such measures include bus turnouts, energy-efficient streetlights, and synchronized traffic signals.

General Plan Chapters 2.6, 3.1, 4.2, 4.3, 4.4, 5.3, 7.3, and 8.3 identify goals and policies that help the City contribute to reducing GHG emissions within the City. These are outlined as follows:

- Continue to work toward improving air quality and meeting all federal and state ambient air quality standards by reducing the generation of air pollutants from stationary and mobile sources, where feasible.
- Encourage land use and transportation strategies that promote use of alternatives to the automobile for transportation, including bicycling, bus transit, and carpooling.
- Adopt the standard construction dust abatement measures included in BAAQMD's CEQA Guidelines.
- Require new residential development and remodeled existing homes to install clean-burning fireplaces and wood stoves.

- In cooperation with local conservation groups, institute an active urban forest management program that consists of planting new trees and maintaining existing ones.
- Maintain a balanced land use program that provides opportunities for continued economic growth, and building intensities that reflect South San Francisco's prominent inner bay location and excellent regional access.
- Provide land use designations that maximize benefits of increased accessibility that will result from BART extension to the City and adjacent locations.
- Encourage mixed-use residential, retail, and office development in centers where they would support transit, in locations where they would provide increased access to neighborhoods that currently lack such facilities, and in corridors where such developments can help to foster identity and vitality.
- Provide incentives to maximize community orientation of new development, and to promote alternative transportation modes.
- As part of establishment of design guidelines and standards, and design review, improve the community orientation of new development.
- Encourage development of Downtown as a pedestrian-friendly mixed use activity center with retail and visitor-oriented uses, business and personal services, government and professional offices, civic uses, and a variety of residential types and densities.
- Enhance linkages between Downtown and transit centers, and increased street connectivity with the surrounding neighborhoods.
- Work with the Peninsula Joint Corridors Board and other agencies to develop a new multi-modal transportation hub on the southeast side of the Grand Avenue/ Airport Boulevard intersection. Encourage the inclusion of a child care facility near the multi-modal hub.
- Improve pedestrian connections between the new multi-modal transportation center and Downtown through techniques such as sidewalk bulbing, lighting improvements, and signage.
- Make efficient use of existing transportation facilities and, through the arrangement of land uses, improved alternate modes, and enhanced integration of various transportation systems serving South San Francisco, strive to reduce the total vehicle-miles traveled.
- Develop a comprehensive and integrated system of bikeways that promote bicycle riding for transportation and recreation.
- Provide safe and direct pedestrian routes and bikeways between and through residential neighborhoods, and to transit centers.
- In partnership with employers, continue efforts to expand shuttle operations.
- In partnership with the local business community, develop a transportation systems management plan with identified trip-reduction goals, while continuing to maintain a positive and supportive business environment.
- Prepare and adopt a Bikeways Master Plan that includes goals and objectives, a list or map of improvements, a signage program, detailed standards, and an implementation program. Once adopted, the Bicycle Master Plan shall be the guiding policy document regarding bicycling matters

that are within the scope of the adopted Bicycle Master Plan. (Amended by Resolution 23, 2011, Adopted February 9, 2011)

- Make bikeway improvements a funding priority.
- Require provision of secure covered bicycle parking at all existing and future multifamily residential, commercial, industrial, and office/institutional uses.
- Undertake a program to improve pedestrian connections between the rail stations—South San Francisco and San Bruno BART stations and the Caltrain Station—and the surroundings.
- Adopt a TDM program ordinance.
- Favor TDM programs that limit vehicle use over those that extend the commute hour.
- Undertake efforts to promote the City as a model employer and further alternative transportation use by City employees.
- Establish parking standards to support trip reduction goals.
- Amend the Zoning Ordinance to reduce minimum parking requirements for projects proximate to transit stations and for projects implementing a TDM program.
- Investigate opportunities for shared parking facilities whenever possible to reduce the number of new parking stalls required.
- Promote local and regional public transit serving South San Francisco.
- Explore mechanisms to integrate various forms of transit.
- Develop a Downtown multi-modal transit center southeast of the Grand Avenue/ Airport Boulevard intersection, with a relocated Caltrain Station as its hub.
- Explore the feasibility a shuttle system between the Downtown/multi modal station and South San Francisco and San Bruno stations. Explore mechanisms to provide the shuttle service free to riders.
- Encourage water conservation measures for both existing and proposed development.
- Establish guidelines and standards for water conservation and actively promote the use of water-conserving devices and practices in both new construction and major alterations and additions to existing buildings.
- Reduce the generation of solid waste, including hazardous waste, and recycle those materials that are used, to slow the filling of local and regional landfills, in accord with the California Integrated Waste Management Act of 1989.
- Continue to work toward reducing solid waste, increasing recycling, and complying with the San Mateo County Integrated Waste Management Plan.

City of South San Francisco Climate Action Plan

The City Council adopted a CAP and a Mitigated Negative Declaration on February 12, 2014. The document demonstrates how the City will reduce GHG emissions in conjunction with the requirements of AB 32. The CAP includes a baseline emissions inventory for 2005; projections of emissions for both 2020 and 2035; reduction target of 15 percent below 2005 emissions by 2020; reductions associated with

applicable legislation and City specific actions; monitoring and updating policies; and an environmental document. Based on the CAP, in 2005, per-service population emissions were 4.66 MT CO_2e, which would be reduced to 3.58 MT CO_2e by 2020 and 3.08 MT CO_2e by 2035 to reach the regulatory requirements. As a Qualified GHG Reduction Strategy, the City can use the CAP as a tool for determining project CEQA compliance, streamlining Environmental Review.

Consistency Analysis

General Plan Chapters 2.6, 3.1, 4.2, 4.3, 4.4, 5.3, 7.3, and 8.3 identify goals and policies that help the City contribute to reducing GHG emissions within the City. As identified in Impact 4.4-1 and Impact 4.4-2, the implementation of the Specific Plan would further the goals of both the AB 32 and SB 375 legislative initiatives and the General Plan and CAP to reduce GHG emissions from the City. Therefore, the proposed project would further the goals and policies of the City of South San Francisco General Plan or CAP.

4.4.3 Impacts and Mitigation Measures

Analytic Method

The impact analysis for the Specific Plan is based on a GHG emissions analysis, which is presented in the Environmental Analysis, below. GHG emissions associated with the development and operation of the proposed plan were estimated using the CalEEMod software, trip generation data from the project traffic analysis (Fehr & Peers 2014), emissions factors from the California Climate Action Registry, and other sources. The methodology and assumptions used in this analysis are detailed below for construction and operation activities. Refer to Appendix C for model output and detailed calculations.

Construction

Construction activities can alter the carbon cycle in many different ways. Construction equipment typically utilizes fossil fuels, which generate GHGs such as carbon dioxide, methane, and nitrous oxide. Methane may also be emitted during the fueling of heavy equipment. The raw materials used to construct new buildings can sequester carbon; however, demolition of structures can result in the gradual release of the carbon stored in waste building materials into the atmosphere as those materials decompose in landfills. Since the exact nature of the origin or make-up of the construction materials is unknown, construction-related emissions are typically based on the operation of vehicles and equipment during construction.

Operation

The following operational activities are typically associated with the operation of retail, commercial, industrial and residential land uses that will contribute to the generation of GHG emissions:

- **Vehicular trips**—Vehicle trips generated by growth within the Specific Plan would result in GHG emissions through combustion of fossil fuels. Carbon dioxide, methane and nitrous oxide emissions were determined based on the annual vehicle miles traveled (VMT) provided in the traffic analysis (Fehr & Peers 2014) with trip rates and average trip lengths in the CalEEMod model averaged to match as close as possible the VMT in the traffic analysis.

- **On-site use of natural gas and other fuels**—Natural gas would be used by development under the Specific Plan for heating of residential, commercial, and industrial space, as well as some industrial operations, resulting in a direct release of GHGs. The use of landscaping equipment would also result in on-site GHG emissions. Estimated emissions from the combustion of natural gas and other fuels from the operation of the uses proposed by the Specific Plan is based on the number of dwelling units, hotel rooms and square footage of nonresidential building use as estimated by the CalEEMod model. GHG emissions associated with building envelope[8] energy use vary based on the size of structures, the type and extent of energy-efficiency measures incorporated into structural designs, and the type and size of equipment installed. Because this is a plan-level document and individual development/redevelopment projects are not identified, individual project building envelope details are not available for incorporation in the inventory. Therefore, the analysis assumes that all development will comply with the current regulatory building standards (such as Title 24, etc.).
- **Electricity use**—Electricity is generated by a combination of methods, which include combustion of fossil fuels. By using electricity, development in the Specific Plan would contribute to the indirect emissions associated with electricity production.
- **Water use and wastewater generation**—California's water conveyance system is energy-intensive, with electricity used to pump and treat water. Typically, development in the Specific Plan would contribute to indirect emissions by consuming water and generating wastewater.
- **Solid waste**—Disposal of organic waste in landfills can lead to the generation of methane, a potent greenhouse gas. By generating solid waste, proposed development would contribute to the emission of fugitive methane from landfills, as well as CO_2, CH_4 and N_2O from the operation of trash collection vehicles.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on greenhouse gas emissions if it would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases

[8] The building envelope includes all the components of a building that separate the inside of the building from the outdoors. This includes exterior walls, foundations, roof, windows, and doors.

Construction-Related Thresholds

The BAAQMD has not adopted a threshold with respect to construction emissions associated with plan level or individual development projects. However, the BAAQMD recommends that the Lead Agency quantify construction emissions and make a significance determination of these emissions in relation to meeting the AB 32 GHG reduction goals. Lead Agencies are encouraged to incorporate Best Management Practices to reduce GHG emissions during construction. Best management practices may include, but are not limited to:

- Use of alternative-fueled (e.g., biodiesel, electric) construction vehicles/equipment of at least 15 percent of the fleet
- Using local building materials of at least 10 percent
- Recycle at least 50 percent of construction waste or demolition materials

For the purposes of this analysis, construction emissions are not cumulatively considerable if development incorporates the BAAQMD recommended BMPs and is consistent with the General Plan policies and CAP policies regarding construction.

Because construction results in temporary emissions and GHG emissions impacts are the result of cumulative operation emissions repeated over decades of activities, construction emissions are seen as insignificant with respect to the ability to impact climate change. By implementing Best Management Practices to reduce GHG emissions, the project would not contradict with plans, policies, and regulations adopted for the purposes of reducing GHG emissions.

Operational Thresholds

The build-out of long-range plans such as area plans have the potential to result in long-term operational impacts by the continued and increased generation of GHGs from new and existing development within the City, including the vehicle emissions associated with these uses. According to the BAAQMD (BAAQMD 2009), the proposed project's impact would not be classified cumulatively considerable if it would meet at least one of the following thresholds:

- Be consistent with the policies of a qualified Climate Action Plan
- Produce emissions of no more than 4.6 MT CO_2e per service population annually

The City of South San Francisco adopted a CAP on February 12, 2014, which represents the City's goals with respect to reducing GHG emissions. However, the BAAQMD's thresholds are still in transition due to recent court challenges. Since the City's reduction goals as outlined in the CAP are more restrictive than the BAAQMD thresholds and they better represent the City's goals to GHG reduction, the goals set in the CAP are used in this analysis to determine cumulatively considerable impacts with respect to the generation of GHGs. The thresholds used in this analysis are:

- Produce emissions of no more than 3.58 MT CO_2e per service population annually by 2020
- Produce emissions of no more than 3.08 MT CO_2e per service population annually by 2035

The BAAQMD has established a per service population emissions threshold for GHGs that, if implemented throughout the BAAQMD's district, will help ensure that California will meet the AB 32 reduction goals of reaching 1990 levels by 2020. The City of South San Francisco thresholds are more stringent than the BAAQMD thresholds and, therefore, would also meet the AB 32 reduction goals. By reaching the identified thresholds identified by the City of South San Francisco's CAP, the project demonstrates that it would not hinder the region's ability to meet the AB 32 goals. By furthering the region's ability to meet AB 32 goals, the emissions of GHGs from the City actions would not be significant and, further, would not contradict the goals of plans, policies, and regulations adopted for the purposes of reducing GHG emissions.

Project Impacts and Mitigation

Various aspects of constructing, operating, and eventually discontinuing the use of commercial and residential development will result in GHG emissions. Operational GHG emissions result from energy use associated with heating, lighting, and powering buildings (typically through natural gas and electricity consumption), pumping and processing water (which consumes electricity), 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 in connection with the use of fuels in construction equipment, creation and decomposition of building materials, vegetation clearing, and other activities. However, it is noted that new development does not necessarily create entirely new GHG emissions. Occupants of new buildings are often relocating and shifting their operational-phase emissions from other locations.

The City of South San Francisco cannot generate enough GHG emissions to influence global climate change on its own. The Specific Plan development participates in this potential change by its incremental contribution of GHG emissions that, when combined with the cumulative increase of all other anthropogenic sources of GHGs, impact global climate change. Therefore, global climate change is by definition a type of cumulative impact and the City's participation in this cumulative impact is through its incremental contribution of GHG emissions. Therefore, the discussion of GHG emissions is strictly cumulative in nature.

4.4.4 Cumulative Impacts

Threshold	Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Impact 4.4-1 **Implementation of the proposed project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to *less than cumulatively significant*.**

Construction

Implementation of the proposed Specific Plan would result in GHG emissions generated from construction activities. For plan-level analysis of construction emissions, the BAAQMD recommends

quantification of the emissions and the implementation BMPs to reduce those emissions. Although the Specific Plan does not have a detailed growth forecast as to the timing of construction activities, the amount of anticipated growth is known. The analysis assumes that an equal amount of construction will occur each year for 20 years in order to reach build-out. To account for construction emissions from redevelopment as well as new development, an areawide average of approximately 25 percent of existing development is assumed to be demolished and reconstructed over the same time period. Table 4.4-3 (Construction Emissions, MT CO_2e) identifies the anticipated emissions from construction over the development of the Specific Plan.

Table 4.4-3 Construction Emissions, MT CO_2e

	CO_2	CH_4	N_2O	CO_2e
Annual	720.43	0.09	0.00	722.30
Full Development[a]	14,408.69	1.78	0.00	14,445.99

SOURCE: Atkins (2014) (taken from the CalEEMod Model).

In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O).The conversion is not shown in the table and therefore the rows will not add across.

a. Construction emissions were analyzed assuming the same level of construction over 20 years. Approximately 1 year was analyzed in CalEEMod. Therefore total emissions over the full development is the annual emissions times 20.

Because GHGs remain in the atmosphere for years, even the temporary emissions from construction activities would be cumulatively considerable without the implementation the BAAQMD recommended BMPs, the General Plan policies, and CAP policies to reduce construction-related GHG emissions. The following General Plan and CAP policies address construction-related GHG emission reductions:

- Continue to work toward improving air quality and meeting all federal and state ambient air quality standards by reducing the generation of air pollutants from stationary and mobile sources, where feasible.
- Adopt the standard construction dust abatement measures included in BAAQMD's CEQA Guidelines.
- Reduce the generation of solid waste, including hazardous waste, and recycle those materials that are used, to slow the filling of local and regional landfills, in accord with the California Integrated Waste Management Act of 1989.
- Continue to work toward reducing solid waste, increasing recycling, and complying with the San Mateo County Integrated Waste Management Plan.
- South San Francisco requires that 100 percent of all inert solids (building materials) and 65 percent of all non-inert solids (all other materials) from construction and demolition activities be recycled. All demolition projects costing over $5,000 and all construction projects of over 2,000 sf or more in size. Eligible projects must submit a Waste Management Plan.

This is considered a potentially significant impact. However, there are no numerical thresholds identified by the BAAQMD for construction related GHG emissions, therefore compliance with adopted state, regional, and local plans and policies are used to determine significance. Implementation of the General Plan and CAP policies along with mitigation measure MM4.4-1 would reduce this impact to ***less than***

cumulatively significant. Incorporation of the General Plan and CAP policies would reduce the generation of waste from construction activities, thereby reducing the emission of GHGs associated with waste disposal and decomposition. Implementation of mitigation measure MM4.4-1 would reduce GHG emissions associated with waste and would have the potential to reduce combustion-related GHG emission by reducing the amount or type of fuel utilized at construction sites.

MM4.4-1 *All construction projects shall incorporate, to the greatest extent feasible, the most recent Best Management Practices for Greenhouse Gas Emissions as indicated by the BAAQMD.*[9] *Best Management Practices to reduce GHG emissions during construction may include, but are not limited to:*

- *Use of alternative-fueled (e.g., biodiesel, electric) construction vehicles/equipment of at least 15 percent of the fleet*
- *Using local building materials of at least 10 percent*
- *Recycle at least 50 percent of construction waste or demolition materials*

Operational

The proposed Specific Plan would result in long-term operational impacts from the generation of GHGs during the operation of land uses developed under the proposed Specific Plan. Thresholds of significance for this analysis have been established as 3.58 MT CO_2e per service population for 2020 and 3.08 MT CO_2e per service population for 2035. Service population for this analysis is defined as the total number of residents and employees anticipated in Specific Plan development. Using 3.01 persons per household, population within the Specific Plan (at 25 percent of build-out) would be 4,319. Using a per square foot employment estimate, employment within the new development (and redevelopment) would be 3,304. This results in a total service population of 7,623.

The proposed Specific Plan is designed to expand the available transportation alternatives by providing infrastructure, enhancing connectivity for bicycle and pedestrian use, and the integration of higher-density and mixed-use development near transit facilities. Including reductions associated with these design features, the Specific Plan would generate an estimated 28,736 MT CO_2e annually or 3.77 MT CO_2e per service population as detailed in Table 4.4-4 (Specific Plan Emissions).

As shown in Table 4.4-4, Specific Plan emissions would not meet the CAP threshold of 3.58 MT CO_2e per service population by 2020. However, as build out of the project is not expected until 2032, the more appropriate threshold would be the 2035 threshold of 3.08 MT CO_2e per service population. Even with the incorporation of project design features, the Specific Plan would exceed both the 2020 and 2035 thresholds; therefore, the project requires additional reduction measures to be implemented. This is considered a potentially significant impact.

[9] Above BMPs are subject to change over time. Bay Area Air Quality Management District will post updates to this list at www.baaqmd.gov.

Table 4.4-4 Specific Plan Emissions

Sources	*CO_2*	*CH_4*	*N_2O*	*CO_2e*[a]
Area[b]	78.86	0.06	0.00	81
Electricity	4,791.87	0.22	0.04	4,810
Natural Gas	6,875.01	0.13	0.13	6,917
Transportation	15,610.98	0.41	0.00	15,620
Waste	500.65	29.59	0.00	1,122
Water	141.60	1.00	0.08	186
Total				***28,736***
Per Service Population				***3.77***

SOURCE: Atkins (2014) (taken from the CalEEMod Model).

a. In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O). The conversion is not shown in the table and therefore the rows will not add across.

b. Area sources are widely distributed and produce many small emissions. Examples of area sources include hearths, architectural coatings, landscaping equipment, and consumer products such as barbeque lighter fluid and hair spray.

The policies within the CAP are applicable to all new development. Therefore, the mitigation included herein is based on the policies in the CAP. All reduction assumptions and calculations are included in Appendix C of this document. Table 4.4-5 (Reduced Specific Plan Emissions) shows the reduced inventory with the incorporation of the mitigation measures MM4.4-2 through MM4.4-10. The assumptions and reduction calculations are detailed in Appendix C. With the incorporation of the mitigation measures, the proposed Specific Plan emissions would meet the CAP threshold of 3.08 MT CO_2e per service population by 2035. Therefore, implementation of mitigation measures MM4.4-2 through MM4.4-10 would reduce this impact to ***less than cumulatively significant***.

Implementation of the following mitigation measures would incorporate the applicable measures from the CAP in order to reduce the GHG emissions anticipated from the implementation of the Specific Plan. The reduction measures are titled based on the CAP measure which it supports. Some measures are supporting measures, meaning that by themselves they do not result in a quantifiable reduction, but when included in conjunction with other measures support the success of the other measures.

MM4.4-2 Support Expansion of Public and Private Transit Programs to Reduce Employee Commutes (1.2). *Employers within the study area shall subscribe to the South San Francisco TDM Ordinance such that a minimum of 39 percent of all employees are included. The South San Francisco TDM Ordinance requires that all nonresidential developments producing 100 average trips per day or more meet a 28 percent non-drive-alone peak hour requirement with fees assessed for noncompliance.*

MM4.4-3 Reduce Dependence on Autos through Smart Parking Policies (1.3). *This measure would implement Smart Parking Policies, such as shared parking, to reduce available parking by 10 percent.*

Table 4.4-5 Reduced Specific Plan Emissions

Sources	CO_2	CH_4	N_2O	CO_2e^a
Area[b]	63.80	0.02	0.01	64
Electricity	3,570.72	0.16	0.03	3,584
Natural Gas	5,108.37	0.10	0.09	5,139
Transportation	13,386.18	0.35	0.00	13,394
Waste	500.65	29.59	0.00	1,122
Water	127.80	0.87	0.07	166
Total				***23,470***
Per Service Population				3.079

SOURCE: Atkins (2014) (taken from the CalEEMod Model).

a. In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O).The conversion is not shown in the table and therefore the rows will not add across.

b. Area sources are widely distributed and produce many small emissions. Examples of area sources include hearths, architectural coatings, landscaping equipment, and consumer products such as barbeque lighter fluid and hair spray.

MM4.4-4 Expand the Use of Alternative-Fuel Vehicles (2.1). *Nonresidential and residential land uses can encourage the use of alternative-fueled vehicles by providing charging stations. In support of this measure, development within the study area shall ensure that a minimum of 60 electric vehicle chargers are installed within nonresidential land uses and within the residential units electric charging capabilities are available for a minimum of 200 vehicles.*

MM4.4-5 Reduce Emissions from Off-Road Vehicles And Equipment (2.2). *In support of this measure, development within the study area shall ensure that a minimum of 25 percent of all lawnmowers and leaf blowers acquired/used within the study area would be electric. This requires that there be sufficient electrical outlets outside of all residential and nonresidential units to encourage the use of non-gas-fueled lawn maintenance equipment.*

MM4.4-6 Maximize Energy Efficiency in the Built Environment through Standards and the Plan Review Process (3.1). *All new development within the study area shall, at a minimum, comply with the CALGreen Tier 1 standards and exceed 2013 Title 24 by a minimum of 10 percent.*

MM4.4-7 Address Heat Island Issues and Expand the Urban Forest (3.4). *At a minimum, 322,000 square feet of all new nonresidential development and 75 new residential units shall address heat island effect issues by using high albedo surfaces and technologies identified in the voluntary CALGreen Standards. This is in addition to the requirements of all new development to plant trees in accordance with Zoning Code Chapter 13.30 with placement used to maximize building shading.*

MM4.4-8 Promote Energy Information Sharing and Educate the Community about Energy-Efficient Behaviors and Construction (3.5). *Develop as part of the Specific Plan an educational information packet that will be distributed to residential and nonresidential land owners. These information packets shall detail potential behavioral changes that can be instituted to save energy, such as unplugging appliances, air-drying clothes, and daylighting strategies.*

MM4.4-9 Energy Reduction (4.1). *In addition to complying with MM4.4-6, the development within the study area shall include the use of solar panels such that a minimum of 35,000 square feet of nonresidential land use roof space is converted to solar panels, 205 residential units are equipped with solar hot water heaters, and the electricity of an additional 75 dwelling units is offset by solar panel arrays associated with the new residential development.*

MM4.4-10 Water Reduction (6.1). *Nonresidential and residential land uses shall reduce per capita water consumption by 40 gallons per day. Measures to be implemented to reduce water consumption may include, but are not limited to:*

- *Limiting turf area in commercial and multi-family projects*
- *Restricting hours of irrigation to between 3:00 AM and 2 hours after sunrise (suggestion to be included in the energy information saving package)*
- *Installing irrigation controllers with rain sensors*
- *Landscaping with native, water-efficient plants*
- *Installing drip irrigation systems*
- *Reducing impervious surfaces*
- *Installing high-efficiency, water-saving appliances*

Threshold	Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Impact 4.4-2 **Implementation of the proposed project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to *less than cumulatively significant*.**

As indicated in Impact 4.4-1, with implementation of mitigation, the proposed Specific Plan would result in per service population emissions of approximately 3.08 MT CO_2e, the per service population goal identified in the City of South San Francisco's CAP which is needed to reduce GHG emissions within the City to exceed the AB 32 goals moving past 2020. Therefore, the emissions of GHGs from new development within the Specific Plan would be consistent with both AB 32 and the CAP for the City.

Further, SB 375 requires that MPOs[10] include sustainable communities strategies for the purpose of reducing greenhouse gas emissions; aligning planning for transportation and housing; and creating specified incentives for the implementation of the strategies. SB 375 targets require a 7 to 8 percent reduction by 2020 and between 13 to 16 percent reduction by 2035 for each MPO. While the proposed Specific Plan is not specifically subject to reduction requirements under SB 375, VMT generated under the Specific Plan could further or hinder the region's ability to achieve the SB 375 targets. With the implementation of the Specific Plan design features and mitigation measures MM4.4-2, MM4.4-3, and

[10] The Metropolitan Transportation Commission is the MPO for the San Francisco Bay Area.

MM4.4-4, traffic within the Specific Plan is anticipated to be reduced by between 14 and 34 percent.[11] Therefore, the implementation of the Specific Plan would further the goals of both the AB 32 and SB 375 legislative initiatives.

This is considered a potentially significant impact. However, implementation of mitigation measures MM4.4-1 through MM4.4-10 would reduce this impact to ***less than cumulatively significant***.

4.4.5 References

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[11] The 34 percent reduction is based on the difference in VMT between what would be anticipated using the ITE trip rates and the trip rates identified in the traffic study. The 14 percent is the difference between the VMT derived from the project specific traffic study and the reductions from the implemented mitigation measures. Because it is unclear if the ITE trip generation rates would represent an accurate baseline by which to calculate starting VMT rates, the reduction is presented as a range.

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4.5 LAND USE/PLANNING

This section of the EIR analyzes the potential environmental effects on land use/planning from implementation of the proposed project. No comment letters specifically addressing land use/planning were received in response to the notice of preparation (NOP) circulated for the proposed project.

Data for this section were taken from the City of South San Francisco General Plan (1999) and other relevant documents. Full reference-list entries for all cited materials are provided in Section 4.5.5 (References).

4.5.1 Environmental Setting

The City of South San Francisco is located within a broad valley in the northern portion of San Mateo County with adjoining hillsides formed by the San Bruno Mountains on the north and the Coast Range on the west, both of which slope toward San Francisco Bay. The City of South San Francisco is surrounded by the Daly City to the north and San Bruno to the south. The City encompasses 4,298 acres, the majority of which is developed. Single-family residential accounts for 33 percent of the City's land, while parks and open space occupy over 10 percent, business parks for high-technology research and development and manufacturing use occupy 14 percent, commercial areas occupy 8 percent, hotels and motels occupy 10 percent, and less than 4 percent of the City's land is vacant. The City includes 167 acres of vacant land, half of which is located in the northernmost point of the City in Bay West Cove and Sierra Point, where there is substantial soil contamination. Portions of this area have undergone remediation and a portion of the land was recently entitled for a research and development campus and a hotel. The other half of the vacant acreage is located within Westborough, and the site has a steep slope making it difficult to develop; thus, virtually all growth in the City will result from redevelopment or intensification.

Specific Plan Characteristics

The Specific Plan study area encompasses approximately 300 acres of the Downtown and East of 101 subareas in the geographical center of the City. The study area straddles the US-101 and Caltrain corridors, which separates the Downtown and East of 101 subareas, resulting in a major barrier to interaction between the two subareas. On the west, the Downtown subarea is characterized by a large retail Downtown, which is surrounded by a mix of residential, service, light manufacturing, and warehousing uses. On the east, the East of 101 subarea is the successful biotech-oriented employment center of the City, but contains underdeveloped light industrial and service sites adjacent to the US-101 within the study area. At the center of the study area, the Caltrain station is tucked under the elevated US-101 freeway and adjacent roadway segments, which makes the station hard to access.

According to the City of South San Francisco General Plan, Downtown commercial and Downtown high-density residential land uses predominate the Downtown subarea west of the US-101 while east of US-101 business technology park, business commercial, and mixed industrial land use predominate. Other land designations found within the study area include Downtown low- and medium-density

residential, business commercial, auto-oriented commercial, school, public, institutional, park and recreation, and vacant uses.

Existing General Plan Designations

The City of South San Francisco General Plan Land Use Element outlines the framework that guides land use decision-making, provides the General Plan land use classification system, and outlines citywide land use policies. The Land Use Element divides the City into fourteen subareas based on analysis of land use and urban design patterns and the need for focused planning efforts and activities. The Specific Plan encompasses two of the fourteen subareas: Downtown and East of 101. The Land Use Element Land Use Diagram identifies properties within the Specific Plan study area as having the following land use designations:

- **Low Density Residential**—This designation provides for single-family residential development with densities up to 8.0 units per net acre. Mainly intended for detached single-family dwellings, but attached single-family units may be permitted provided each unit has ground-floor living area and private outdoor open space.
- **Downtown Medium Density Residential**—This designation provides for residential developments at densities ranging from 15.1 to 25.0 units per net acres. A full range of housing types is permitted.
- **Downtown High Density Residential**—This designation provides for residential development at densities ranging from 25.1 to 40.0 units per net acre for lots equal to or greater than H-acre (21,789 square feet [sf]) in area. For lots smaller than H-acre, maximum density shall be 30.0 units per acre.
- **Downtown Commercial**—This designation provides for a range of uses in commercial core of Downtown, including retail stores, eating and drinking establishments, commercial recreation, entertainment establishments and theaters, financial, business and personal services, hotels, educational and social services, and government offices. In addition, residential uses may be permitted on second and upper floors only, and subject to a use permit.
- **Business Commercial**—This designation is intended for business and professional offices, and visitor service establishments, and retail. Permitted uses include for administration, financial, business, professional, medical and public offices, and visitor oriented and regional commercial activities. Regional commercial centers, restaurants, and related services are permitted subject to appropriate standards.
- **Transportation Center**—This designation is intended to support the Caltrain rail line.
- **Mixed Industrial**—This designation is intended to provide and protect industrial lands for a wide range of manufacturing, industrial processing, general services, warehousing, storage and distribution, and serve commercial uses.

Existing Zoning

The City of South San Francisco's Zoning Ordinance was adopted on July 28, 2010, and implements the City's General Plan. The purpose of the Zoning Ordinance is to protect and promote the public health, safety, peace, comfort, convenience, prosperity, and general welfare. Under the City's existing zoning,

there are seven different zones located within the study area: Downtown Core, Downtown Mixed-Use, Downtown Residential High, Downtown Residential Medium, Public, Mixed Industrial, and Business Commercial.

- **Downtown Core**—This zone is intended to maintain the pedestrian-oriented environment in the heart of South San Francisco's Downtown with a focus on ground-level commercial uses and pedestrian-oriented development that encourages pedestrian activity.
- **Downtown Mixed-Use**—This zone is intended to provide a mix of residential development, retail, office uses, hotels, and other commercial uses oriented toward a more regional market.
- **Downtown Residential High**—This zone is for multi-unit development at densities form 25.1 to 40 units per acre with a maximum of 30 units for lots smaller than half-acre. Retail and office development and hotels are not permitted.
- **Downtown Residential Medium**—This zone provides for a full range of housing types at densities ranging from 15.1 to 25 units per acre. Consistent with the General Plan, there is a minimum residential density of 15.1 units per acre. Retail and office development and hotels are not permitted.
- **Public/Quasi-Public**—This zone is for government owned facilities, civic uses and public utilities, and quasi-public uses such as hospitals and large institutional uses but does not include either public or private schools. The purpose of this zone is to provide areas for uses on sites of 2 or 3 acres or more that may not be appropriate within other zones. This zone is consistent with the General Plan's Public designation.
- **Mixed Industrial**—This zone provides areas for a wide range of manufacturing, industrial processing, general service, warehousing, storage and distribution, and service commercial uses and to protect areas where such uses now exist. Industries that use or produce substantial amounts of hazardous materials or generate noise, odor, or other pollutants are not permitted. Conventional residential and/or group residential development are also prohibited but live-work uses such as artists' studios are allowed in designated areas. Small-scale retail and service uses serving local employees, residents, and visitors may be permitted as secondary uses. This zone is consistent with the General Plan's Mixed Industrial designation.
- **Business Commercial**—This zone is intended for business and professional offices, visitor service establishments, and retail uses with an emphasis on larger and regional-serving uses west of US-101. A wide range of nonresidential uses are appropriate including administrative, financial, business, professional, medical and public offices, and visitor-oriented and regional commercial activities such as warehouse clubs and other large-format retail uses.

Surrounding Land Uses

The areas immediately surrounding the Specific Plan study area include a range of land uses. To the north of the study area is a mix of residential, community commercial, public, and open space uses. Paradise Valley Neighborhood is located immediately north of the study area, which consists of low density residential units and is served by Martin School, which is located on the boundary of the study area. To the east of the study area are business commercial uses and the Gateway Specific Plan District, which serves as the guiding plan to develop the area with commercial and business uses. To the south of the study area is the Lindenville Neighborhood, comprised mostly of mixed-industrial uses, and the

Colma Creek Canal. To the west of the study area is a mix of residential uses, including Downtown high, medium, and low residential, and low density residential and open space use.

4.5.2 Regulatory Framework

Federal and State

There are no federal or state regulations related to land use applicable to the proposed project.

Local

South San Francisco General Plan

Adopted in 1999 and most recently amended in 2014, the South San Francisco General Plan provides a vision for the long-range physical and economic development for the City, provides strategies and specific implementing actions, such as the Zoning Code, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The General Plan also allows City departments, other public agencies, and private developers to design projects that will enhance the character of the community, preserve and enhance critical environmental resources, and minimize hazards. The South San Francisco General Plan contains the following chapters:

- Land Use
- Planning Sub-Areas
- Transportation
- Parks, Public Facilities, and Services
- Economic Development
- Open Space and Conservation
- Health and Safety
- Noise

These chapters include six of the seven elements required by state law and other optional elements that address local concerns and regional requirements. The seventh required element is the Housing Element, which is updated on a more regular basis than the General Plan and published under a separate volume.

The General Plan contains a Planning Sub-Areas Element, which establishes policies specific to individual planning subareas within the City. The Planning Sub-Areas Element's policies complement citywide policies included in the Land Use and other elements. Some of these subareas have detailed area plans, specific plans, or development plans. Where appropriate, the General Plan provides guidance as to how these plans may need to be changed in order to conform to the policy direction provided by the General Plan. The subareas, fourteen in all, were collectively derived from analysis of land use and urban design patterns and existing and needed planning efforts and activities. The Specific Plan encompasses the Downtown and East of 101 subareas.

The applicable goals, objectives, and policies of each of the above-listed elements are discussed in the section pertaining to the relevant resource in this EIR. The thresholds for analysis of land use impacts include the identification of conflicts with goals and policies. As such, applicable goals and policies in the

Land Use Element and Planning Sub-Areas Element of the General Plan related to land use that are potentially relevant to the Specific Plan are analyzed under Impact 4.5-1.

City of South San Francisco Municipal Code (SSFMC)

Policies set forth in the General Plan are implemented through the City's Zoning Code, which is codified as South San Francisco Municipal Code Title 20. The Zoning Code prescribes the allowable uses within specified zoning districts and imposes standards on those uses. The current zones within the Specific Plan study area are described above ("Existing Zoning"); however, all properties within the study area boundaries would be subject to the provisions of the Specific Plan. The proposed Specific Plan and its contents would work together with the South San Francisco Zoning Code, and would supersede it when there is a conflict. The Zoning Code will be amended to address all aspects of development projects and their processing.

San Mateo County Airport Land Use Plan

The Specific Plan is located in the influence area of the San Francisco International Airport, and is therefore subject to airport-related height limitations of the San Mateo County Airport Land Use Plan (ALUP). The San Mateo County ALUP restricts building heights within the planning site from 100-150 feet above mean sea level. San Mateo County ALUP Chapter V was updated in 2012 addressing specifically the San Francisco International Airport's Land Use Plan.

Proposed Specific Plan

The Specific Plan land use strategy is focused on encouraging intensification of activity and uses in the Downtown and East of 101 subareas, both of which are within a 0.5-mile radius of the Caltrain station. This intensification strategy will support South San Francisco's long-term goals, articulated in the General Plan, of preserving the scale and character of existing neighborhoods while maintaining and enhancing the Downtown as the "physical and symbolic center" of the City. In addition, the Specific Plan is also intended to increase transit ridership by bringing new residents and employees within a short walk of the Caltrain station. In parallel, Caltrain has plans to extend the platform south of its current location to ensure accessibility.

The Specific Plan designates areas within the study area with specific development strategies in order to transition the Downtown area into a transit-oriented, pedestrian friendly environment. The Specific Plan will provide a development framework through establishment of the following zones:

- **Downtown Subareas:**
  - **Downtown Transit Core:** This area lies within 0.25 mile (a 5-minute walk) of the proposed extension of the Caltrain station and undercrossing. This area is envisioned to be a vibrant, mixed-use area and, due to its proximity to the Caltrain station and relative abundance of suitable developable sites, is the most suitable for the highest intensities of new development in the Downtown area. The higher-density housing would help support transit ridership, since residential units would be within a short walk of the station, as well as provide the pedestrian activity needed to support Downtown businesses. The focus of this area is residential development with ground level retail or support uses encouraged, but not required. This Downtown Transit Core subarea would allow up to 100 dwelling units per

acre; a minimum of 80 dwelling units per acre is required. A maximum of 120 dwelling units per acre would be allowed for development meeting specified criteria.

> **Grand Avenue Core:** Grand Avenue would remain the historic retail center of the City, and the district would extend from Airport Boulevard on the east to Spruce Avenue on the west. The district only includes the properties directly fronting Grand Avenue. Historically interesting buildings would be retained wherever possible. New mixed-use development of underutilized properties would be encouraged but guidelines would limit building heights along Grand Avenue in order to respect the historic character of the existing buildings and to create a comfortable pedestrian environment. Off Grand Avenue, on the rear portions of Grand Avenue–facing lots, taller heights will be allowed to help accommodate new residential uses and increase development opportunities. The Grand Avenue Core would allow up to 60 dwelling units per acre and requires a minimum of 14 units per acre. Residential densities up to 80 dwelling units per acre or 100 units per acre on corner sites or on a site over 0.5 acre.

> **Downtown Residential Core:** Outside of the Grand Avenue Core and Downtown Transit Core areas, the remaining areas between Tamarack Lane and Second Lane are designated Downtown Residential Core. This designation is intended to encourage higher densities than currently allowed, but would still be compatible in scale with the other Downtown residential districts: Downtown High Density Residential and Downtown Medium Density Residential. The areas encompassed in this district are within two blocks of Grand Avenue. The Downtown Residential Core designation would allow up to 80 dwelling units per acres with a minimum of 40 units per acre. Densities up to 100 units per acre would be allowed if specific criteria are met, and for the inclusion of affordable senior housing a density of up to 125 dwelling units would be allowed.

> **Linden Neighborhood Center:** This area is defined as the properties fronting Linden Avenue between California and Juniper Avenues. The current small collection of retail uses along Linden Avenue and California and Juniper Avenues provide a starting point for a more robust neighborhood center that will be walkable for the surrounding residential areas and could be supplemental to the more citywide destinations that would be located along Grand Avenue. Some aspects of this zone include ground level retail uses; widening sidewalks along Linden Avenue; and providing special street paving to accommodate special events. The Linden Neighborhood Center would allow densities ranging from 40 to 60 dwelling units per acres, with 80 units per acre allowed if specific criteria are met.

> **Linden Commercial Corridor:** This area includes the properties fronting Linden Avenue from California Avenue to Sixth Lane and from Second Lane to Railroad Avenue. Linden Avenue throughout its length has historically been a location for a variety of commercial uses and today many of these remain and serve as resources for local residents and businesses. This designation applies to areas of Linden Avenue south of Aspen Avenue that do not otherwise fall into the Downtown Residential Core, Downtown Transit Core, or Grand Avenue Core districts. Commercial and mixed uses will continue to be allowed and encouraged on properties within this corridor. While not required, commercial uses will provide opportunities for local services for adjoining residential neighborhoods. As with other mixed use locations, improvements to the sidewalks and streetscape will be encouraged to provide additional pedestrian amenities and accessibility especially for local residents. Retail use will be encouraged at ground level in this corridor. Other requirements of the Downtown High Density Residential district will pertain with densities from 25 to 40 dwelling units per acre.

- **Eastern Neighborhood:**
  - **Eastern Neighborhood:** Due to its proximity to the Caltrain station, regional highways, San Francisco International Airport, San Francisco and Silicon Valley, and the biotechnology innovation hub anchored by Genentech, the Eastern Neighborhood is targeted as a location for high-density employment. To optimize circulation in this area, existing streets would be enhanced with a more well-integrated network of vehicular and pedestrian/bicycle routes. This is intended to expand upon the limited, vehicular-oriented circulation pattern that currently dominates the area. No residential uses will be allowed in this area.
  - **Transit Office/R&D Core:** The Transit Office/R&D district is bounded by on the North by East Grand Avenue, on the east by Gateway Boulevard, on the south by South Airport Boulevard, and on the west by Industrial Way and the US-101 right-of-way. Currently a mix of parking lots and low scale service and light industrial uses, this district would be developed with taller buildings, which would conform to FAA height limitations. The taller buildings would support corporate offices, hotels, and other major facilities as this district is immediately adjacent to the platform extension of the Caltrain station and is highly visible from the San Francisco International Airport, Downtown South San Francisco, and the various employment centers on the peninsula. With the extension of the Caltrain station and the construction of the pedestrian underpass, this area would be well connected with Downtown, providing opportunity for a significant number of workers to easily access the Downtown at lunch and other times for services, restaurants, coffee shops, and other amenities. In the Transit Office/R&D Core the allowable development intensity would be 1.5 to 3.5 FAR. No residential uses will be allowed in this area.
- **Other Districts:**
  - **Other Districts:** Other land designations would remain in effect in the Downtown and areas surrounding the rail tracks and US-101. Residential areas north and south of the Downtown core would remain as currently planned; existing land use and zoning designations already allow some intensification of use if desired. The industrial and business commercial areas focused around the transportation infrastructure currently serve a variety of airport and related uses; it is unlikely that there will be pressure for these to change within the planning horizon of the Specific Plan.

In addition to the various districts within the Specific Plan, policies of the Specific Plan will act as the planning tool that guides and directs new development; economic development; streetscape improvements; transportation improvements; parking, pedestrian amenities; open space and land use; and preservation of cultural resources and art space. Adoption of the Specific Plan involves General Plan amendments and Zoning amendments to ensure consistency with the goals of the City. The proposed Specific Plan will provide development framework through the establishment of the following principles and policies:

Land Use and Urban Design

Guiding Principle 1 Revitalize the Downtown of South San Francisco as a citywide destination that is economically vital, diverse, active, and that encompasses a variety of uses.

Policy LU-1 Encourage the use of local workforce and local business sourcing for development in the plan area so that money in

wages and materials used in the construction of these developments is invested in the local economy.

Policy LU-2 Encourage a mix of uses, activities, and amenities throughout the Downtown to assist in revitalization of the Downtown as a citywide and regional destination.

Policy LU-3 Require ground level retail or other active ground floor uses in future development along Grand Avenue and on key intersecting streets—Linden, Cypress and Maple Avenues—to ensure activity and vitality in the Downtown.

Guiding Principle 2 Increase development intensities in the Downtown to grow the resident population and thus support a variety of commercial and service uses.

Policy LU-4 Establish the highest intensity land uses within ¼-mile of the Caltrain station. Here, densities up to 120 dwelling units per acre will be encouraged.

Policy LU-5 Designate a high-density district surrounding Grand Avenue and in proximity to the station as allow up to 80 dwelling units per acre.

Policy LU-6 Maintain the scale of Grand Avenue itself by slightly lowering allowable heights along its length to protect its historic character, while encouraging a mix of uses with retail at the ground level.

Guiding Principle 3 Preserve and enhance the character of existing Downtown neighborhoods while continuing to encourage modest intensifications of use as currently allowed.

Policy LU-7 Retain existing land use and density standards for residential neighborhoods outside of the Downtown core.

Guiding Principle 4 Encourage redevelopment of the East of 101 neighborhood between Gateway Boulevard, East Grand Avenue and the US-101 corridor as a high intensity office/R&D district.

Guiding Principle 5 Encourage variety in new housing development.

Policy LU-8 Encourage a mix of housing types including ownership, rental, family and senior housing, and also encourage provision of units accessible to persons with disabilities.

Policy LU-9 Encourage the provision of affordable housing in the Specific Plan area, by working with non-profit housing developers and through inclusionary or in-lieu fee provisions.

Downtown Subareas

Guiding Principle 6 Retain existing residential neighborhoods that surround the Downtown as currently planned, with no proposed changes in zoning.

Guiding Principle 7 Focus public investments in the historic core of the City, along Grand Avenue from Airport Boulevard to Spruce Avenue, and on adjoining streets—the

pedestrian-priority zone—to create an attractive pedestrian environment to support businesses Downtown.

Guiding Principle 8 Focus increases in residential and mixed-use densities within 1/4 mile of the Caltrain station and in areas proximate to Grand Avenue to increase patronage of Caltrain as well as Grand Avenue businesses.

Guiding Principle 9 Require pedestrian-oriented ground level retail and service uses on Grand Avenue or intersecting streets or in the neighborhood center on Linden between California and Juniper Avenues. Encourage ground level retail in other areas, especially in the Downtown Transit Core.

Guiding Principle 14 Redesign Grand Avenue to accommodate wider sidewalks and an improved streetscape that will better support the retail environment of the Downtown.

Eastern Neighborhood

Guiding Principle 10 Encourage high-density employment.

Guiding Principle 11 Enhance the few existing streets with a more fine-grained pattern of vehicular and bicycle/pedestrian routes to allow convenient circulation throughout the area rather than the limited, vehicular-oriented pattern that dominates the district today.

Guiding Principle 12 Provide a direct connection from the planned pedestrian/bicycle underpass of the tracks through the northern part of the area to allow station drop-off and shuttle pick-ups as well as direct bicycle and pedestrian access to the station and to Downtown.

Guiding Principle 13 Allow retail uses along the Grand Avenue extension to provide amenities for the office population and a strong visual and physical linkage to the Downtown to the west.

4.5.3 Impacts and Mitigation Measures

Analytic Method

The analysis in this section addresses the compatibility of land uses identified in the proposed Specific Plan with existing and planned land uses within and adjacent to the study area, as well as consistency with any applicable land use plans, policies, or regulations.

CEQA requires that the environmental document evaluate direct physical changes in the environment that may be caused by the project as well as reasonably foreseeable indirect physical changes in the environment that may be caused by the project. Economic and social changes resulting from the project are not to be treated as significant effects on the environment for purposes of CEQA, although a physical change caused by economic or social effects of a project may be considered. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment (CEQA Guidelines Section 15064(c)).

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on the environment if it would:

- Physically divide an established community
- 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
- Conflict with any applicable habitat conservation plan or natural community conservation plan

Effects Not Found to Be Significant

Threshold	Would the project physically divide an established community?

Existing and future uses within the study area include residential, commercial, manufacturing and research and development activities. Redevelopment under the Specific Plan would be consistent with existing land uses in the study area and surrounding area. The Specific Plan does not propose major changes to the existing circulation system, or other barriers that would divide an existing neighborhood. The proposed below-grade pedestrian and bicycle undercrossing at East Grand Avenue would provide an additional connection between development east and west of US-101 and the Caltrain station. Railroad Avenue would also be extended to the east side of US-101. Additionally, streetscape improvements and new public plazas would encourage pedestrian connections throughout the study area. Because the Specific Plan does not include barriers or changes to the circulation system that would physically divide an existing neighborhood, implementation of the proposed project would have ***no impact*** related to physically dividing an established community, and no further analysis of this issue is required in this EIR.

Threshold	Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?

As previously discussed in Section IV(e) of the Initial Study prepared for the Specific Plan, there is no adopted Habitat Conservation Plan, Natural Communities Conservation Plan, or other approved local, regional, or state habitat conservation plan that is applicable to the study area. Because the Specific Plan is not subject to any above-mentioned plans, implementation of the proposed project would have ***no impact*** on biological conservations plans, and no further analysis of this issue is required in this EIR.

Project Impacts and Mitigation

Threshold	Would the project 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?

Impact 4.5-1 **Implementation of the proposed Specific Plan would adopt new standards and permit land uses not currently allowed within the study area. However, the proposed Specific Plan would not conflict with applicable land use plans, policies, or regulations adopted for the purpose of mitigating an environmental effect. This impact would be *less than significant*.**

The proposed Specific Plan includes General Plan amendments, as implementation of the proposed Specific Plan would result in changes to the land use designations, density and development intensities, build-out population and employment tables, projected jobs to employment ratio table, and includes improvements to streets and bikeways systems. Additionally, implementation of the Specific Plan includes Zoning amendments to add the Downtown Specific Plan into Division III (Specific and Area Plan Districts); add a reference to the Specific Plan in District Purposes; include a map of the Specific Plan study area; update land use regulations to be consistent with the Specific Plan; and include the development and design regulations and standards. Once adopted, the Specific Plan would replace the General Plan land use designations and standards for the study area and would be the governing document for development in the study area. The proposed amendments to the General Plan and Zoning Ordinance would be considered and adopted at the same time as adoption of the Specific Plan.

The proposed Specific Plan would yield significant amounts of new residential and employment uses in the study area, where development potential would be determined by applying the land use, density and intensity assumptions to land within each district. Since the size of individual parcels in the study area is small, some consolidation of sites will likely be required before development would occur. Consolidation will take time as many properties are economically viable in their currently configuration, leaving minimal motivation for many property owners to take any action. Therefore, for the purposes of the Specific Plan and for assessing environmental impacts associated with the plan, it has been assumed that only 25 percent of parcels in the study area would be developed within the plan's 20-year timeframe.

Assuming only 25 percent of the parcels within the study area would be redeveloped over the approximate 20-year timeframe of the plan, the Specific Plan has the potential to add 1,435 units of residential uses to the existing 1,426 units in the area, for a total of 2,861 residential units in the proximity of the Caltrain station. Additionally, the Specific Plan has the potential to add a maximum of 1.2 million sf of new office/R&D uses, which represents as many as 2,400 or more jobs added to the City.

As required by CEQA Guidelines Section 15125(d), this EIR discusses any inconsistencies between the proposed project and applicable regional and local plans. The plans applicable to the Specific Plan include the South San Francisco General Plan Land Use Element and the South San Francisco General Plan Planning Subareas: Downtown and East of 101. Consistency of the Specific Plan with applicable policies from these plans is provided in Table 4.5-1 (South San Francisco General Plan Policies). In specific cases where the policies or goals are similar, or address similar issues, the consistency analysis has

been summarized for multiple policies. If one policy or goal is unique or addresses a specific issue, a separate consistency analysis is provided for that policy.

Table 4.5-1 South San Francisco General Plan Policies

South San Francisco General Plan	*Project Consistency*
Land Use—Guiding Policies	
Policy 2-G-1. Preserve the scale and character of established neighborhoods, and protect residents from changes in nonresidential areas.	**Consistent.** The proposed Specific Plan includes Guiding Principle 3, which states that the Specific Plan would "preserve and enhance the character of existing Downtown neighborhoods." Residential neighborhoods within the study area will be intensified with higher residential densities, but the Specific Plan stresses maintaining and updating the existing character of these neighborhoods to ensure the scale and character of the Downtown area is preserved. In addition, the Specific Plan's Guiding Principle 6 states, "Retain existing residential neighborhoods that surround Downtown as currently planned, with no proposed changes in zoning". The Specific Plan recognizes that the residential neighborhoods to the north, west, and south are important components of the character of South San Francisco and would protect these neighborhoods, as no changes to their current zoning or land use would be made. Implementation of the Specific Plan would provide better connections and an improved pedestrian environment to link these surrounding neighborhoods with the Downtown area and transit.
Policy 2-G-2. Maintain a balanced land use program that provides opportunities for continued economic growth, and building intensities that reflect South San Francisco's prominent inner bay location and excellent regional access.	**Consistent.** The Specific Plan would designate different land uses within the various districts and corridors that include residential, retail, business, and a transit station. The new land use program would result in higher intensity economic and residential growth, which would be further supported by the easy transit access provided by the Caltrain station.
Policy 2-G-5. Maintain Downtown as the City's physical and symbolic center, and a focus of residential, commercial, and entertainment activities.	**Consistent.** The Specific Plan's goal for the Downtown district is to support and encourage intensifications of uses while respecting the historic fabric, especially of Grand Avenue. New improvements would be focused on Grand Avenue to return this historic corridor to again being the focus of the community, while encouraging retention of existing, local businesses to the Downtown area and attracting new businesses to increase economic growth.
Policy 2-G-6. Maximize opportunities for residential development, including through infill and redevelopment, without impacting existing neighborhoods or creating conflicts with industrial operations.	**Consistent.** The Downtown and East of 101 areas of South San Francisco are highly urbanized environments. The Specific Plan proposes higher-density residential uses through emphasis on infill projects and development of underutilized or vacant parcels and would have the potential to add up to 1,435 housing units within the study area. Improvements and development in the area would improve the standard of living for existing neighborhoods by providing additional services and improving public rights-of-way with lighting and sidewalks upgrades as well as improving circulations for alternative modes of transportation.
Policy 2-G-7. Encourage mixed-use residential, retail, and office development in centers where they would support transit, in locations where they would provide increased access to neighborhoods that currently lack such facilities, and in corridors where such developments can help to foster identity and vitality.	**Consistent.** The Specific Plan focuses on properties within 0.25 and 0.5 mile of the Caltrain station, which is proposed for a platform extension south of the existing location. The Specific Plan proposes various mixed-use centers within a 0.25-mile radius of the Caltrain station to encourage transit ridership and increase movement between the Downtown and the East of 101 area. Implementation of the Specific Plan would provide a sense of identity for individual corridors while also providing a cohesive identity and vision for the study area as a whole.

Table 4.5-1 South San Francisco General Plan Policies	
South San Francisco General Plan	***Project Consistency***
Policy 2-G-8. Provide incentives to maximize community orientation of new development, and to promote alternative transportation modes.	**Consistent.** The Specific Plan proposes the highest land use intensities of residential, business, and other uses in the study area within 0.25 mile of the Caltrain station to promote increased transit ridership as well as to promote Downtown as a "go to" destination for residents and visitors. The Specific Plan would encourage a mix of uses, activities, and amenities throughout the Downtown to assist in revitalization of the Downtown as a regional destination, which will be supported by the Caltrain station.
Land Use—Implementing Policies	
Policy 2-I-1. Update the City's Zoning Ordinance and Subdivision Regulations in the Municipal Code for consistency with the General Plan.	**Consistent.** The Specific Plan includes various General Plan amendments, which would be adopted concurrent with the adoption of the Specific Plan. The General Plan amendments would modify the General Plan to adopt the Specific Plan as the governing document for the study area as well as change the land use designations to match those in the Specific Plan. Once the Specific Plan is adopted, changes to the Zoning Ordinance would ensure consistency between all three documents.
Policy 2-I-2. Establish height limitations for specific areas as delineated on Figure 2-3. For these specific areas, do not regulate heights separately by underlying base district uses.	**Consistent.** The Specific Plan proposes height limitations based on the desired building intensity and type of use proposed within a particular district or corridor. Because the greatest density of uses and services would be located within 0.25 mile of the Caltrain station, the Specific Plan proposes the greatest building heights in this area. The Specific Plan includes a General Plan amendment to change the existing Figure 2-3 "Special Area Height Limitations" to be consistent with the Specific Plan's new building height limitations.
Policy 2-I-6. Undertake a comprehensive review of the parking standards and established criteria for reduced parking for mixed-used developments, for development that meets specified TDM criteria, and Medium- and High-Density Residential development.	**Consistent.** The Specific Plan includes a Parking Report that recommends strategies to reduce the number of surface level parking lots within the study area as well as refinements to parking requirements that would promote trip reduction and decrease emissions. Different criteria and requirements were identified for the different districts and corridors within the study area due to differences in proposed land uses and development density.
Policy 2-I-7. Establish a comprehensive design standards and guideline strategy.	**Consistent.** Design standards and guidelines related to building design, building materials, site open space and landscape design, and parking structure/lot design have been incorporated into the Specific Plan and zoning for the Plan. The design standards are mandatory elements to be incorporated into individual project designs, while the design guidelines are important considerations that would help inform design and individual project approval.
Policy 2-I-8. As part of establishment of design guidelines and standards and design review, improve the community orientation of new development.	**Consistent.** The Specific Plan proposes different districts and corridors within the study area, and individual corridors would have specific design standards and guidelines. These design standards and guidelines are intended to promote the distinct identity and character of each area such that implementation of the Specific Plan would create a cohesive, attractive Downtown area, where an improved community orientation would be clearly established.
Policy 2-I-9. Ensure that any design and development standards and guidelines that are adopted reflect the unique patterns and characteristics of individual neighborhoods.	**Consistent.** The Specific Plan includes design and development standards and guidelines that would preserve and enhance the character of existing Downtown neighborhoods while allowing for new infill development that is reflective of existing character. The purpose of the Specific Plan is to revitalize the Downtown subareas to create attractive, vibrant corridors that promote economic and pedestrian activity.

Table 4.5-1 South San Francisco General Plan Policies	
South San Francisco General Plan	***Project Consistency***
Policy 2-I-18. Senior Citizen housing projects may be allowed to be constructed to a maximum density of 50 units/acres and off-street parking may be provided at a ratio lower than that which is otherwise required.	**Consistent.** The Specific Plan encourages a variety of housing types. The Downtown Residential Core allows an increase in density from 80 to 125 units per acre for senior housing projects.
Planning Sub-Areas: Downtown—Guiding Policies	
Policy 3.1-G-1. Promote Downtown's vitality and economic well-being, and its presence as the city's center.	**Consistent.** The Specific Plan focuses public investments in the historic core of the City, along Grand Avenue from Airport to Spruce, and on adjoining streets - the pedestrian-priority zone - to create an attractive pedestrian environment to support businesses Downtown. The Specific Plan proposes to revitalize Grand Avenue to be the main focus of the city center within Downtown by developing ground-floor retail and other services along Grand Avenue. The creation of the pedestrian-priority zone would increase economic growth and create an active, vibrant Downtown environment.
Policy 3.1-G-2. Encourage development of Downtown as a pedestrian-friendly mixed-use activity center with retail and visitor-oriented uses, business and personal services, government and professional offices, civic uses, and a variety of residential types and densities.	**Consistent.** The Specific Plan envisions the revitalization of Downtown South San Francisco as a citywide destination that is economically vital, diverse, active, and encompasses a variety of uses. The five Downtown subareas comprise the pedestrian-priority zone, where sidewalks would be wider to support more pedestrian activity. Additionally, the five Downtown subareas would support a range of residential types and densities with incorporated nonresidential uses.
Policy 3.1-G-3. Promote infill development, intensification, and reuse of currently underutilized sites.	**Consistent.** Throughout the study area there are a number of surface parking lots, underutilized parcels, and vacant lots. Since the Downtown area is already highly urbanized, infill development would utilize these parcels in order to implement the Specific Plan.
Policy 3.1-G-4. Enhance linkages between Downtown and transit centers, and increased street connectivity with the surrounding neighborhoods.	**Consistent.** The Specific Plan includes improvements to various linkages to better connect Downtown with the Caltrain station and the Eastern Neighborhood. Additionally, alleys and intersection improvements within the pedestrian-priority zone would help improve street connectivity within the study area.
Planning Sub-Areas: Downtown—Implementing Policies	
Policy 3.1-I-1. Maintain land uses and development intensities in Downtown in accordance with Table 3.1-2.	**Consistent.** The Specific Plan includes General Plan amendments to change the General Plan Land Use Diagram, the General Plan Standards for Density and Development Intensity, and Land Use classification text to reflect changes in intensity and density to show the Specific Plan land uses and development intensities. The adoption of the General Plan amendments would reflect the new land use and development intensities.
Policy 3.1-I-2. Prohibit manufacturing, warehouses, and marginal uses such as bars or adult entertainment, as well as additional single-room occupancy units in Downtown. **Policy 3.1-I-3.** Do not permit any commercial and office uses in areas designated Downtown Residential.	**Consistent.** The Downtown subareas promote the intensification of uses while respecting the historic fabric of the area, especially along Grand Avenue. The Downtown subareas include the Downtown Residential Core, Downtown Transit Core, Grand Avenue Core, and Linden Neighborhood Center. None of the Downtown subareas would allow manufacturing, warehouses, or marginal uses. In addition, none of the Downtown subareas would permit any commercial and office uses within Downtown residential areas.
Policy 3.1-I-4. Establish a height overlay zone in the Municipal Code corresponding to the standards depicted in Figure 2-3. Do not maintain separate height requirements tied to underlying land uses.	**Consistent.** The Specific Plan includes a General Plan amendment to change the Special Area Height Limitations to reflect the proposed changes in height limitations per Specific Plan land use. The adoption of the General Plan amendment would reflect the new height limitations.

Table 4.5-1 South San Francisco General Plan Policies

South San Francisco General Plan	*Project Consistency*
Policy 3.1-I-5. Establish development standards in the Municipal Code to reinforce Downtown's traditional development pattern.	**Consistent.** The Specific Plan includes design standards and guidelines intended to reinforce the traditional Downtown development pattern in order to revitalize and increase the intensity and density of the different subareas within the Downtown area. These standards and regulations would be incorporated into the Municipal Code via a zoning amendment.
Policy 3.1-I-6. Work with the Peninsula Joint Corridors Board and other agencies to develop a new multi-modal transportation hub on the southeast side of the Grand Avenue/Airport Boulevard intersection. Encourage the inclusion of a child care facility near the multi-modal hub.	**Not Applicable.** The existing platform for the Caltrain station would be extended southward with implementation of the Specific Plan in order to promote accessibility and transit-oriented development.
Policy 3.1-I-7. Undertake a Downtown streetscape improvement program, which would include: ■ Signage or banners along the east side of Airport Boulevard to announce Downtown and the auto row from US-101 ■ Signage for the new multi-modal transportation center at the southeast corner of Grand Avenue/Airport Boulevard ■ Tree planting, especially along Linden Avenue, Maple Avenue, and Spruce Avenue and Miller, Grand, and Commercial avenues ■ Vegetation along Railroad Avenue to provide a buffer between Downtown residential uses and industrial areas to the south. **Policy 3.1-I-8.** Improve pedestrian connections between the new multi-modal transportation center and Downtown through techniques such as sidewalk bulbing, lighting improvements, and signage.	**Consistent.** The Specific Plan includes an extensive streetscape improvement plan that includes improvements for street landscaping, ground plane planting, paving, tree grates, benches, trash and other receptacles, bicycle racks, light standards, and public art. Signage would be incorporated into all aspects of the Downtown area to inform users about parking, pedestrian safety, important features in the Downtown area, such as the Gateway entry points on Grand Avenue, and special events. In addition, signage would be used to direct transit users to the Caltrain station to help encourage easy access and encourage increased ridership. A new street lighting system would improve safety and security as well as provide for an active nighttime environment by illuminating the Downtown area, especially the pedestrian-priority zone, plazas, and the Gateway entry points. The design of the new fixtures and bulbs would complement new development, provide unique character to the neighborhood streets, and be energy efficient. Lighting improvements would also occur to the underpass that would connect the Downtown area to the Caltrain station and Eastern Neighborhood to increase safety and discourage crime.
Policy 3.1-I-9. Establish design and signage standards for development along Grand and Linden avenues.	**Consistent.** Grand and Linden Avenues are part of the proposed pedestrian-priority zone, and both are designated as "important streets" by the Specific Plan. Grand Avenue is the historic core of the City, where new development would be consistent with the character and feeling of the Avenue. New development along Linden Avenue would be consistent with the design standards and guidelines proposed in the Specific Plan.
Policy 3.1-I-10. Require all development in Downtown to either meet the established off-street parking requirements, or contribute an appropriate share to the Downtown Parking District to mitigate impacts associated with development.	**Consistent.** A Parking Report was prepared as part of the analysis for the Specific Plan, in which strategies and recommendations were identified to reduce the number of surface level parking lots within the study area and to refine parking requirements to promote fewer trips traveled and decrease emissions. The Parking Report includes a range of strategies to help meet and decrease the presence of off-street parking, which includes in-lieu parking fees, residential permit parking, meter parking, and a wayfinding program to help mitigate impacts associated with new development.
Planning Sub-Areas: East of 101—Guiding Policies	
Policy 3.5-G-1. Provide appropriate settings for a diverse range of nonresidential uses.	**Consistent.** The Eastern Neighborhood of the Specific Plan is proposed as an urban, corporate office center that also incorporates retail uses. The Transit Office/Research and Development (R&D) Core is proposed as an urban employment district with corporate offices, hotels, and other major facilities and also incorporates retail and other nonresidential uses. The Specific Plan proposes no residential use within either of these districts.

Table 4.5-1 South San Francisco General Plan Policies	
South San Francisco General Plan	***Project Consistency***
Policy 3.5-G-3. Promote campus-style biotechnology, high-technology, and research and development uses.	**Consistent.** The Specific Plan promotes biotechnology, research and development, and other technology based employment within the Eastern Neighborhood and the Transit Office/R&D Core in order to be consistent with existing uses, such as Genentech, which is located within the East of 101 subarea.
Planning Sub-Areas: East of 101—Implementing Policies	
Policy 3.5-I-3. Do not permit any residential uses in the East of 101 area.	**Consistent.** In the small portion of the East of 101 area overlapping the study area, the Specific Plan envisions an urban, corporate office format. As mentioned above, the Specific Plan encourages development of the Eastern Neighborhood with high-density employment uses, and would not permit any residential uses.
Policy 3.5-I-4. Unless otherwise stipulated in a specific plan, allow building heights in the East of 101 area to the maximum limits permissible under Federal Aviation Regulations Part 77.	**Consistent.** The Specific Plan proposes a height limitation that is the maximum limit permissible under Federal Aviation Regulations Part 77 for the properties immediately adjacent to the Caltrain station and a height limitation of 85 feet for the properties that are not adjacent to the station but are still located within 0.25 mile of the station.

The proposed Specific Plan would support transit-oriented development (TOD); create an open space framework; create pedestrian linkages, alleys, and a pedestrian priority zone; create a new bicycle network; and employ new parking strategies. The General Plan encourages projects that provide a mix of uses, are compatible and harmonious with surrounding development, and offer amenities that enhance the image and quality of life and the environment. The Specific Plan's policies are designed to create vibrant and diverse commercial corridors; well-designed buildings, attractive streetscapes, and engaging public spaces; multi-modal streets to accommodate pedestrians, bicyclists, and vehicles; a mix of uses with residential and employment densities that support transit use; and a range of housing options, while the residential areas north and south of the Downtown core would remain as currently planned. These policies are intended to enhance the image of the community and promote compatibility between land uses. Added services in the areas would improve the standard of living for existing residents as well as new residents in the area. The proposed project would represent a net change in land use acreage (see Table 3-1 [Existing and Proposed Land Uses]) but would not in itself result in environmental impacts related to land use and planning. The Specific Plan would not conflict with existing City policies or regulations that were adopted for the purpose of mitigating an environmental effect. Instead, the Specific Plan would provide the City with TOD in an area that could support high density uses in specific zones while maintaining the existing character and fabric of the well-established South San Francisco community. The proposed project would permit a new mix of development to enhance the area's economic viability and provide employment, retail and housing opportunities which would directly benefit the community. Consequently, this impact would be ***less than significant***, and no mitigation is required.

4.5.4 Cumulative Impacts

A cumulative impact analysis is only provided for those thresholds that result in a less-than-significant, potentially significant, or significant and unavoidable impact. A cumulative impact analysis is not provided for Effects Found Not to Be Significant, which result in no project-related impacts.

Threshold	Would the project 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?

This cumulative impact analysis considers development of the proposed Specific Plan, in conjunction with other development in the City of South San Francisco. This analysis accounts for all anticipated cumulative growth within this geographic area, as represented by full implementation of the City of South San Francisco General Plan and development of the related projects.

Cumulative land use impacts have the potential to occur where a number of projects have the potential to conflict with applicable land use plans adopted for the purpose of avoiding or mitigating an environmental affect. Adherence to existing land use plans, policies, and regulations generally prevents such conflicts. Future development in the City of South San Francisco would be reviewed for consistency with adopted land use plans and policies and in accordance with the requirements of CEQA, which require findings of plan and policy consistency prior to approval of entitlements for development. It should be noted that future projects could also include General Plan amendments and/or zone changes. However, modifications to existing land use patterns that require such amendments do not necessarily represent an inherent negative effect on the environment, particularly if the proposed changes do not conflict with the policies that were specifically adopted for the purpose of avoiding or mitigating an environmental effect. Cumulative projects would primarily result in development to enhance existing land use patterns within areas of the City, and are therefore generally anticipated to be compatible with adjacent uses. However, should such analysis identify significant land use impacts, mitigation measures would be required to reduce those impacts to a less-than-significant level. Absent effective and feasible mitigation, the City may determine that the benefits derived from the proposed land use changes are sufficient to justify adoption of a Statement of Overriding Considerations, permitting the revisions and their associated projects to proceed.

The proposed Specific Plan's main goals are to (1) revitalize Downtown South San Francisco to be a vibrant and successful community resource and a source of local pride; (2) promote new residential, mixed use, and employment uses as to add a "critical mass" of business patrons and residents Downtown while maintaining a scale and character that is complementary; (3) focus new improvements on Grand Avenue to return this historic corridor to being the focus of the community, encourage retention of existing and local businesses to the Downtown, and protect historic building fabric; and (4) improve pedestrian and bicycle connections to Caltrain as well as the Downtown with the east employment area. The Specific Plan includes significant changes in the study area, as density of housing units would be intensified and new land use designations implemented. However, General Plan amendments would be adopted concurrent with the adoption of the Specific Plan. As demonstrated in the consistency analysis, the Specific Plan would be consistent with the General Plan and compatible with surrounding land uses. Land uses types would be retained but modified through General Plan and Zoning amendments such that greater residential densities would be allowed while retaining neighborhood character. The proposed Specific Plan would be consistent with the broad vision and policies of the City of South San Francisco General Plan, the City of South San Francisco Zoning Ordinance, and the community vision for the Downtown area. Therefore, there would be no conflicts with adopted plans and policies resulting from

future development within the study area as a result of the Specific Plan and the cumulative impact would be ***less than significant***.

4.5.5 References

Atkins. 2011. *Final Environmental Impact Report for Laguna Niguel Gateway Plan PEIR*, October.

PBS&J. 2009. *City of Huntington Beach Beach and Edinger Corridors Specific Plan EIR*, August.

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?nid=360.

———. 2010. *City of South San Francisco Zoning Ordinance*. Adopted July 28, 2010. http://zoning.ssf.net/zopdfs/complete.pdf (accessed December 2, 2013).

4.6 NOISE

This section of the EIR analyzes the potential environmental effects on noise from implementation of the proposed project. No comment letters addressing noise were received in response to the notice of preparation (NOP) circulated for the proposed project.

Data for this section were taken from the South San Francisco Municipal Code (SSFMC), the City of South San Francisco General Plan; the Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport (C/CAG 2012), and project-specific traffic impact analysis (Fehr & Peers 2014). Full reference-list entries for all cited materials are provided in Section 4.6.5 (References).

4.6.1 Environmental Setting

Noise and Vibration Basics

Quantification of Noise

Noise is commonly defined as unwanted sound. Sound pressure magnitude is measured and quantified using a logarithmic ratio of pressures, the scale of which gives the level of sound in decibels (dB). Sound pressures in the environment have a wide range of values and the sound pressure level was developed as a convenience in describing this range as a logarithm of the sound pressure. The sound pressure level is the logarithm of the ratio of the unknown sound pressure to a reference quantity of the same kind. To account for the pitch of sounds and the corresponding sensitivity of human hearing to them, the raw sound pressure level is adjusted with an A-weighting scheme based on frequency that is stated in units of decibels (dBA). Typical A-weighted noise levels are listed in Table 4.6-1 (Typical A-Weighted Noise Levels).

A given level of noise may be more or less tolerable depending on the sound level, duration of exposure, character of the noise sources, the time of day during which the noise is experienced, and the activity affected by the noise. For example, noise that occurs at night tends to be more disturbing than that which occurs during the day because sleep may be disturbed. Additionally, rest at night is a critical requirement in the recovery from exposure to high noise levels during the day. In consideration of these factors, different measures of noise exposure have been developed to quantify the extent of the effects anticipated from these activities. For example, some indices consider the 24-hour noise environment of a location by using a weighted average to estimate its habitability on a long-term basis. Other measures consider portions of the day and evaluate the nearby activities affected by it as well as the noise sources. The most commonly used indices for measuring community noise levels are the equivalent energy level (L_{eq}), and the community noise equivalent level (CNEL).

- **L_{eq}**, the equivalent energy level, is the average acoustical or sound energy content of noise, measured during a prescribed period, such as 1 minute, 15 minutes, 1 hour, or 8 hours. It is the decibel sound level that contains an equal amount of energy as a fluctuating sound level over a given period of time.

Table 4.6-1 Typical A-Weighted Noise Levels

Common Outdoor Activities	*Noise Level (dBA)*	*Common Indoor Activities*
	— 110 —	Rock band
Jet fly-over at 1,000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	— 70 —	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

SOURCE: California Department of Transportation, *Technical Noise Supplement—A Technical Supplement to the Traffic Noise Analysis Protocol* (October 1998).

- **L_X**, the Xth-percentile-exceeded sound level, is the sound level exceeded X percent of a prescribed period. For example, L_{50} is the sound level exceeded 50 percent of a prescribed period.
- **CNEL**, community noise equivalent level, is the average equivalent A-weighted sound level over a 24-hour period. This measurement applies weights to noise levels during evening and nighttime hours to compensate for the increased disturbance response of people at those times. CNEL is the equivalent sound level for a 24-hour period with a +5 dBA weighting applied to all sound occurring between 7:00 PM and 10:00 PM and a +10 dBA weighting applied to all sound occurring between 10:00 PM and 7:00 AM Similar to the CNEL, L_{dn}, the day-night average noise level is a 24-hour average L_{eq} with a +10 dBA weighting applied to noise during the hours of 10:00 PM to 7:00 AM. L_{dn} and CNEL are typically within 1 dBA of each other and, for most intents and purposes, are interchangeable.

The decibel level of a sound decreases (or attenuates) exponentially as the distance from the source of that sound increases. For a single point source such as a piece of mechanical equipment, the sound level normally decreases by about 6 dBA for each doubling of distance from the source. Sound that originates from a linear, or "line" source such as a heavily traveled traffic corridor, attenuates by approximately 3 dBA per doubling of distance, provided that the surrounding site conditions lack ground effects or obstacles that either scatter or reflect noise. Noise from roadways in environments with major ground effects due to vegetation and loose soils may either absorb or scatter the sound yielding attenuation rates as high as 4.5 dBA for each doubling of distance. Other contributing factors that affect sound reception include meteorological conditions and the presence of manmade obstacles such as buildings and sound barriers. Barriers between a noise source and a receiver can substantially reduce noise levels at the receiver. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dBA of noise reduction. Taller barriers provide increased noise reduction (Caltrans 2008).

Noise Effects

Noise has a significant effect on the quality of life. An individual's reaction to a particular noise depends on many factors such as the source of the noise, its loudness relative to the background noise level, and the time of day. The reaction to noise can also be highly subjective; the perceived effect of a particular noise can vary widely among individuals in a community. Because of the nature of the human ear, a sound must be about 10 dBA greater than the reference sound to be judged as twice as loud. In general, a 5 dBA change in community noise levels is clearly noticeable, and a 3 dBA change is the smallest increment that is perceivable by most receivers. Generally, 1 to 2 dBA changes are not detectable. Although the reaction to noise may vary, it is clear that noise is a significant component of the environment, and excessively noisy conditions can affect an individual's health and well-being. The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on a community can be organized into six broad categories: sleep disturbance, permanent hearing loss, human performance and behavior, social interaction or communication, extra-auditory health effects, and general annoyance.

Environmental Vibration Basics

Vibration is defined as any oscillatory motion induced in a structure or mechanical device as a direct result of some type of input excitation. Vibration consists of waves transmitted through solid material. There are several types of wave motion in solids, unlike in air, including compressional, shear, torsional, and bending. The solid medium can be excited by forces, moments, or pressure fields. This leads to the terminology of "structure-borne/ground-borne" vibration.

Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. Soil properties also affect the propagation of vibration. When groundborne vibration interacts with a building there is usually a ground-to-foundation coupling loss, but the vibration can also be amplified by the structural resonances of the walls and floors. Vibration in buildings is typically perceived as rattling of windows or items on shelves or the motion of building surfaces. The vibration of building surfaces can also be radiated as sound and heard as a low-frequency rumbling noise, known as groundborne noise.

The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest in groundborne vibration is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

Existing Noise Environment

Existing noise sources that affect the study area are described below.

Operational Noise Sources

The study area is currently developed with moderate density residential development and employment uses including Downtown retail commercial, business commercial, auto-serving commercial, and industrial development. No residential uses are located east of the Caltrain line. Land uses in this area are dominated by industrial, business commercial, and auto-serving commercial land uses. Residential and commercial uses are located throughout the study area west of the Caltrain line at various densities. Densities generally increase toward Grand Avenue, which is the major Downtown commercial corridor. Business commercial and auto-serving commercial uses are concentrated along Airport Boulevard. Industrial uses west of the Caltrain line are concentrated north of Armour Avenue and south of Railroad Avenue. Limited recreational uses are located in the study area and consist of an open space area at the Irish Town Greens on Armour Avenue, a play lot at Cypress and Pine Avenues, open space in Jack Drago Park near Gateway Boulevard, and a play lot at City Hall on Miller Avenue. Adjacent to the Specific Plan boundaries to the west and north are residential neighborhoods. To the east are business commercial and research and development uses, and residences and industrial uses are located to the south.

Residences are typically not a source of substantial operational noise. The play lots at City Hall and Cypress/Pine include outdoor playgrounds that intermittently result in noise from children playing. Downtown and business commercial uses do not typically require heavy machinery or equipment that would be a substantial source of operational noise, other than heating, ventilation, and air conditioning (HVAC) systems, which are typically shielded. Occasional nuisance noise may also result from surrounding surface parking lots, such as loud music or car alarms. Auto-serving commercial uses and industrial uses may require machinery that generates noise that is audible at surrounding uses. The General Plan Noise Element identifies the industrial land uses south of Railroad Avenue as having the potential to result in noise levels that exceed 60 dBA CNEL at adjacent residences.

Existing Noise Levels

Noise measurements conducted during preparation of the General Plan Noise Element determined that much of the City experiences noise levels in excess of 65 dBA CNEL. The General Plan Noise Element identifies most of the study area west of US-101 as having noise levels of 60 dBA CNEL or less. Noise

levels east of Linden Avenue are 65 dBA CNEL and above, areas along US-101 exceed 70 dBA CNEL, and areas between US-101 and the Caltrain line exceed 75 dBA CNEL.

Transportation Noise Sources

Aviation

The General Plan Noise Element identifies San Francisco International Airport (SFIA) as a major noise source in some areas of the City. The study area is located approximately 0.75 mile from the SFIA. However, due to distance and the orientation of the airport runways, the study area is not located within the 65 dBA CNEL noise contour of the SFIA (C/CAG 2012).

Roadways

The South San Francisco General Plan Noise Element identifies US-101 as a major noise source in the City. This freeway traverses the study area from north to south between Airport Boulevard and the railroad line. Major thoroughfares through the study area also contribute to traffic noise, including Airport Boulevard, South Airport Boulevard, Baden Avenue, and Gateway Boulevard. Existing traffic noise levels were modeled using standard noise modeling equations adapted from the FHWA noise prediction model. This model takes into account traffic volumes, vehicle mix, vehicle speed, and roadway configuration. It is conservative and does not take into account existing site topography, structures, or noise barriers along the freeways. Table 4.6-2 (Existing Roadway Noise Levels) shows the existing noise levels generated by select roadways in the study area. Selected roadways include roadway segments where the Specific Plan is projected to result in a future increase of more than 1,000 peak hour trips. For each roadway, only the segment with the greatest traffic volume was analyzed. As shown in Table 4.6-3 (Existing Freeway Noise Contours), noise levels along major roadways in the study area typically range from 59 dBA CNEL to 71 dBA CNEL at 50 feet from the roadway centerline. According to the California Department of Health, roadway noise levels up to 60 dBA CNEL are normally compatible with single-family residences, noise levels up to 65 dBA CNEL are normally compatible with multifamily residences, and noise levels up to 70 dBA CNEL are normally compatible with civic and commercial development. As shown in Table 4.6-2, noise levels in the study area currently exceed the normally compatible noise standards for single-family residences. Noise levels along most roadway segments exceed the normally compatible noise standards for multifamily residences. Noise levels in most areas are considered normally compatible with civic and commercial uses.

Roadway noise level contours for existing traffic volumes on US-101 are shown in Table 4.6-3. As shown in Table 4.6-3, single-family residences within 0.69 mile of the freeway may be exposed to noise levels in excess of 60 dBA CNEL. Multifamily residences may be exposed to noise levels in excess of the normally acceptable standard of 65 dBA CNEL within 0.33 mile of the freeway. Civic and commercial uses within approximately one city block from the freeway may be exposed to noise levels in excess of 70 dBA CNEL.

Table 4.6-2 Existing Roadway Noise Levels

Segment	*Existing ADT*	*Existing Ambient Noise Level (dBA CNEL)*
Airport Blvd between Baden Ave and San Mateo Ave/So. Airport Blvd	21,660	71
South Airport Blvd between Airport Blvd/ Produce Ave and Gateway Blvd	20,030	68
Baden Ave between Airport Blvd and Linden Ave	14,410	63
Gateway Blvd between E. Grand Ave and So. Airport Blvd/Mitchell Ave	13,510	67
Grand Ave between Airport Blvd and US-101	14,410	63
E. Grand Ave between US-101 and Dubuque Ave	20,890	69
Industrial Way south of Grand Ave	6,520	60
Linden Ave between Grand Ave and Baden Ave	8,920	61
Miller Ave between Airport Blvd and Linden Ave	6,440	59
Produce Ave south of San Mateo Ave/ So. Airport Blvd	25,020	69

SOURCE: Fehr & Peers, *South San Francisco Station Area Land Use Plan: EIR Transportation Analysis assumptions* (February 14, 2014) (see Appendix D for noise model assumptions and output).
Peak hour PM volumes are assumed to be 10 percent of total daily trips.

Table 4.6-3 Existing Freeway Noise Contours

Roadway Segment	*Distance from Freeway Centerline (miles)*			
	70 dBA CNEL	*65 dBA CNEL*	*60 dBA CNEL*	*55 dBA CNEL*
US-101/I-380 Junction to Produce/Airport	0.17	0.36	0.77	1.66
US-101—Produce/Airport to Grand Ave	0.16	0.35	0.75	1.62
US-101—Grand Ave to Oyster Point Blvd	0.16	0.36	0.77	1.65

SOURCE: Atkins (2013), based on traffic data provided by California Department of Transportation, *2012 Annual Average Daily Truck Traffic on the California State Highway System* (2012) and California Department of Transportation, *2012 Traffic Volumes on the California State Highways System* (2013).

Railroads

The Southern Pacific Railroad line traverses the study area just east of US-101. Caltrain runs sixty-eight commuter trains each day through South San Francisco, and Southern Pacific freight trains also use the line. According to the Noise Element, since the line runs adjacent to US-101 and is generally surrounded by industrial and commercial land uses, rail operations have a negligible impact on noise exposure in South San Francisco.

Noise-Sensitive Land Uses

Noise-sensitive land uses (NSLU) are land uses that may be subject to stress and/or interference from excessive noise. The General Plan Noise Element defines NSLU as residences, schools, churches, and hospitals. Industrial and commercial land uses are generally not considered sensitive to noise. The term "noise receptor" is often used to represent a specific location where individuals would be exposed to noise, such as a specific residence. Noise sensitive land uses are located throughout the western portion of the study area, including residences, public and private schools, and churches. Along the western edge

of US-101 freeway and east of the freeway land uses are predominantly commercial and industrial uses which are not noise sensitive.

Vibration-Sensitive Land Uses

Land uses in which groundborne vibration could potentially interfere with operations or equipment, such as research, manufacturing, hospitals, and university research operations are considered "vibration sensitive" (FTA 2006). The degree of sensitivity depends on the specific equipment that would be affected by the groundborne vibration. There is the potential for vibration sensitive activities to currently exist in the commercial and industrial land uses. In addition, the railroad tracks could result in groundborne vibrations in excess of 100 feet from the tracks, however there are no known vibration sensitive land uses within the study area that are located within 100 feet of the rail line. Excessive levels of groundborne vibration of either a regular or an intermittent nature can result in annoyance to residents.

4.6.2 Regulatory Framework

Federal

Federal Highway Administration Standards

CFR Title 23, Part 772, sets procedures for the abatement of highway traffic noise and construction noise. Title 23 is implemented by the Department of Transportation Federal Highway Administration (FHWA). The purpose of this regulation is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways. All highway projects which are developed in conformance with this regulation shall be deemed to be in conformance with the Department of Transportation FHWA Noise Standards. Title 23 establishes 67 dBA as the worst-case hourly average noise level standard for impacts of federal highway projects to land uses including residences, recreational uses, hotels, hospitals, and libraries (23 CFR Chapter 1, Part 772, Section 772.19).

Federal Transit Administration Standards and Federal Railroad Administration Standards

Although the Federal Transit Administration (FTA) standards are intended for federally funded mass transit projects, the impact assessment procedures and criteria included in the FTA Transit Noise and Vibration Impact Assessment Manual (May 2006) are routinely used for projects proposed by local jurisdictions. The FTA and Federal Railroad Administration have published guidelines for assessing the impacts of groundborne vibration associated with rail projects, which have been applied by other jurisdictions to other types of projects. The FTA measure of the threshold of architectural damage for conventional sensitive structures from groundborne vibration is 0.2 in/sec peak particle velocity (PPV).

State

California Noise Control Act of 1973

The California Noise Control Act of 1973, California Health and Safety Code Sections 46000 through 46080, finds that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also finds that there is a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

California Noise Insulation Standards (California Code of Regulations, Title 24)

Title 24 establishes an interior noise standard of 45 dBA for multifamily residential structures, and also requires noise insulation of new multifamily dwellings constructed within a 60 dBA noise contour (OPR 2003).

California Department of Health Services Guidelines

The California Department of Health Services has published guidelines for the preparation of noise elements that outlines recommendations to minimize the exposure of community residents to excessive noise, including noise compatibility standards. These guidelines are included in State of California General Plan Guidelines Appendix C (Guidelines for the Preparation and Content of the Noise Element of the General Plan) (OPR 2003). The recommended noise-compatibility guidelines are provided in Table 4.6-4 (Noise Compatibility Guidelines). These guidelines apply to ambient noise levels rather than individual noise sources. The guidelines also provide adjustment factors that may be used in order to arrive at noise-acceptability standards that reflect a particular community's sensitivity. The adjustment factor for noisy urban residential communities near busy roads is -5 dBA CNEL, which means that measured noise levels would be reduced by 5 dBA CNEL before comparison to the noise compatibility guidelines. Essentially the adjustment factors indicate that noise compatibility guidelines 5 dBA CNEL higher than recommended in Table 4.6-4 are appropriate in urban residential communities due to existing noise levels.

Table 4.6-4 Noise Compatibility Guidelines

Land Use Category	*Community Noise Exposure*			
	L_{dn} or CNEL, dBA			
	Normally Acceptable	*Conditionally Acceptable*	*Normally Unacceptable*	*Clearly Unacceptable*
Residential—Single family, Duplex, Mobile Home	50–60	55–70	70–75	75–85
Residential—Multifamily	50–65	60–70	70–75	75–85
Transient Lodging, Motels, Hotels	50–65	60–70	70–80	80–85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50–70	60–70	70–80	80–85
Auditoriums, Concert Halls, Amphitheaters	NA	50–70	NA	65–85
Sports Arena, Outdoor Spectator Sports	NA	50–75	NA	70–85
Playgrounds, Neighborhood Parks	50–70	NA	67.5–75	72.5–85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50–75	NA	70–80	80–85
Office Buildings, Business Commercial, Professional	50–70	67.5–77.5	75–85	NA
Industrial, Manufacturing, Utilities, Agriculture	50–75	70–80	80–85	NA

SOURCE: California Governor's Office of Planning and Research, *State of California General Plan Guidelines* (2003), Appendix C (Guidelines for the Preparation and Content of the Noise Element of the General Plan).

NORMALLY ACCEPTABLE—Specified land use is satisfactory, based upon the assumption that buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE—New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

NORMALLY UNACCEPTABLE—New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with noise insulation features included in the design.

CLEARLY UNACCEPTABLE—New construction or development clearly should not be undertaken.

Local

City of South San Francisco General Plan

The Noise Element of the City's General Plan assesses potential noise sources in the City and makes recommendations to minimize noise exposure. Applicable Noise Element policies include the following:

Policy 9-I-6 Require that applicants for new noise-sensitive development in areas subject to noise generators producing noise levels greater than 65 dB CNEL, obtain the services of a professional acoustical engineer to provide a technical analysis and design of mitigation measures.

Policy 9-I-7 Where site conditions permit, require noise buffering for all noise-sensitive development subject to noise generators producing noise levels greater than 65 dB CNEL. This noise attenuation method should avoid the use of visible sound walls, where practical.

Policy 9-I-8 Require the control of noise at source through site design, building design, landscaping, hours of operation, and other techniques, for new developments deemed to be noise generators.

The Noise Element includes the San Mateo Airport Land Use Commission noise/land use compatibility standards for review of development in noise impacted areas. The compatibility standards are specifically applicable to development with the 65 dBA CNEL noise contour of the San Francisco International airport. The noise compatibility standards are listed in Table 4.6-5 (Land Use Criteria for Noise-Impacted Areas).

Table 4.6-5 Land Use Criteria for Noise-Impacted Areas

Land Use	*CNEL Range*	*General Land Use Criteria*
Residential	Less than 65	Satisfactory; no special insulation requirements
	65 to 70	Development requires analysis of noise reduction requirements and noise insulation as needed
	Over 70	Development should not be undertaken
Commercial	Less than 70	Satisfactory; no special insulation requirements
	70 to 80	Development requires analysis of noise reduction requirements and noise insulation as needed
	Over 80	Airport-related development only; special noise insulation should be provided
Industrial	Less than 75	Satisfactory; no special insulation requirements
	75 to 85	Development requires analysis of noise reduction requirements and noise insulation as needed
	Over 85	Airport-related development only; special noise insulation should be provided
Open Space	Less than 75	Satisfactory; no special insulation requirements
	Over 75	Avoid uses involving concentrations of people or animals

SOURCE: City of South San Francisco, *City of South San Francisco General Plan* (1999).

City of South San Francisco Municipal Code

The City of South San Francisco has adopted a Noise Ordinance (SSFMC Chapter 8.32), which identifies ambient baseline noise levels, noise standards for various sources, specific noise restrictions, exemptions, and variances for sources of noise within the City. The noise levels are used as baseline criteria for noise levels for different land use categories. SSFMC Section 8.32.030 provides noise level standards for specific zones and land uses within the City (see Table 4.6-6 [City of South San Francisco Noise Level Standard]). The noise standards apply to all noise sources with the exception of construction activities, vehicle horns and utility and emergency vehicles.

Per Section 8.32.050(d) of the SSFMC, construction activities are "allowed on weekdays between the hours of eight a.m. and eight p.m., on Saturdays between the hours of nine a.m. and eight p.m., and on Sundays and holidays between the hours of ten a.m. and six p.m., or at such other hours as may be authorized by the permit, if they meet at least one of the following noise limitations:

- No individual piece of equipment shall produce a noise level exceeding 90 dB at a distance of 25 feet. If the device is housed within a structure or trailer on the property, the measurement shall be made outside the structure at a distance as close to 25 feet from the equipment as possible.
- The noise level at any point outside the property plane of the project shall not exceed 90 dB."

Table 4.6-6 City of South San Francisco Noise Level Standard

Land Use Category	*Time Period*	*Noise Level (dB)*
R-E, R-1 and R-2 zones or any single-family or duplex residential in a specific plan district	10:00 PM–7:00 AM	50
	7:00 AM–10:00 PM	60
R-3 and D-C zones or any multiple-family residential or mixed residential/commercial in any specific plan district	10:00 PM–7:00 AM	55
	7:00 AM–10:00 PM	65
C-1, P-C, Gateway and Oyster Point Marina specific plan districts or any commercial use in any specific plan district	10:00 PM–7:00 AM	60
	7:00 AM–10:00 PM	65
M-1, P-I	Anytime	70

SOURCE: *City of South San Francisco Municipal Code* Section 8.32.030.

Per SSFMC Section 8.32.080, the operation of sound-amplifying equipment shall only occur between the hours of 8:00 AM and 8:00 PM. No operation of sound-amplifying equipment for commercial purposes shall be permitted on Sundays or legal holidays. The operation of sound-amplifying equipment for noncommercial purposes on Sundays and legal holidays shall occur only between the hours of 10:00 AM and 8:00 PM.

4.6.3 Impacts and Mitigation Measures

Analytic Method

Implementation of the proposed project could result in the introduction of noise levels that may exceed City noise standards. The primary sources of noise associated with the proposed project would be construction activities within the study area and project-related traffic volumes associated with operation of the proposed project. Secondary sources of noise would include new stationary sources (such as HVAC units) and increased human activity throughout the study area. The net increase in noise levels generated by these activities and other sources were quantitatively estimated and compared to the applicable noise standards and thresholds of significance.

Aside from noise levels, groundborne vibration would also be generated during the construction phase of the proposed project by various pieces of construction equipment. Thus, the groundborne vibration levels generated by construction equipment were quantitatively estimated and compared to applicable thresholds of significance.

Construction Noise Levels

Construction noise levels were estimated based on data published by the U.S. Environmental Protection Agency (USEPA). Potential noise levels are identified for on- and off-site locations that are sensitive to noise, including hotels and sensitive research facilities.

The USEPA has compiled data regarding the noise-generating characteristics of typical construction activities. These noise levels would diminish rapidly with distance from the construction site, at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 86 dBA measured at 50 feet

from the noise source to the receptor would reduce to 80 dBA at 100 feet from the source to the receptor, and reduce by another 6 dBA to 74 dBA at 200 feet from the source to the receptor.

Roadway Noise Levels

Roadway noise levels were calculated for various locations around the study area using the FHWA-RD-77-108 model and traffic volumes from the project traffic study. The average vehicle noise rates (energy rates) utilized in the FHWA Model were modified to reflect average vehicle noise rates identified for California by Caltrans. Traffic volumes used in the FHWA model are derived from the project traffic study, which is provided in Appendix D and summarized in Section 4.10 (Transportation/Traffic) of this document. As part of the proposed project, there were two scenarios analyzed based on the configuration of the Airport Boulevard/Grand Avenue intersection. In the first scenario the west bound lane would remain, and in the second scenario the westbound lane would be removed. The overall worst-case noise levels (that would result from removal of the west-bound left lane) are reported.

Vibration Levels Associated with Construction Equipment

Groundborne vibration levels resulting from construction activities occurring within the study area were estimated by data published by the City/County Association of Governments of San Mateo County. Potential vibration levels are identified for on- and off-site locations that are sensitive to vibration, including hotels and sensitive research facilities.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on noise if it would do any of the following:

- Result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- If located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in the exposure of people residing or working in the study area to excessive noise levels
- If within the vicinity of a private airstrip, result in the exposure of people residing or working in the study area to excessive noise levels

The CEQA Guidelines do not define the levels at which temporary and permanent increases in ambient noise are considered "substantial." Typically, a noise level increase of 3 dBA is barely perceptible to most people, a 5 dBA increase is readily noticeable, and a difference of 10 dBA would be perceived as a

doubling of loudness. Based on this information, a 3 dBA CNEL increase would be considered significant.

The City of South San Francisco has implemented Land Use noise compatibility standards for uses in noise impacted areas. With the high volume roadways, the US-101 freeway, and the rail line bisecting the study area, the noise compatibility standards are an appropriate significance threshold for this analysis.

The CEQA Guidelines also do not define the levels at which groundborne vibration or groundborne noise is considered "excessive." For the purpose of this analysis, groundborne vibration impacts associated with human annoyance would be significant if the proposed project exceeds 85 VdB, which is the vibration level that is considered by the Federal Transit Administration (FTA) to be acceptable only if there are an infrequent number of events per day (as described in Table 4.6-2 [Human Response to Different Levels of Groundborne Vibration]). Groundborne vibration impacts associated with the use of vibration sensitive equipment would be significant if the proposed project exceeds 66 VdB.

Consistency Analysis

The Specific Plan is intended to facilitate and guide the City of South San Francisco in its planning efforts to create a vibrant, transit-supportive, diverse Downtown. The Specific Plan would provide connectivity to the Downtown and Caltrain station, encourage long-term development that is transit-supportive and provide accessibility for all community members. As shown above, the Noise Element of the City's General Plan assesses potential noise sources in the City and makes recommendations to minimize noise exposure. The Specific Plan focuses on five areas that represent prime opportunities for change: Grand Avenue; transit-oriented Downtown development; eastern Downtown employment district; Caltrain station platform extension and Grand Avenue extension; and Downtown public realm improvements. Four core areas are identified in the proposed land use plan, including the Downtown Residential Core, the Downtown Transit Core, the Grand Avenue Core, and the Transit Office/R&D Core, which is located immediately adjacent to the east of the Caltrain station. Implementation of the Specific Plan would increase residential and commercial density around the transit corridor, which would increase exposure to higher levels of transit noise. However, as indicated in the General Plan and the analysis below, noise exposure would be mitigated through acoustical engineering in order to meet state and City exposure limits. Therefore the implementation of the Specific Plan would be consistent with the General Plan Noise Element.

Effects Not Found to Be Significant

Threshold	Would the project, if located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in the exposure of people residing or working in the study area to excessive noise levels?

The study area is located approximately 0.75 mile from the SFIA. Due to distance and the orientation of the airport runways, the study area is not located within the 65 dBA CNEL noise contour of the SFIA (C/CAG 2012). Noise levels of 65 dBA CNEL and below are considered compatible with residential land uses in the City's General Plan (South San Francisco 1999, Noise Element). Therefore, the

proposed project would not expose people residing or working in the study area to excessive noise levels from aircraft. Therefore, there would be ***no impact***, and no further analysis is required in this EIR.

Threshold	Would the project, if located within the vicinity of a private airstrip, result in the exposure of people residing or working in the study area to excessive noise levels?

The study area is not located within the vicinity of a private airstrip. Therefore, there would be ***no impact***, and no further analysis is required in this EIR.

Project Impacts and Mitigation

Threshold	Would the project result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Impact 4.6-1 **Implementation of the Specific Plan could result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. This is considered a potentially significant impact. However, implementation of mitigation would reduce the impact from operational noise sources to a *less-than-significant* level.**

The implementation of the Specific Plan would have the potential to generate noise levels in excess of established standards by developing new stationary sources of noise, by increasing human activity throughout the study area, and by generating additional vehicular traffic. Potential noise generating land uses include mixed-use commercial and general commercial, residential, recreational (hotel), and industrial uses. This section addresses the potential for sensitive receptors in the study area to be exposed to excessive noise levels from roadways and other noise sources. The permanent increase in noise levels that would occur as a result of increased traffic on roadways is addressed under Impact 4.6-4.

Operational Noise Sources

Operational noise sources would be similar to existing conditions with implementation of the Specific Plan because land uses would be similar, including the operation of commercial, residential, hotel, and industrial uses. However, development intensity would increase with plan implementation, specifically transit-oriented mixed-use development. The Specific Plan seeks to create a pedestrian-, bicycle-, and transit-friendly environment that would result in the placement of residential development in close proximity to commercial land uses. Therefore, noise levels would have the potential to increase in the study area.

New commercial and hotel development pursuant to the Specific Plan would have the potential to expose existing NSLU to noise levels that exceed the City's noise limits for residences: 65 dBA with no special insulation requirements. Noise sources from commercial use include delivery truck loading and unloading, parking lot noise, and mechanical equipment (HVAC units). Parking lots could also generate noise levels that exceed noise level limits from vehicle horns and/or car alarms, depending on the distance from these sources to sensitive receptors. However, noise exposure from nearby parking lots

would be intermittent and would not occur at the same time and location so that the overall effects would be separate and in most cases would not adversely affect the same noise-sensitive receptors.

However, commercial land uses could also generate noise levels from HVAC systems and other equipment that exceeds the exterior and interior residential and commercial noise limits. Large HVAC systems associated with new buildings in the study area could result in noise levels that average between 50 and 65 dBA L_{eq} at 50 feet from the equipment. The 24-hour CNEL noise levels are about 6.7 dBA greater than 24-hour L_{eq} measurements. This means that the HVAC equipment installed under future development could generate noise levels that average between 57 to 72 dBA CNEL at 50 feet if equipment is operating unshielded and constantly over 24 hours. At these unscreened levels, the HVAC noise levels would be anticipated to exceed the City's noise limits for residential and commercial land uses and would result in potentially significant impacts. However, City standards require all mechanical equipment to be shielded; therefore, noise generated from these sources would not exceed the City's noise limits.

Intermittent or temporary neighborhood noise from amplified music, barking dogs, landscape maintenance, and stand-by power generators are disturbing to residents but are difficult to attenuate and control. Nuisance noise impacts are more likely to occur in more densely developed areas, where residences are closer together and neighbors are more likely to hear noises such as a barking dog or loud music. The Specific Plan would accommodate intensified mixed-use and multifamily development. The increase in residential development in the study area could result in an increase in nuisance noise. However, these noises would be generally temporary and intermittent in nature. Additionally, residents would be required to comply with the exterior noise standards in the Noise Ordinance, which are enforced by the City's Code Enforcement office and/or Police Department. Violations of the Noise Ordinance are a misdemeanor and are punishable by fees and/or jail time. Therefore, nuisance noise from residential development would not result in a significant increase in the ambient noise level.

Exposure to Traffic Noise

Acoustical calculations were performed for existing plus project traffic volumes along roadway segments in the area most affected by the Specific Plan using standard noise modeling equations adapted from the FHWA noise prediction model (FHWA-RD-77-108). The modeling calculations considered the posted vehicle speed, average daily traffic volume, and the estimated vehicle mix. The model assumed "pavement," or hard surface, site propagation conditions. The future scenario is based upon data from the traffic analysis prepared for the project by Fehr & Peers (April 2014). Future traffic volumes on US-101 were estimated based on data from Caltrans (2014). This analysis focuses on the potential exposure of people to traffic noise as a result of the project. The potential for the project to substantially increase traffic noise is addressed under Impact 4.6-4.

The Specific Plan proposes intensified commercial, residential and mixed-use development along study area roadways. New development and redevelopment could place new multifamily residential development and commercial development along major roadways and freeways, and could expose sensitive receptors to noise levels in excess of the City's Land Use Criteria of 65 dBA for residential and 70 dBA for commercial land uses. As discussed in greater detail under Impact 4.6-4, traffic noise levels on surface roads in the study area with project implementation would typically range from 61 to 71 dBA

CNEL. Freeway noise levels would have the potential to exceed 60 dBA CNEL within 0.75 mile of a freeway, 65 dBA CNEL within 0.35 mile, and 70 dBA CNEL within 0.16 mile. This would result in a potentially significant impact associated with exposure to traffic noise.

Railroad Noise

The Union Pacific Railroad line runs adjacent to US-101 through the study area and generates relatively high average noise levels in the immediate vicinity. Caltrain also runs commuter trains through South San Francisco along this line. The proposed project would not cause an increase in freight trains through the study area, but is being implemented in part to increase ridership on the commuter train, Caltrain. The existing Caltrain station is located in the study area, east of US-101 north of E. Grand Avenue. The commuter trains occupy the same line as the freight trains. According to the FTA (FTA 2006), noise from rail lines range from 80 dBA to 85 dBA at 50 feet depending on the type of line and the type of train. When approaching the station, typically a warning horn will sound, generating a noise level of around 90 dBA at 50 feet. Therefore, anticipated commercial and residential development within the study area could expose sensitive receptors to noise levels that exceed the normally acceptable ambient noise standards established by the City (65 dBA residential and 70 dBA commercial). Therefore, development proposed within a noise contour which exceeds the limits established by the City would result in a potentially significant impact.

Audible warnings when approaching the train station and where required at railroad crossings would continue to be a source of intermittent noise in the study area. Implementation of the Specific Plan would increase exposure to these events by increasing development density. New residential development along the rail line would have the potential to expose sensitive uses to noise levels in excess of the City's interior noise level limits from train noise. A potentially significant impact would occur.

Combined Roadway and Railroad Noise

There are four sources of transportation noise that could impact new mixed-use residential and commercial development within the study area. Noise impacts would be anticipated based on proximity to US-101, Gateway Boulevard, South Airport Boulevard, and the commuter/freight rail line. As discussed below under Impact 4.6-4, traffic noise would increase up to 71 dBA CNEL, at 50 feet from the any roadway centerline. The noise levels of 71 dBA CNEL would occur along South Airport Boulevard. Railroad noise levels are anticipated at 80 to 85 dBA up to 50 feet from the rail line. Combining street traffic noise and rail noise would result in a noise level of greater than 85 dBA CNEL at 50 feet from the railroad. With a noise level of 85 dBA CNEL at 50 feet, assuming attenuation by distance alone, the commercial threshold of 70 dBA would not be achieved until 160 feet from the centerline of the railroad tracks and the residential threshold of 65 dBA would not be achieved until approximately 300 feet from the railroad tracks. New commercial and residential development under the proposed Specific Plan may be located within 300 feet of the rail line and/or US-101; therefore, exterior noise thresholds may be exceeded. Additionally, interior noise levels at new residences may not achieve 45 dBA CNEL with the incorporation of standard building practices. Therefore, a potentially significant impact would occur.

Summary

The proposed project has the potential to expose new development to stationary sources of noise and transportation noise levels that exceed the City's normally acceptable compatibility standards. This is considered a potentially significant impact. However, implementation of mitigation measures MM4.6-1 through MM4.6-3 would reduce this impact to ***less than significant***.

MM4.6-1 HVAC Mechanical Equipment Shielding. *Prior to the approval of building permits for non-residential development, the applicant shall submit a design plan for the project demonstrating that the noise level from operation of mechanical equipment will not exceed the exterior noise level limits for a designated receiving land use category as specified in Noise Ordinance Section 8.32.030. Noise control measures may include, but are not limited to, the selection of quiet equipment, equipment setbacks, silencers, and/or acoustical louvers.*

MM4.6-2 Site-Specific Acoustic Analysis—Nonresidential Development. *Prior to the approval of building permits for new non-residential land uses where exterior noise level exceeds 70 dBA CNEL, an acoustical analysis shall be performed to determine appropriate noise reduction measures such that exterior noise levels shall be reduced to be below 70 dBA CNEL, unless a higher noise compatibility threshold (up to 75 dBA CNEL) has been determined appropriate by the City of South San Francisco. The analysis shall detail the measures that will be implemented to ensure exterior noise levels are compatible with the proposed use. Measures that may be implemented to ensure appropriate noise levels include, but are not limited to, setbacks to separate the proposed nonresidential structure from the adjacent roadway, or construction of noise barriers on site.*

MM4.6-3 Site-Specific Acoustic Analysis—Multifamily Residences. *Prior to the approval of building permits for the following uses, an acoustical analysis shall be performed to ensure that interior noise levels due to exterior noise sources shall be below 45 dBA CNEL:*

- *Multifamily residences where exterior noise levels exceed 65 dBA CNEL or where noise contours identified in the General Plan Noise Element project a CNEL between 65 and 70 dBA*
- *Multifamily residential units that are located within the same building as commercial development*
- *Multifamily residential units located near a structure requiring an HVAC system*
- *Building plans shall be available during design review and shall demonstrate the accurate calculation of noise attenuation for habitable rooms. For these areas, it may be necessary for the windows to be able to remain closed to ensure that interior noise levels meet the interior standard of 45 dBA CNEL. Consequently, based on the results of the interior acoustical analysis, the design for buildings in these areas may need to include a ventilation or air conditioning system to provide a habitable interior environment with the windows closed. Additionally, for new multifamily residences on properties where train horns and railroad crossing warning signals are audible, the acoustical analysis shall ensure that interior noise levels during crossing events do not exceed the Interior Noise Standards in Noise Ordinance Section 8.32.040.*

Threshold	Would the project result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Impact 4.6-2 **Construction of the proposed project would result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.**

The main concerns related to groundborne vibration are annoyance and property damage to fragile buildings. Vibration-sensitive instruments and operations can also be disrupted at much lower levels. Potential vibration-sensitive uses in the proposed study area may include machinery in industrial uses, or research laboratory equipment. These land uses are located throughout the eastern portion of the study area. The primary sources of vibration within the project vicinity would be from operation of the freight and commuter rail and construction activities. Because the proposed land uses accommodated under the Specific Plan would be similar to existing land uses, vibration levels from operational activities would not be substantially different from existing conditions.

Construction activities that would occur under the proposed project would have the potential to generate low levels of groundborne vibration. Table 4.6-7 (Vibration Source Levels for Construction Equipment) identifies various vibration velocity levels for the types of construction equipment that would operate within the study area during construction. Based on the information presented in Table 4.6-7, vibration levels could reach as high as approximately 87 VdB within 25 feet of an active construction site. Construction activities occurring under the proposed project would have the potential to impact the nearest sensitive receptors where construction staging would occur closer to these receptors.

Table 4.6-7 Vibration Source Levels for Construction Equipment

Construction Equipment	*Approximate VdB at 25 feet*
Large Bulldozer	87
Caisson Drilling	87
Loaded Trucks	86
Jackhammer	79
Small Bulldozer	58

SOURCE: Federal Transit Administration, Office of Planning and Environment (FTA), *Transit Noise & Vibration Impact Assessment* (May 2006).

Construction within approximately 25 feet of existing sensitive uses would exceed the 85 VdB threshold. With attenuation due to distance, construction activities occurring 30 feet or more away from an active construction site would not exceed 85 VdB. As there is the potential for construction to occur within 25 feet of existing sensitive receptors, there is the potential for groundborne vibration impacts to be significant without mitigation. This is considered a potentially significant impact. However, implementation of mitigation measure MM4.6-4 would reduce this impact to ***less than significant***.

MM4.6-4 Construction Vibration. *For all construction activities within the study area, the construction contractor shall implement the following measures during construction:*

a. The construction contractor shall provide, at least three weeks prior to the start of construction activities, written notification to all residential units and nonresidential tenants within 115 feet of the construction site informing them of the estimated start date and duration of vibration-generating construction activities.

b. Stationary sources, such as temporary generators, shall be located as far from off-site receptors as possible.

c. Trucks shall be prohibited from idling along streets serving the construction site.

Impact 4.6-3 Operation of the proposed project would result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. This is considered a potentially significant impact. However, implementation of mitigation would reduce this impact to a *less-than-significant* level.

An existing additional potential source of groundborne vibration is the freight and commuter line which bisects the study area. The FTA provides thresholds for land use categories that may be subject to vibration impacts from a commuter railroad (FTA 2006). For Category 1 uses (vibration-sensitive equipment), the disturbance criteria for frequent events is 65 VdB. For Category 2 land uses (residences and buildings where people normally sleep), the disturbance criteria is 72 VdB. The screening distance for Category 3 land uses (institutional land uses) is 75 VdB. The proposed project would potentially accommodate Category 1, Category 2, and Category 3 land uses throughout the study area, including concentrated Category 2 land uses close to the rail lines.

According to the FTA (FTA 2006), light rail vehicles result in groundborne vibration of up to 85 VdB at less than 10 feet from the rail line and freight trains result in groundborne vibration of 85 VdB at approximately 50 feet from the rail line. The commuter line would have the potential to exceed the FTA disturbance criteria for Category 1 uses up to 115 feet from the rail line, up to 70 feet for Category 2 uses, and up to 55 feet for Category 3 uses. The freight line would have the potential to exceed FTA disturbances for criteria for Category 1 at greater than 300 feet from the rail line, up to 200 feet for Category 2 uses, and up to 150 feet for Category 3 uses. Mixed-use development is proposed within 0.25 mile of the rail line, which could include Category 1, 2, or 3 land uses. Therefore, the Specific Plan has the potential to locate new land uses within the applicable screening distance of light-rail and freight lines. New development that is proposed within the screening distances would require further analysis to determine vibration-sensitive impacts.

This is considered a potentially significant impact. However, implementation of mitigation measure MM4.6-5 would reduce this impact to ***less than significant***.

MM4.6-5 Rail Line Groundborne Vibration. *Implement the current FTA and Federal Railroad Administration (FRA) guidelines, where appropriate, to limit the extent of exposure that sensitive uses may have to groundborne vibration from trains. Specifically, Category 1 uses (vibration-sensitive equipment) within 300 feet from the rail line, Category 2 uses (residences and buildings where people normally sleep) within 200 feet, and Category 3 uses (institutional land uses) within 155 feet of the rail line shall require a site-specific groundborne vibration analysis conducted by a qualified*

groundborne vibration specialist in accordance with the current FTA and FRA guidelines prior to obtaining a building permit. Vibration control measures deemed appropriate by the site-specific groundborne vibration analysis to meet 65 VdB, 72 VdB, and 75 VdB respectively for Category 1, Category 2, and Category 3 uses, shall be implemented by the project applicant and approved by the City prior to receiving a building permit.

Threshold	Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Impact 4.6-4 **Implementation of the proposed project would result in a substantial permanent increase in ambient noise levels as a result of increased traffic in the project vicinity above levels existing without the project. This is considered a potentially significant impact. Implementation of mitigation would reduce this impact, but not to a less-than-significant level. Therefore, the increase in traffic noise would be a *significant and unavoidable* impact.**

This section addresses the potential for implementation of the Specific Plan to permanently increase ambient noise levels as a result of increased traffic noise. The potential for other noise sources associated with project implementation to result in increases that would expose NSLU to excessive noise levels is addressed under Impact 4.6-1.

The primary way in which implementation of the Specific Plan would change noise within the study area and in the surrounding vicinity is by increasing traffic. Acoustical calculations were performed for future traffic volumes along roadway segments most affected by the project using standard noise modeling equations adapted from the FHWA noise prediction model (FHWA-RD-77-108). Most affected segments include those where implementation of the project would result in a net increase of more than 1,000 peak hour trips. The modeling calculations considered the posted vehicle speed, average daily traffic volume, and the estimated vehicle mix, and, as discussed previously, represent the noise levels for the study area with the removal of the west-bound turn lane from the intersection of Airport Boulevard and Grand Avenue.

Table 4.6-8 (Noise Levels With Project, CNEL) shows that future noise levels (within the study area) range from 61 to 71 dBA CNEL at a distance of 50 feet from the roadway centerline. An increase in traffic noise of 3 dBA CNEL or more is considered significant because a 3 dBA change is the smallest increment that is perceivable by most receivers. The addition of project traffic would result in an increase in noise levels of up to 3 dBA for two roadway segments in the study area. Therefore, project-related impacts associated with increases in traffic noise are considered significant.

Table 4.6-8 Noise Levels With Project, CNEL

Segment	*Existing Ambient Noise Level (dBA CNEL)*	*Project Noise Level (dBA CNEL)*	*Change in Noise Level*	*Significant?*
Airport Blvd north of Baden Avenue	69	70	1	No
Airport Blvd between Baden Ave and San Mateo Ave/So. Airport Blvd	71	70	-1	No
South Airport Blvd between Airport Blvd/ Produce Ave and Gateway Blvd	68	71	3	**Yes**
Baden Ave between Airport Blvd and Linden Ave	63	64	1	No
Gateway Blvd between E Grand Ave and S Airport Blvd/Mitchell Ave	67	70	3	**Yes**
E Grand Ave between US-101 and Dubuque Ave	69	69	0	No
Industrial Way south of Grand Ave	60	61	1	No
Linden Ave between Grand Ave and Baden Ave	61	62	1	No
Miller Ave between Airport Blvd and Linden Ave	59	61	2	No
Produce Ave south of San Mateo Ave/ S Airport Blvd	69	70	1	No

SOURCE: Fehr & Peers, *South San Francisco Station Area Land Use Plan: EIR Transportation Analysis assumptions* (February 14, 2014) (see Appendix D for noise model assumptions and output).
Peak hour PM volumes are assumed to be 10 percent of total daily trips.

Typical sound mitigation for traffic noise consists of walls or other barriers that would attenuate noise to the sensitive receptors behind the barrier. However, the feasibility of noise walls is restricted by access requirements for driveways, presence of local cross streets, underground utilities, other noise sources in the study area, and safety considerations. The study area is currently developed and driveways and cross-streets currently exist along Gateway Boulevard and South Airport Boulevard. A noise wall would be ineffective on the impacted segments in the study area due to necessary breaks in the wall to accommodate existing and potential new driveways or cross-streets. Additionally, noise barriers on surface streets inhibit the creation of a pedestrian-friendly streetscape by walling off businesses and public spaces from the public view and limiting pedestrian access, contradicting the goals of a transit-oriented development area. Therefore, installation of a noise wall along impacted segments may not be feasible. Where new and complete redevelopment is planned, noise walls or other appropriate noise barriers may be feasible and should be considered where appropriate. There are no other mitigation measures available to reduce roadway noise besides limiting/reducing residential or consumer traffic, which would contradict the TOD goals of the Specific Plan. Because no certain feasible mitigation is available to reduce this impact to a less-than-significant level, this impact would remain ***significant and unavoidable***.

Threshold	Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Impact 4.6-5 **The proposed project would not result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. This would be a *less-than-significant* impact.**

As described in the Initial Study for the proposed project (Appendix A to this EIR), construction of future development would result in temporary increases in noise levels associated with operation of construction equipment. Construction of land uses accommodated by the study area would not take place all at once, and would be spread throughout the study area so that limited receptors would be exposed to construction noise at any given time. Under SSFMC Section 8.32.050(d), construction activities are limited to between the hours of 8:00 AM to 8:00 PM on weekdays, 9:00 AM to 8:00 PM on Saturdays, and 10:00 AM to 6:00 PM on Sundays and holidays, or as authorized by the construction permit. Construction noise that occurs during these hours is exempt from the noise level limits established in the City's Noise Ordinance because these hours are outside of the recognized sleep hours for residents and outside of evening and early morning hours and time periods where residents are most sensitive to exterior noise. Consequently, the City considers impacts resulting from construction noise during these hours to be less than significant. Future construction under the Specific Plan would be required to comply with all applicable City ordinances, including limits on construction hours. Therefore, impacts related to construction noise would be ***less than significant***, and no mitigation is required.

4.6.4 Cumulative Impacts

The geographic context for the analysis of cumulative noise impacts is the City of South San Francisco, as represented by full build-out of the City's General Plan including development of the cumulative projects as identified in Table 3-2 (Cumulative Projects—Planned East of 101 Development by 2035) of the Project Description. The City is largely built out, and cumulative development would focus upon development of vacant parcels and intensified redevelopment of infill parcels within the City, with an emphasis on TOD.

Threshold	Would the project result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The project would result in an increase in the ambient noise level from new operational noise sources and increased human activity throughout the study area. However, project-related operational noise would be similar to the existing noise environment and impacts would be mitigated to the extent feasible with the incorporation of the above measures MM4.6-1, MM4.6-2, and MM4.6-3. Therefore, the cumulative impact from operational noise sources would not be cumulatively considerable and the cumulative impact would be ***less than significant***.

Threshold	Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Buildout of the Specific Plan, along with future regional growth, and other projects to be developed within the project vicinity would result in increases in traffic that would cumulatively increase traffic noise. The potential noise impacts that would result from project impacts are addressed under Impact 4.6-4. As shown in Table 4.6-8, noise levels along two surface roadways in the study area would exceed the normally acceptable noise compatibility standards. In addition, increased roadways noise would be anticipated from regional growth, especially along US-101. As existing noise levels already exceed the standards, a cumulative impact would be anticipated when impacts from regional growth are included. Operation of the rail line (both commuter and freight) and US-101 freeway would also contribute to exposure to excessive noise levels. The new TOD Zone in the study area would only be developed with implementation of the Specific Plan; therefore, implementation of the proposed project would result in a cumulatively considerable contribution to a significant cumulative impact related to permanent increases in traffic and railroad noise. As discussed under Impact 4.6-4, there are no mitigation measures available to reduce roadway noise besides limiting/reducing residential or consumer traffic, which would contradict the TOD goals of the Specific Plan. Because no certain feasible mitigation is available to reduce this impact to a less-than-significant level, this impact would remain ***cumulatively considerable and unavoidable***.

Threshold	Would the project result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Cumulative development in the study area and surrounding area is not likely to result in the exposure of people to or the generation of excessive groundborne vibration and/or noise levels, due to the localized nature of vibration impacts and the fact that all construction would not occur at the same time or at the same location. Therefore, the cumulative impact from excessive groundborne vibration would be ***less than significant***.

4.6.5 References

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4.7 POPULATION/HOUSING

This section of the EIR analyzes the potential environmental effects on population/housing from implementation of the proposed project. Some comments were received in response to the notice of preparation (NOP) circulated for the proposed project relating to affordable housing and displacement of existing housing.

Data used to prepare this section were taken from the United States Bureau of the Census (U.S. Census), the California Department of Finance (CDOF), the Association of Bay Area Governments (ABAG), the City of South San Francisco General Plan (1999), the City of South San Francisco Housing Element of the General Plan (2009), and the South San Francisco Downtown Station Area Specific Plan (Specific Plan) (BMS Design Group 2014). Full reference-list entries for all cited materials are provided in Section 4.7.5 (References).

4.7.1 Environmental Setting

The Specific Plan area (study area) is located in the City of South San Francisco, California and straddles the north/south US-101 and Interstate 280 (I-280) freeways on the east and west, respectively. Additionally, two fixed rail lines serve the City: BART and Caltrain.

United States 2000 Census

The United States Census Bureau provides population and housing data from the 2010 National Decennial Census (the "Census"). The Census occurs every 10 years for the purpose of counting the population and housing units for the entire United States. While the primary purpose of the Census is to provide the population counts that determine how seats in the U.S. House of Representatives are apportioned, the Census data is also the basis for most demographic projections. The Census data, compiled from U.S. household surveys, are provided for the nation, all states, and all counties, as well as each individual city. Because the latest Census is four years old, these data are not as accurate in reflecting existing conditions as they were in 2010.

California Department of Finance (CDOF)

The Demographic Research Unit of the CDOF is designated as the single official source of demographic data for State planning and budgeting. Estimated city and county population data, housing units, vacancies, average household size, and components of population change are provided on an annual basis. Consequently, the CDOF typically contains the most current population and housing estimates, which are used throughout this section wherever feasible.

Association of Bay Area Governments (ABAG)

South San Francisco is located within the County of San Mateo, which is part of the larger planning area of ABAG, the lead planning agency for the Bay Area. ABAG consists of nine local governments from Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties. ABAG's mission statement states, "ABAG is committed to enhancing the quality of life in the

San Francisco Bay Area by leading the region in advocacy, collaboration, and excellence in planning, research, and member services," which is implemented with a wide variety of programs, including planning and service programs, to support the growth and vitality of the nine counties. One of ABAG's primary functions is to forecast population, housing, and employment growth for each county within ABAG's jurisdiction. ABAG produces updated forecasts every two years and publishes them as projections, which assess realistic growth in the region while recognizing trends in markets and demographics and local policies that promote more compact in-fill and transit-oriented development. The latest regional projections are from 2009.

Population

According to the U.S. Census in 2010 the City of South San Francisco had a population of 63,632. This decennial census population matches the 2010 population estimated by the CDOF of 63,632. Table 4.7-1 (Population: City of South San Francisco, 1980–2010) presents the California CDOF data for the City's population over the past three decades, including the 1990, 2000, and 2010 Census counts and the most recent 2013 CDOF population estimate.

Table 4.7-1 Population: City of South San Francisco, 1980–2010

Year	*Population*	*Increase*	*Average Annual Growth(persons/year)*	*Average Annual Growth Rate*
1980	49,393	—	—	—
1990	54,312	9.05%	492	0.99%
2000	60,552	11.48%	624	1.14%
2010	63,632	5.08%	308	0.05%
2013	65,127	2.35%	150	0.23%

SOURCES: California Department of Finance, *E-4 Population Estimates for California Counties and Cities: January 1, 1976 through January 1, 1980* (1981), http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/1971-80/counties-cities/#tab76to80;
California Department of Finance, *E-4 Revised Historical City, County and State Population Estimates, 1991–2000, with 1990 and 2000 Census Counts* (Sacramento, California, March 2002), http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/1991-2000/;
California Department of Finance, *E-4 Population Estimates for Cities, Counties, and the State, 2001–2010, with 2000 & 2010 Census Counts* (Sacramento, California, November 2012), http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2001-10/view.php;
California Department of Finance, *E-1 Cities, Counties, and the State Population Estimates with Annual Percent Change— January 1, 2012 and 2013* (May 1, 2013), http://www.dof.ca.gov/Research/demographic/reports/estimates/e-1/view.php.

According to the CDOF data noted in Table 4.7-1, the City's existing population is approximately 65,127 residents. This represents a 1.5 increase over the CDOF estimated 2012 City population of 64,161 residents. The CDOF data also demonstrates that the population in the City has increased by 15,734 residents, or approximately 32 percent, between 1980 and 2013. This represents an average annual growth rate of approximately 0.96 percent and an increase of about 478 residents per year for the 1980–2013 period.

The 2010 Census data indicates that the City's year 2010 population of 63,632 residents represented approximately 8.8 percent of the San Mateo County's total year 2010 population (719,729 residents). Currently South San Francisco is the fifth most populated city in San Mateo County, with approximately

8.8 percent of the County's population in the CDOF 2013 estimates. For the purposes of analysis in this EIR, 2010 Census data are used.

Housing

As shown in Table 4.7-2 (Housing Units: City of South San Francisco, 2000–2010), the 2000 Census reported that the City had a housing inventory of 20,138 housing units. The 2010 Census reported that the City's housing inventory had increased by 1,676 housing units, as the City had a 2010 housing inventory of 21,814 housing units.

Table 4.7-2 Housing Units: City of South San Francisco, 2000–2010

Year	Housing Type			Total Number of Units	Occupied Units
	Single Family	Multifamily	Mobile Homes/Other		
2000	14,300	5,429	409	20,138	19,677
2010	13,046	5,629	343	21,814	20,938

SOURCE: California Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties, and the State, 2001–2009, with 2000 Benchmark* (Sacramento, California, May 2009).

The 2010 approximate percentage breakdown for housing by type in the City is as follows:

- 60 percent single-family
- 26 percent multifamily
- 1.5 percent mobile homes/other
- 96 percent of total housing units are occupied

Vacancy Rates

The vacancy rates and affordability of the housing stock are also key elements in the balance between supply and demand in the City's housing market. High vacancy rates usually indicate low demand and/or high prices in the housing market or significant mismatches between the desired and available types of housing. Conversely, low vacancy rates usually indicate high demand and/or low prices in the housing market. However, vacancy rates are not the sole indicator of market conditions. They must be viewed in the context of all the characteristics of the local and regional market and economy. Vacancy rates, which indicate a "market balance" (i.e., a reasonable level of vacancy to avoid local housing shortages, and appropriate price competition and consumer choice), generally range from 1 to 3 percent for single-family units and from 3 to 5 percent for multifamily units. As shown in Table 4.7-3 (Total Housing Units, Households, and Population: City of South San Francisco, 2000–2010), the City's overall vacancy rate increased from 2.3 percent in 2000 to 4.0 percent in 2010, an overall increase of 1.7 percent over the ten-year period.

Regional Housing Needs Allocation (RHNA)

The City of South San Francisco General Plan Housing Element outlines the determined Regional Housing Needs Allocation (RHNA) need for the City. The City implements zoning to ensure there is an adequate supply of land to meet its 2007 and 2014 ABAG RHNA of 1,635 units including 373 very-low-income units, 268 low-income units, 315 moderate-income units, and 679 above-moderate-income units.

This most recent RHNA was adopted in 2009 as part of the City's General Plan Housing Element and covers the 2007–2014 planning period. The RHNA includes calculated housing needs for the City based on population projections, existing housing stock, and calculated new housing demand.

Table 4.7-3 Total Housing Units, Households, and Population: City of South San Francisco, 2000–2010

Census Year	*Total Number of Units*	*Occupied Units (Households)*	*Percent Vacant*	*Population*	*Average Persons Per Household*
2000	20,138	19,677	2.3	60,552	3.05
2010	21,814	20,938	4.0	63,632	3.01

SOURCES: California Department of Finance, Demographics Research Unit, State Census Department, Table 2 (Housing Units, Households, and Vacant Units: 2000 and 2010 Incorporated Cities by County in California) (generated March 8, 2011), http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=3&ved=0CDcQFjAC&url=http%3A%2F%2Fwww.dof.ca.gov%2Fresearch%2Fdemographic%2Fstate_census_data_center%2Fcensus_2010%2Fdocuments%2F2010Census_Table2_RedistrictingFile.xls&ei=leCMUum2DNay4APfq4HwAQ&usg=AFQjCNFhpfFBDKoXe4lk5YyJgxEcc_YbCA&bvm=bv.56643336,d.dmg;
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Table 4.7-4 (RHNA Needs by Income Category: City of South San Francisco, 2007–2014) presents the latest adopted RHNA calculated housing need assigned to the City of South San Francisco. During this planning period, a total of 1,062 units have been constructed out of RHNA's 1,635.

Table 4.7-4 RHNA Needs by Income Category: City of South San Francisco, 2007–2014

Income Category	*RHNA-Identified Need*
Very Low	373
Low	268
Moderate	315
Upper	679
Total	***1,635***

SOURCE: City of South San Francisco, *City of South San Francisco General Plan Housing Element* (June 24, 2009), RHNA http://www.ssf.net/DocumentCenter/Home/View/906 (accessed November 14, 2013).

Households

A household is defined by the CDOF and the Census as a group of people who occupy a housing unit. A household differs from a housing (or dwelling) unit because the number of housing units includes both occupied and vacant housing units. It is important to note that not all of the population lives in households. A portion lives in group quarters, such as board and care facilities, and others are homeless.

As shown in Table 4.7-3, the average household size in the City of South San Francisco decreased from 3.05 pph in 2000 to 2.96 pph in 2013. Implementation of the proposed Specific Plan has the potential to add 1,435 housing units between 2014 and 2035.

Employment

According to data from the California Employment Development Department (EDD), the City of South San Francisco currently (November 2013) has a labor force of approximately 33,600 persons and unemployment in the City stands at 6.6 percent of the labor force (2,200 people).

Table 4.7-5 (Current and Future Employment: City of South San Francisco and ABAG Region, 2005–2025) presents the current and projected (estimated) employment in the City of South San Francisco from the ABAG 2007 South San Francisco Market Information projections and ABAG 2009 overall projections. The ABAG estimate for 2010 employment in the City was 44,490 workers, which is 10,890 more workers than the 2013 EDD employment estimate for the City. Both the EDD and the ABAG numbers are estimates, so it is reasonable to conclude that the current labor force in the City is somewhere in the range between the low estimate (33,600 workers) and the high estimate (44,490 workers), particularly given the downturn in the economy in recent years.

Table 4.7-5 Current and Future Employment: City of South San Francisco and the ABAG Region, 2005–2025

	2005	*2010*	*2015*	*2020*	*2025*
South San Francisco	42,080	44,490	46,340	49,970	53,380
ABAG Region	3,225,100	3,410,300	3,663,700	3,962,800	4,264,600

SOURCES: Association of Bay Area Governments, *ABAG Projections 2007: Regional Projections* (2007);
Association of Bay Area Governments, *ABAG Projections 2009: Regional Projections* (2009).

According to the employment growth forecast presented in Table 4.7-5, the number of workers in South San Francisco is projected to grow by 11,300 employees between 2005 and 2025, representing an average annual increase of 1.34 percent, or about 565 workers per year. In comparison, employment in the ABAG region is projected to grow by 1,009,500 workers between 2005 and 2025, with an estimated average annual increase of 1.5 percent or about 50,475 workers per year.

4.7.2 Regulatory Framework

Federal

There are no federal regulations related to population and housing that apply to the proposed project.

State

California State Housing Law Program

The State Housing Law (SHL) Program, which is implemented by the California Department of Housing and Community Development (HCD), was established to assure the availability of affordable housing

and uniform statewide code enforcement; to protect the health, safety, and general welfare of the public and occupants of housing and buildings accessory thereto. To fulfill this obligation the SHL Program may propose legislation and regulations. The program oversees the application of state laws, regulations, and code enforcement by a city, county, city and county building, housing, health, and fire department or fire district. The SHL Program develops statewide building standards for new construction of hotels, motels, lodging houses, apartments, dwellings, and buildings accessory thereto. The building standards are published in California Code of Regulations (CCR) Title 24, known as the California Building Standards Code. The SHL Program adopts regulations for maintenance, use, occupancy, repair, alteration, moving, and demolition of existing hotels, motels, lodging houses, apartments, dwellings, and buildings accessory thereto. The regulations are published in the CCR Title 25, Division 1, Chapter 1.

As required by the SHL, HCD allocates each region's share of the statewide housing need to the respective Councils of Governments (COG) based on CDOF population projections and regional population forecasts used to prepare regional transportation plans. The COG, which in this case is the Association of Bay Area Governments (ABAG), then develops a Regional Housing Needs Allocation (RHNA) that allocates the region's share of the statewide housing need to cities and counties within the region. Refer to the discussion below under ABAG for the RHNA for the City.

Housing Element Law

The Housing Element Law requires local governments to adequately plan to meet their existing and projected housing needs, including their share of the regional housing need. A complete analysis is required to include quantification and a descriptive analysis of the specific needs and resources available to address identified needs.

Regional

Association of Bay Area Governments (ABAG)

ABAG, which is the designated metropolitan planning organization (MPO) for nine Bay Area counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma), is the official comprehensive planning agency for the San Francisco Bay region. ABAG's mission is to strengthen cooperation and coordination among local governments, which addresses social, environmental, and economic issues that transcend local borders. As noted above, the City implements zoning to ensure there is an adequate supply of land to meet its 2007 and 2014 ABAG RHNA of 1,635 units including 373 very-low-income units, 268 low-income units, 315 moderate-income units, and 679 above-moderate-income units. This most recent RHNA was adopted in 2009 as part of the City's General Plan Housing Element and covers the 2007–2014 planning period.

The population and household forecasts for the City of South San Francisco, San Mateo County, and the ABAG region (as prepared in 2009 by ABAG) are provided in Table 4.7-6 (ABAG Population and Household Forecast).

Table 4.7-6 ABAG Population and Household Forecast

	2010	2015	2020	2025	2030	2035
South San Francisco						
Population	63,400	66,600	69,200	71,500	73,900	76,200
Households	20,130	21,660	22,530	23,380	24,240	25,050
San Mateo County						
Population	719,729	747,637	747,563	766,521	803,288	833,209
Households	1,039,201	1,071,810	1,088,375	1,102,370	1,110,659	1,118,490
ABAG Region						
Population	7,341,700	7,677,500	8,018,000	8,364,900	8,719,300	9,073,700
Households	2,667,340	2,784,690	2,911,000	3,039,910	3,171,940	3,302,780

SOURCE: Association of Bay Area Governments, *ABAG Projections 2009: Regional Projections* (2009).

Local

General Plan Housing Element (2009)

The General Plan Housing Element (2009) provides South San Francisco's housing plan for the 2007–2014 planning period. The City has established the Housing Element in consideration of the local needs and priorities, as well as its obligations under State Housing law. Goals and policies listed in the Housing Element of the General Plan relevant to the Specific Plan are presented below.

Goal 1 Promote the provision of housing by both the private and public sectors for all income groups in the community

Policy 1-1 Ensure adequate supply of land to meet its 2007 to 2014 ABAG Regional Housing Needs Allocation (RHNA) of 373 very low income units, 315 moderate low income units, and 679 above moderate units.

Policy 1-2 Continue to implement the Inclusionary Housing Ordinance requiring new residential development over four units to provide a minimum of twenty percent low- and moderate-income housing.

Policy 1-3 Investigate new sources of funding for the affordable housing programs.

Policy 1-5 Promote construction of the lower cost units by providing incentives and encouraging mixed use projects, second units, density bonuses, loft-style units, and manufacturing housing.

Policy 1-6 Review and continue to implement the Density Bonus Ordinance

Policy 1-7 Encourage a mix of residential, commercial and office uses in the areas designated as Downtown Commercial, mixed Community Commercial and High Density Residential, mixed

Business Commercial and High Density Residential, mixed Business Commercial, and Medium Density Residential in the General Plan.

Policy 1-9 Maximize opportunities for residential development, through infill and redevelopment of underutilized sites, without impacting existing neighborhoods or creating conflicts with industrial operations.

Goal 5 Support the development of an adequate supply of safe, decent and affordable housing for groups with special housing needs

Policy 5-1 Continue to give special attention in housing programs to the needs of special groups, including the disabled, large families, the elderly, and families with low income.

Policy 5-2 Encourage the development of housing for the elderly.

Policy 5-3 Encourage non-profit groups to provide housing for the elderly citizens of South San Francisco. Encourage the development of senior housing in higher density areas close to shopping and transportation.

Policy 5-4 Encourage the establishment of a range of housing types for seniors including residential board and care facilities for the elderly in the community.

Consistency Analysis

The proposed Specific Plan would have the potential to add up to 1,435 housing units between 2014 to 2035 with the addition of new transit infrastructure and an increased emphasis on urban infill development. Currently, approximately 60 percent of the City's existing housing inventory consists of single-family residential housing units. As such, implementation of the Specific Plan would diversify housing opportunities in the City by providing multifamily dwelling units, near transit, which could accommodate all income levels, consistent with Goal 1 and Policies 1-7 and 1-9, and Goal 5 and Policies 5-1, 5-2, and 5-3. In order for the City to address the community's housing needs as identified by the RHNA, the proposed Specific Plan would be subject to Policy 1-7 of Goal 1 of the City's General Plan and the Housing Element to ensure consistency with the respective plans. Therefore, the proposed project would be consistent with the City's Housing Element.

The City of South San Francisco General Plan (1999) provides for build-out of a maximum 3,620 additional housing units and 12 million square feet of additional non-residential space in the City. The proposed Specific Plan would potentially add 1,435 housing units, which would slightly exceed the expected residential population for build-out of the City by 2030. A General Plan amendment would be adopted for consistency when the Specific Plan is adopted that would reflect the maximum build-out. Therefore, the proposed Specific Plan would be consistent with the City's General Plan.

4.7.3 Impacts and Mitigation Measures

Analytic Method

This analysis considers population and household growth that would occur with implementation of the proposed Specific Plan and whether this growth is within local or regional forecasts, whether it can be considered substantial with respect to remaining growth potential in the City as articulated in the General Plan, and/or whether it would result in the displacement of housing or people. In addition, this analysis of potential population and housing impacts considers whether population growth and increased development were previously assumed to occur in a particular area. Specifically, population and housing impacts were analyzed by comparing the proposed Specific Plan with growth projections for the City from ABAG and the City's General Plan.

All project components described in Chapter 3 (Project Description) are considered for temporary employment growth associated with construction activities. The proposed residential components of the Specific Plan are considered for their ability to directly result in population growth. An analysis of the potential for the Specific Plan to indirectly induce growth by extending roads or infrastructure and by providing permanent employment opportunities is also addressed. This EIR presents and analyzes the proposed allowable growth scenario as a result of implementation of the Specific Plan from 2014 through a planning horizon of 2035.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on population/housing if it would:

- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere

Project Impacts and Mitigation

Threshold	Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Impact 4.7-1 **Implementation of the proposed project would not induce substantial population growth. This would be a *less-than-significant* impact.**

As proposed, implementation of the Specific Plan is intended to accommodate existing and future population growth forecasted for the City by introducing new residential housing within the study area.

As proposed, implementation of the Specific Plan could result in the addition of up to 1,435 housing units between 2014 and 2035 in the study area. Additionally, up to 1.2 million square feet of new office/research and development (R&D) uses could be added in the study area, to be developed predominantly on the eastern side of the US-101, which could represent as many as 2,400 or more new jobs added to the City. The Specific Plan study area is currently developed, and no major extension of infrastructure is proposed as part of the proposed project except for the redesign of the Caltrain station. The following analysis discusses direct population growth from the residential component as well as indirect population growth that could result from nonresidential uses.

Direct Population Growth from New Housing

According to the City's General Plan Land Use Element, South San Francisco will accommodate a population of approximately 67,832 at build-out in 2035, as the horizon of the General Plan is 20 years (South San Francisco 1999, Land Use Element). The 2010 Census estimated a population of 63,632 residents in the City, which is 6,178 residents fewer than the General Plan build-out estimate. According to the Specific Plan, the study area had a population of approximately 11,000 in 2010, but ABAG anticipates a larger rate of household and housing unit growth in the study area compared to San Mateo County and the rest of the City by 2040 (BAE Urban Economics 2012). ABAG projections estimate a substantial amount of growth by 2040 with an estimated three times as many households and 2.5 times as many jobs within the study area than in 2010 (BAE Urban Economics 2012). Additionally, according to ABAG's projections the study area's share of the City's employment will increase from 6 percent in 2010 to 12 percent by 2040 (BAE Urban Economics 2012).

As noted above, implementation of the Specific Plan could result in an additional 1,435 housing units within the study area from 2010 to 2035. A goal of the Specific Plan is to "intensify certain allowed uses selectively in the Downtown to increase the resident population and thus support a variety of commercial and service uses" (BAE Urban Economics 2012). The Specific Plan would provide significant additional housing over the life span of the plan and beyond with the highest densities located in the immediate proximity of to the extended Caltrain station. Thus, this would substantially increase the housing stock of the study area and would directly increase the City's population, particularly in the Downtown area. Utilizing an average person-per-household factor of 2.96, the Specific Plan could result in a population increase of 4,248 residents, which would result in a citywide population of 67,880 in 2035. The Specific Plan would only slightly exceed the population estimated for build-out of the City as a result of higher-density residential areas within the study area and increased employment opportunities, which would attract new residents to the area. However, that assumes no existing residents of the City would relocate to the Specific Plan area and that all new occupants of development under the Specific Plan would be new to the City. It also does not account for the lower person-per-household ratio for senior housing. It is reasonable to assume that at least a percentage of new occupants would be existing residents of the City. In addition, the difference of 48 residents, assuming full occupancy, represents only 0.07 percent of the overall population of the City at build-out of the General Plan, which would not be considered significant. Therefore, the direct increase in population as a result of the Specific Plan would be a less-than-significant impact.

Compared to development under the General Plan, the Specific Plan would yield a greater amount of new residential and employment uses within the study area. However, General Plan amendments and

Zoning amendments would be adopted concurrent with the preparation of the Specific Plan. With the General Plan and Zoning amendments, implementation of the Specific Plan would be consistent with the General Plan, where additional population growth due to the higher-density areas within the study area would be accounted for in future population growth projections for the City. Additionally, higher employment rates would also be accounted for in the General Plan. Therefore, the Specific Plan would be consistent with all governing documents and policies regulating the City and would not exceed the build-out estimated population of the amended General Plan. Thus, the impacts from direct population growth as a result of new housing units would be ***less than significant***, and no mitigation is required.

Indirect Growth through Extension of Infrastructure

The proposed Specific Plan would provide for infill development that makes maximum use of existing infrastructure. The study area is located in the center of a dense urban area, and implementation of the Specific Plan would not include extension of the existing infrastructure, only site-specific infrastructure upgrades as needed. Therefore, the proposed Specific Plan would not result in indirect growth due to extension of infrastructure, and the impact would be ***less than significant***, and no mitigation is required.

Threshold	Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?
Threshold	Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

Impact 4.7-2 **Construction of development projects pursuant to the Specific Plan would not displace substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere. This would be a *less-than-significant* impact.**

The study area is currently developed with a variety of land uses, which include residential (low, medium, and high density), commercial (Downtown and business), office and technology park, transportation center, and open spaces uses.

The proposed Specific Plan has the potential to add up to 1,435 housing units, 511,780 sf of business commercial, 21,250 sf of industrial, 268,800 sf of commercial, and 1,185,049 sf of office/R&D between 2010 and 2035. Most of the development in the study area is expected to occur on vacant or underutilized parcels in commercial areas and at the opportunity sites identified in the Specific Plan, with little or no redevelopment occurring on parcels occupied by residential units. However, there remains the possibility, although unlikely, that in the process of implementing the Specific Plan, demolition of existing buildings and displacement of residents may be necessary as a part of redevelopment under the Specific Plan.

The Specific Plan also includes an Affordable Housing and Anti-Displacement Strategy intended to ensure provision of adequate affordable housing in the study area. The Affordable Housing and Anti-Displacement Strategy includes the following implementing strategies to minimize the displacement of existing tenants through the loss of affordable housing:

Preservation Strategies

1. Create a comprehensive inventory of existing rental housing in the study area offering affordable housing options to lower-income households.
2. Monitor the status of existing affordable rental housing in the study area and partner with local nonprofit agencies to explore strategies for acquiring these buildings in order to preserve long-term affordability and improve the quality of the neighborhood's housing stock.
3. Conduct outreach to low-income homeowners in the study area to provide information about City and private resources for home rehabilitation, maintenance, and energy-efficient upgrades.
4. Implement housing policy provisions to protect tenants and rental housing, and to promote a stable and diverse resident community.

Funding Strategies

5. Update the City's existing Inclusionary Housing ordinance and conduct a new nexus study to implement an affordable housing in-lieu fee in the study area for rental projects (since ownership projects have inclusionary requirements). The fee will generate revenue for an affordable housing trust fund that provides gap for affordable housing projects.
6. Conduct a study to assess the feasibility of creating a new commercial linkage fee that would generate revenues for an affordable housing trust fund.
7. Partner with neighboring jurisdictions in San Mateo County to explore options for creating a permanent source of financing for affordable housing in the County.

Land Use, Zoning, and Regulatory Strategies

8. Lower-income and senior households typically have lower rates of car ownership, making reduced parking ratios feasible, particularly in areas accessible to transit. Based on this, allow for reduced parking ratios in the Plan Area to decrease development costs.
9. Consistent with the City's existing Housing Element and affordable housing policies, continue to identify sites suitable for a full range of affordable housing types in the Plan Area.

In addition to these strategies, the Specific Plan includes a 20 to 25 percent density bonus for affordable and senior housing, which would encourage residential development that could accommodate any residents displaced by redevelopment in the study area.

Implementation of the Specific Plan would not displace significant numbers of residents or residential units necessitating construction of replacement housing elsewhere. Most new development would occur on commercial or vacant sites. Additionally, the Specific Plan would accommodate higher density residential development so that could support any affordable housing units lost through redevelopment in the study area. Therefore, the proposed Specific Plan would not displace substantial numbers of people or existing housing units necessitating the construction of replacement housing elsewhere. This impact would be ***less than significant***, and no mitigation is required.

4.7.4 Cumulative Impacts

The geographic context for the analysis of cumulative population and housing impacts is the City of South San Francisco, as represented by full build-out of the City's General Plan. The City is largely built out, and cumulative development would focus on the development of vacant and underutilized commercial parcels and intensified density of these infill parcels within the City.

Threshold	Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?
Threshold	Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?
Threshold	Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

ABAG projections estimate a substantial amount of growth by 2040 with an estimated three times as many households and 2.5 times as many jobs within the study area than in 2010 (BAE Urban Economics 2012). Additionally, according to ABAG's projections the study area's share of the City's employment will increase from 6 percent in 2010 to 12 percent by 2040 (BAE Urban Economics 2012). While the City does not have a substantial number of undeveloped parcels, the Specific Plan would result in redevelopment and reutilization of the Downtown and East of 101 subareas as transit-oriented to increase Downtown population and employment opportunities.

Currently approved residential projects within the City would result in the construction of an additional 247 housing units. Utilizing an average person-per-household factor of 2.96, future residential development in the City could result in a population increase of approximately 731 residents, while the Specific Plan could increase the population by 4,248 residents. In consideration of build-out of the proposed Specific Plan and approved residential projects outside the study area, the City's housing stock could increase by a net of 1,682 units by 2040 and the City's population could increase by 4,979 residents. This increase in housing units and residential population slightly exceeds the General Plan estimated population growth by 683 persons. This represents 1.0 percent of the overall population at General Plan build-out. This determination of exceedances of population growth projections assumes that all occupants of new residential development would be new residents of the City. It is reasonable to assume that a certain percentage of project occupants would be existing residents of the City. Despite the exceedances of population estimates by 683 persons as a result of cumulative development in the City, population growth would remain consistent with regional and county population growth rates (BAE Urban Economics 2012) and would not be considered substantial. Therefore, the cumulative impact of population growth would be ***less than significant***.

While the proposed Specific Plan could include demolition activities as part of redevelopment, substantial numbers of residents would not be displaced, as new housing units would be primarily be constructed on vacant or underutilized commercial sites within the study area. Therefore, substantial existing housing would not be displaced. Since the Specific Plan would increase the study area housing stock 1,435 housing units, construction of replacement housing elsewhere would not be necessary.

In consideration of build-out of the proposed Specific Plan and approved residential projects outside the Specific Plan, the City's housing stock could increase by 1,435 units by 2040. Therefore, cumulative development in the City would not displace substantial numbers of housing or people such that construction of housing elsewhere would be necessary. Therefore, the cumulative impact on the displacement of housing or people would be ***less than significant***.

4.7.5 References

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4.8 PUBLIC SERVICES

This section of the EIR analyzes the potential environmental effects on public services from implementation of the proposed project. For purposes of this EIR, the public service analysis is divided into four subsections: (1) fire protection and emergency response, (2) police protection, (3) schools, and (4) libraries. No comment letters addressing public services were received in response to the notice of preparation (NOP) circulated for the proposed project.

Fire Protection and Emergency Response

This section of the EIR describes fire protection and emergency response services within the City of South San Francisco and analyzes the potential physical environmental effects related to fire protection and emergency response created by construction of new or additional facilities associated with implementation of the proposed project.

Data for this section were provided by South San Francisco Fire Department (SSFFD). Full reference-list entries for all cited materials are provided in Section 4.8.5 (References).

4.8.1 Environmental Setting

The SSFFD is responsible for protecting lives and property in the City from the hazards of fire, sub-standard building construction, natural disasters, hazardous materials, and emergency medical incidents by means of direct response, public education and code development and enforcement (South San Francisco n.d.a). The SSFFD provides the following services to the residents of the City of South San Francisco: Fire Prevention, Municipal Code Enforcement, Fire Suppression, Emergency Medical Services (Advanced Life Support and non-emergency Basic Life Support ambulance transportation), Urban Search and Rescue, Hazardous Materials, Public Education, Disaster Preparedness, and Marine Search and Rescue services (South San Francisco n.d.b). The SSFFD is dispatched to a variety of incidents such as structure fires, hazardous materials, medical calls, traffic accidents, confined space, etc. The SSFFD also works in conjunction with the City's Economic and Community Development Department (i.e., planning and building and safety) to ensure that all new construction and remodels are built in compliance with local and State building and fire codes as well as, including the provision of adequate emergency access and on-site fire protection measures.

According to the City's General Plan, there are two factors that contribute to the fire risks within the City of South San Francisco. South San Francisco contains vegetation on both public and privately owned land that is poorly maintained and overgrown and nonnative vegetation in and near open spaces poses a threat of wildland fire. Poor access and inadequate local water supply can also increase the loss of life and property in fire. The General Plan has identified areas within the City that are susceptible to fire hazards; however, the study area is not located within an identified fire hazard area (South San Francisco 1999, Figure 8-4 [Fire Hazard Management Units], 8-269).

Fire stations are strategically located throughout the City to provide prompt assistance to area residents. SSFFD has firefighters and paramedics located in five different locations throughout the City.

Table 4.8-1 (Fire Station Facilities) describes the stations and Figure 4.8-1 (Fire and Police Facilities) identifies the locations of each fire station in the City.

Table 4.8-1 Fire Station Facilities

Station No.	*Location*	*Distance*	*Equipment*
61	480 North Canal St	Approximately 0.14 mile south of the study area	Engine 61; Rescue 61 ambulance; BLS Ambulance; Battalion Chief BC17.
62	249 Harbor Wy	Approximately 0.25 mile southeast of the study area	Quint 62 (combination of an Engine and a Truck); Technical Rescue Trailer and Utility 62; Rescue Boat 62 (located at Oyster Point Marina)
63	33 Arroyo Dr	Approximately 1.8 miles west of the study area	Engine 63 and Rescue 63 ambulance
64	2350 Galway Dr	Approximately 2.47 miles southwest of the study area	Engine 64 and Reserve 67 ambulance
65	1151 South San Francisco Dr	Approximately 0.64 mile northwest of the study area	Engine 65; Type 1 Heavy Rescue USAR 165 and Reserve Engine 66

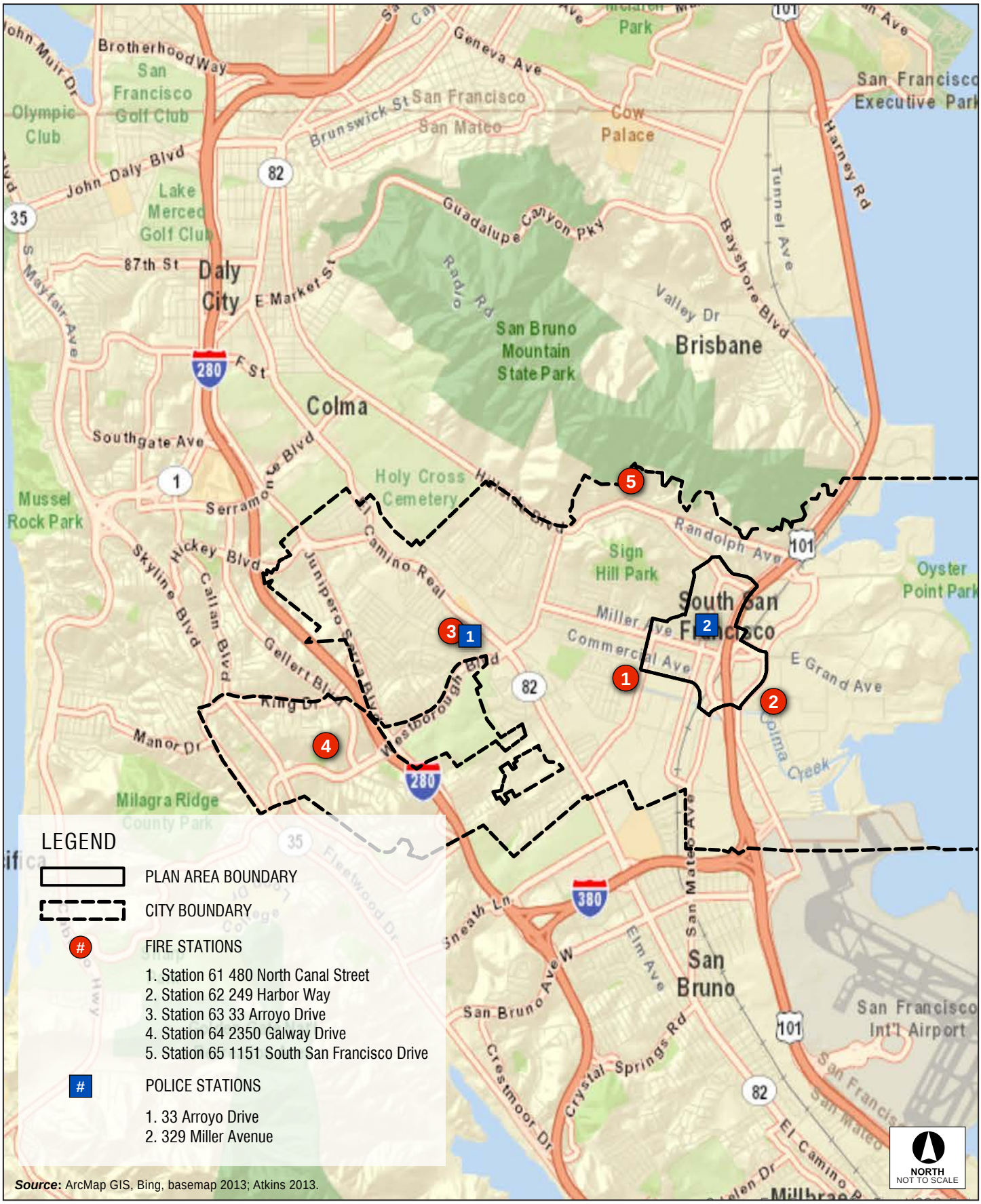
SOURCE: City of South San Francisco, City of South San Francisco Fire Department—Stations (n.d.c), http://ca-southsanfrancisco.civicplus.com/index.aspx?NID=452 (accessed November 14, 2013).

Response time is defined as the time that elapses between the moment a call is received by dispatch and the moment when the first unit assigned to the call arrives at the scene. The average response time for service within the City in 2013 for SSFFD Fire Engine and Quint apparatus is 4 minutes 26 seconds. The average emergency response time for SSFFD Rescue Ambulance calls within the City for 2013 is 5 minutes 45 seconds (Nuckolls 2013).

Approximately 85 members are allocated to the fire department to serve the City of South San Francisco (South San Francisco 2013). Each engine company is staffed with three people and each ambulance has two paramedics (South San Francisco n.d.d). Minimum on-duty staffing is 20 persons (South San Francisco n.d.a). Every effort is made to staff each engine company with a paramedic on a daily basis to create what is called a paramedic engine company, also known as an Advanced Life Support (ALS) engine company.

Standardized Emergency Management System

The Standardized Emergency Management System (SEMS) is an organizational and command structure required by California Government Code Section 8607(a) for the purpose of managing response to multi-agency and multi-jurisdiction emergencies in California. SEMS consists of five organizational levels, which are activated as necessary, and include: field response, local government, operational area, Office of Emergency Services (OES) Mutual Aid Regions, and State OES. In addition, SEMS incorporates the use of the Incident Command System (ICS), the Master Mutual Aid Agreement and existing mutual aid systems, the Operational Area Concept, the Operational Area Satellite Information System (OASIS), and multi-agency or inter-agency coordination (Cal OES 2011). The City of South San Francisco has adopted an emergency operations plan, the Association of Bay Area Governments (ABAG) Multi-Jurisdictional Local Hazard Mitigation Plan 2010, managing its response to multi-



Source: ArcMap GIS, Bing, basemap 2013; Atkins 2013.

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Figure 4.8-1
Fire and Police Facilities

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department and multi-jurisdiction emergencies and to facilitate communications and coordination between all levels of the system and among all responding departments and agencies (ABAG 2010).

Mutual Aid Agreements

The foundation of California's emergency planning and response is a statewide mutual aid system which is designed to ensure that adequate resources, facilities, and other support is provided to jurisdictions whenever their own resources are inadequate to cope with a given situation. The California Emergency Services Act mandates the use of the California Disaster and Civil Defense Master Mutual Aid Agreement as the standard form of agreement between jurisdictions. The Master Mutual Aid Agreement creates a formal structure wherein the City retains control of its own facilities, personnel, and resources but may also receive or render assistance to/from other jurisdictions within the state. State government is obligated to provide available resources to assist the City in emergencies; however, responsibility for the negotiation and preparation of mutual aid agreements rests with the local jurisdictions. Mutual aid agreements exist in law enforcement, fire services, medical and public works, building and safety, and emergency management.

OES provides administrative coordination and support for designated OES mutual aid regions through three administrative regional offices. The City of South San Francisco is within San Mateo County and located in Region II of the Office of Emergency Services Coastal Region. Other agencies other than fire services could be called for support and these include local law enforcement, and state and federal agencies involved in fire hazard mitigation, response, and recovery, including: Office of Emergency Services, Fish and Wildlife Service, National Park Service, Urban Search and Rescue Task Forces, U.S. Agriculture Forest Service, U.S. Environmental Protection Agency, National Aeronautics and Space Administration, National Weather Service, the Department of the Interior, and, in extreme cases, the Department of Defense (Cal OES 2008, 3-5 and 3-6).

4.8.2 Regulatory Framework

Federal

Federal Emergency Management Agency

In March 2003, the Federal Emergency Management Agency (FEMA) became part of the U.S. Department of Homeland Security. FEMA's continuing mission is to lead the effort to prepare the nation for all hazards and effectively manage federal response and recovery efforts following any major national incident. FEMA also initiates mitigation activities, trains first responders, and manages the National Flood Insurance Program and the U.S. Fire Administration.

Disaster Mitigation Act of 2000

In 2000, the Disaster Mitigation Act amended the Robert T. Stafford Disaster Relief Act of 1988. Among other things, this new legislation reinforces the importance of pre-disaster infrastructure mitigation planning to reduce disaster losses nationwide by controlling and streamlining the administration of federal disaster relief and developing programs that promote hazard mitigation activities. Among the Act's major provisions:

- Funding for pre-disaster mitigation activities
- Developing experimental multi-hazard maps to better understand risk
- Establishing state and local government infrastructure mitigation planning requirements
- Defining how states can assume more responsibility in managing the Hazard Mitigation Grant Program (HMGP)
- Adjusting ways in which management costs for projects are funded

The mitigation planning provisions outlined in Section 322 of the Act establish performance-based standards for mitigation plans. The Act further requires states to provide for a public assistance program (Advance Infrastructure Mitigation [AIM]) to develop County government plans. Counties which fail to develop an infrastructure mitigation plan, risk significant reduction in federal government assistance for repair/replacement of damaged facilities if that facility has been damaged on more than one occasion during the preceding 10-year period by a similar event.

International Fire Code

The International Fire Code includes specialized technical fire and life safety regulations which apply to the construction and maintenance of buildings and land uses. Topics addressed in the Code include fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, fire and explosion hazards safety, hazardous materials storage and use, provisions intended to protect and assist fire responders, industrial processes, and many other general and specialized fire-safety requirements for new and existing buildings.

State

California Fire Code (California Code of Regulations Title 24, Part 9)

The California Fire Code is Part 9 of the California Code of Regulations (CCR) Title 24, and is also referred to as the California Building Standards Code (CBSC). The California Fire Code combines the International Fire Code with amendments necessary to address California's unique needs. The CBSC includes regulations which are consistent with nationally recognized standards of good practice, intended to facilitate protection of life and property. Among other things, its regulations address the mitigation of the hazards of fire explosion, management and control of the storage, handling and use of hazardous materials and devices, mitigation of conditions considered hazardous to life or property in the use or occupancy of buildings and provisions to assist emergency response personnel.

California Health and Safety Code

State fire regulations set forth in California Health and Safety Code Sections 13000 et seq., address building standards, fire protection and notification systems, provision of fire protection devices such as extinguishers and smoke alarms, high-rise building and childcare facility standards, and fire suppression training.

California Emergency Management Agency (Cal EMA)

The Cal EMA was established as part of the Governor's Office on January 1, 2009, and created by Assembly Bill (AB) 38, which merged the duties, powers, purposes, and responsibilities of the former Governor's Office of Emergency Services with those of the Governor's Office of Homeland Security.

Cal EMA is responsible for the coordination of overall state agency response to major disasters in support of local government. The Agency is responsible for assuring the state's readiness to respond to and recover from all hazards—natural, manmade, war-caused emergencies and disasters—and for assisting local governments in their emergency preparedness, response, recovery, and hazard mitigation efforts.

California Code of Regulations, Title 19

CCR Title 19, Chapters 1 through 6, establishes regulations related to emergency response and preparedness.

Local

City of South San Francisco Municipal Code

Fire Code

The California Fire Code, discussed above under "State" regulations, is adopted by the City under City's Municipal Code Chapter 15.24 with amendments as the South San Francisco Fire Code.

General Plan Fire Hazards Element

The City of South San Francisco Fire Hazards Element is concerned with identifying, maintaining, and enhancing fire protection services. Applicable goals and policies of this Element include the following:

Goal 8.4-G-1 Minimize the risk to life and property from fire hazards in South San Francisco.

Goal 8.4-G-2 Provide fire protection that is responsive to citizens' needs.

- **Policy 8.4-I-1** Institute a comprehensive fire hazard management program to reduce fire hazards on public lands in those management units identified in Figure 8-4 and Table 8.4-1 of the Fire Hazards Element.
- **Policy 8.4-I-2** Explore incentives or programs as part of the comprehensive fire hazard management program to encourage private landowners to reduce fire hazards on their property.
- **Policy 8.4-I-3** Consider future access and water supply infrastructure improvements in the Dundee and Sign Hill areas to reduce fire hazard risk.
- **Policy 8.4-I-4** Require site design features, fire retardant building materials, and adequate access as conditions for approval of development or improvement to reduce the risk of fire within the City.

Consistency Analysis

Any future development under the proposed project would be required to follow all applicable State and local laws with respect to fire safety. Compliance with the regulations of the California Fire Code pertaining to fire protection systems and equipment, general safety precautions, and many other general and specialized fire-safety requirements for new and existing buildings and premises, would assist in ensuring consistency with the General Plan goals and policies related to new construction and site design. Therefore, implementation of the proposed Specific Plan would not conflict with these policies.

4.8.3 Impacts and Mitigation Measures

Analytic Method

The proposed project was analyzed to determine its impact on existing fire protection services provided by SSFFD within the City. Impacts on fire protection services are considered significant if an increase in population or building area would result in inadequate staffing levels, response times, and/or increased demand for services that would require the construction of new fire protection facilities or the expansion of existing fire protection facilities that may have an adverse physical effect on the environment.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on fire protection and emergency response if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 fire protection and emergency response

Project Impacts and Mitigation

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 fire protection and emergency response?

Impact 4.8-1 **Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 fire protection and emergency response. This would be a *less-than-significant* impact.**

Implementation of the Specific Plan would modify land use designations to increase densities of existing and new uses in the study area. As discussed in Section 4.7 (Population/Housing), the Specific Plan has the potential to add 1,435 housing units between 2010 and 2035. Additionally, up to 1.2 million square feet (sf) of new office/ research and development (R&D) uses could be added in the study area, representing as many as 2,400 new jobs added to the City. The City of South San Francisco General Plan (1999) provides for build-out of a maximum 3,620 additional housing units and 12 million sf of additional nonresidential space to the City. The Specific Plan would result in only slightly more population growth (0.07 percent) than that identified in the General Plan but would be considered to be consistent with the General Plan and other land use plans because a General Plan amendment would be adopted for consistency when the Specific Plan is adopted that would reflect the maximum build-out. However, the future increase in the residential population would result in an increase in the number of fire service calls to the area compared to existing conditions.

The current personnel-to-population ratio for the SSFFD is 1.33 firefighters per 1,000 residents. Based on the City's 2.96 persons per household (pph) (U.S. Census Bureau 2013), during the planning horizon for the proposed project, the project could increase the City's population by 4,248 residents. These additional residents would increase the City's population to approximately 67,880 residents. To maintain the current ratio of 1.33 fire-fighters per 1,000 residents, SSFFD would need to provide an additional 5 firefighters for a total of 90 during the lifetime of the Specific Plan.

It is not possible to specify the exact type, location, size, or timing of future development, due to the size and long-range nature of the proposed project. Instead, the Specific Plan prescribes the type and intensity of development that would be allowed to occur in identified zones. The City has implemented a Public Safety Impact Fee (2012) for all new development. This fee is intended to fund improvements in infrastructure or public services necessitated by new development. All development pursuant to the Specific Plan would be required to pay this fee. However, construction of new fire facilities is not expected as a result of this project.

Further reducing impacts to fire services, all development pursuant to the Specific Plan would be required to comply with provisions of the California Building Code and Fire Code pertaining to fire protection systems and equipment, general safety precautions, and many other general and specialized fire safety requirements for new and existing buildings and premises, such as emergency access provisions (South San Francisco Municipal Code Sections 15.08.010 and 15.24.010).

Compliance with Municipal Code requirements and payment of Public Safety Impact Fees would ensure that this impact would be ***less than significant***.

4.8.4 Cumulative Impacts

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 fire protection and emergency response?

The geographic context for the consideration of impacts related to fire protection and emergency services is the City of South San Francisco, which represents the service area of the SSFFD. As additional development occurs in the City, there may be a cumulative increase in the demand for fire services, including personnel, equipment, and/or facilities. All cumulative development would be required to comply with provisions of the California Building Code and California Fire Code pertaining to fire protection systems and equipment, general safety precautions, and many other general and specialized fire-safety requirements for new and existing buildings and premises, such as an emergency access provisions. Additionally, all new development within the City would be required to comply with the City's Public Safety Impact Fee Program to help ensure adequate funding for fire services to maintain the SSFFD's level of service.

Cumulative development within the City would result in additional demand for fire services, which could result in a significant cumulative impact if existing services would not be sufficient to accommodate the growth. This would be a potentially significant cumulative impact. However, as development occurs within the City, the SSFFD will continue to monitor response times and require payment of public safety impact fees to ensure that the SSFFD is operating within the current level-of-service standards. As such, the contribution of the proposed project to cumulative impacts on fire services would not be cumulatively considerable with compliance with Municipal Code requirements and payment of the Public Safety Impact Fee. This would be a ***less-than-significant cumulative*** impact.

4.8.5 References

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Police Protection

This section of the EIR describes police protection services within the City of South San Francisco and analyzes the potential physical environmental effects related to police protection created by construction of new or additional facilities associated with implementation of the Specific Plan.

Data for this section were provided by the South San Francisco Police Department (SSFPD). Full reference-list entries for all cited materials are provided in Section 4.8.10 (References).

4.8.6 Environmental Setting

The study area is in the center of South of San Francisco and is patrolled multiple times on a daily basis by the SSFPD (Campbell 2013). Police-related incidents occurring on the Caltrain station property are ultimately handled by the San Mateo County Sheriff's Department (SMCS), Transit Bureau. However, the SSFPD acts as the first responder to emergency situations on the property and liaises with the SMCS Transit Bureau once the incident is resolved. In the event that the SMCS does not have an available deputy to handle the incident, SSFPD generally prepares a courtesy report. These reports are prepared pursuant to the mutual aid policies adopted by both departments.

South San Francisco Police Department (SSFPD)

The SSFPD has one main station located at 33 Arroyo Drive. The police department also has a sub-station located at 329 Miller Avenue (within the study area); however, this facility is not always occupied (refer to Figure 4.8-1). In 2013, the SSFPD response times to Priority 1 (emergency) calls averaged 3.21 minutes and non-emergency calls averaged 5.76 minutes. These response times are considered acceptable (Campbell 2013).

As of 2014, the Department had a total of 114 employees, with 79 sworn officers and 35 civilian positions (South San Francisco 2014). The unsworn, civilian personnel each holds specific assignments to include: parking enforcement, police service technicians, dispatch, evidence specialists, records management, information technology and secretarial positions.

Based on the City's 2010 population of 63,632 residents (U.S. Census 2010), the current officer-to-population ratio for SSFPD is 1.24 officers per 1,000 residents. The Health and Safety Element of the General Plan suggests a target ratio of 1.5 officers per 1,000 residents to ensure rapid and timely response to all emergencies (South San Francisco 1999, 273). As such, the City is relatively consistent with respect to recommended staffing levels (Campbell 2013). The daytime civilian population rises to over 100,000 due to the growing workforce in the City of South San Francisco. SSFPD's officer to population ratio is considered acceptable at this time (Campbell 2013).

Services provided by the SSFPD include response to emergency and non-emergency calls for assistance, routine patrol, traffic enforcement, investigation of crime, parking control services, community problem-solving. The SSFPD Patrol Division is the primary provider of police services who cover the City on a 24-hour basis. The Patrol Division personnel are prepared to response to both emergency and nonemergency calls for services in each the City. The patrol division is divided into six teams: two Day Shift Teams, two Swing Shift Teams and two Grave Shift Teams. Each team has a supervisor (Sergeant), a Team Leader (Corporal) and several patrol officers. Officers work in a solo capacity – one officer per patrol vehicle. The City of South San Francisco provides all safety equipment as required by State Law and needed to provide essential duties as a police officer (Campbell 2013).

The police department provides a Downtown bicycle patrol unit year round in and around the study area. The unit's primary focus is the safety in the Downtown corridor and working with Downtown merchants to resolve any problems. The unit consists of two sworn officers during the summer months and one officer year-round. The police department also maintains a detective bureau, canine unit, traffic division, school resource officers, community policing division, planning and crime prevention division, tactical unit (SWAT), and a neighborhood response team. The police department currently has an acceptable level of equipment and seeks to maintain and improve this level as needed (Campbell 2013).

4.8.7 Regulatory Framework

Federal

There are no federal regulations related to police protection services applicable to the proposed project.

State

There are no state regulations related to police protection services applicable to the proposed project.

Local

City of South San Francisco General Plan

Law Enforcement—Health and Safety Element

The City of South San Francisco Law Enforcement Section of the Health and Safety Element is concerned with identifying, maintaining, and enhancing law enforcement services. Applicable goals and policies of this Section include the following:

Goal 8.5-G-1 Provide police services that are responsive to citizen's needs to ensure a safe and secure environment for people and property in the community.

Goal 8.5-G-2 Assist in crime prevention through physical planning and community design.

Policy 8.5-I-1 Ensure adequate police staff to provide rapid and timely response to all emergencies and maintain the capability to have minimum average response times.

Actions that could be taken to ensure rapid and timely response to all emergencies include:

- Maintain a law enforcement standard of 1.5 police officers per 1,000 residents.

Policy 8.5-I-2 Control and/or intervene in conduct recognized as threatening to life and property.

Policy 8.5-I-3 Reduce crime by strengthening the police/community partnership.

Policy 8.5-I-4 Assess community needs and expectations on an ongoing basis and report periodically to the City Council on citizen complaints and citizen commendations received.

Policy 8.5-I-5 Continue to coordinate law enforcement planning with local, regional, State and federal plans.

Consistency Analysis

Future development under the Specific Plan would increase the population in the City, which could result in more crime and a need for additional police personnel and facilities. Compliance with the Public Safety Impact Fee program would ensure that adequate funding for additional staffing and/or equipment would be provided to maintain acceptable levels of service throughout the community. Consequently, implementation of the proposed Specific Plan would not conflict with the applicable goals and policies of the City's General Plan.

4.8.8 Impacts and Mitigation Measures

Analytic Method

Impacts on police protection services are considered significant if an increase in population or building area would result in inadequate staffing levels (as measured by the ability of the SSFPD to respond to call loads) and/or increased demand for services that would require the construction or expansion of new or altered police protection facilities that might have an adverse physical effect on the environment.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on police protection if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 police protection

Project Impacts and Mitigation

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 police protection?

Impact 4.8-2 **Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 police protection. This would be a *less-than-significant* impact.**

Implementation of the Specific Plan would result in land use changes and increases in development which would result in direct population growth. The Specific Plan has the potential to add 1,435 housing units to the study area. Additionally, up to 1.2 million sf of new office/R&D uses could be added in the study area, representing as many as 2,400 new jobs added to the City. As discussed in detail in Section 4.7, the City of South San Francisco General Plan (1999) provides for build-out of a maximum 3,620 housing units and 12 million sf of nonresidential space to the City. The proposed Specific Plan would not exceed the maximum build-out planned for the City by 2030. However, the future increase in the residential population in the study area could result in an increase in the number of police service calls to the area compared to existing conditions.

Based on the City's 2010 population of 63,632 residents (U.S. Census 2010), the current officer-to-population ratio is 1.24 officers per 1,000 residents. Based on the City's population 2.96 pph (U.S. Census Bureau 2013), the project would increase the City's population by up to 4,248 additional residents. These additional residents would increase the City's population to approximately 67,880 residents. To maintain the existing ratio (which is considered an acceptable level of service, as noted, above) of 1.24 officers per 1,000 residents, SSFPD would need to provide 5 additional officers during the life of the Specific Plan, increasing the size of the SSFPD to a total of 84 officers.

In addition to increasing the residential population, implementation of the Specific Plan would increase the daytime civilian population, which currently rises to over 100,000 due to the growing workforce in the City of South San Francisco. Implementation of the Station Area Plan could increase the daytime population by 2,400 or more.

The Specific Plan would result in only slightly more population growth (0.07 percent) than that identified in the General Plan but would be considered to be consistent with growth permitted under the General Plan and other land use plans. The future increase in the residential population would result in an increase in the number of police calls to the area compared to existing conditions. Due to the size and long-range nature of the proposed project, it is not possible to specify the exact type, location, size, or timing of future development. Instead, the Specific Plan prescribes the type and intensity of development that would be allowed to occur. In order to ensure that an adequate service ratio is maintained, the City imposes a Public Safety Impact Fee for all new development to fund expansion of needed public services. It is not anticipated that new police facilities would be required by implementation of the proposed project.

It should be noted that a variety of approaches can be used to ensure adequate staffing levels, including, but not necessarily limited to, hiring (temporary and/or full-time), authorizing overtime and/or reassignments. Therefore, increases in staffing are evaluated by the SSFPD during its annual budgetary process, and personnel are hired, or overtime pay is funded for existing personnel, as needed, to ensure that adequate police protection services are provided.

Therefore, the impact on police protection services would be ***less than significant***.

4.8.9 Cumulative Impacts

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 police protection?

The geographic context for the consideration of cumulative impacts related to police services is the City of South San Francisco, which represents the SSFPD's service area. As additional development occurs in the City, there may be an overall increase in the demand for police services, including personnel and/or equipment. The provision of adequate police services is of critical importance to the City, and funds are allocated to these services during the annual monitoring and budgeting process to ensure that police protection services are responsive to changes in the City. Funds collected in the form of plan check fees,

inspection fees, and permit fees (for new development) are deposited into the General Fund and allocated to City services, as needed. As noted in the Public Safety Impact Fee Program, new development is required to contribute its share of funding for the replacement of public safety capital equipment, vehicles and facilities through the City's build-out (South San Francisco 2012). Similarly, staffing levels are evaluated by the SSFPD during the annual budgetary process, and personnel are hired, as needed, to ensure that adequate police protection services are maintained.

Cumulative development in the City would result in increased demand for police protection services, which could result in a significant cumulative impact if existing services would not be sufficient to accommodate the growth. This is a potentially significant cumulative impact. The proposed project does not include specific development projects and merely updates the land use standards and intensities that are applied within the study area, and future individual development projects proposed within the Specific Plan study area would be evaluated on a project-by-project basis for consistency with the City's General Plan. The Specific Plan does permit additional residential development within the City slightly above that originally permitted in the General Plan. However, the exceedance of General Plan build-out projections would be extremely small, only 0.07 percent of the total population at build-out, which would not be significant. The Specific Plan would be considered consistent with the General Plan and all other applicable land use plans. All new development pursuant to the Specific Plan would be required to pay a Public Safety Impact Fee to help fund any needed improvements or expansion of police protection facilities. Therefore, the contribution of the proposed project to cumulative impacts on police protection services would not be cumulatively considerable. This would be a ***less-than-significant cumulative*** impact.

4.8.10 References

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South San Francisco, City of. 2013. City of South San Francisco Fiscal Year 2013-2014 Adopted Operation Budget, p. B-5. http://www.ssf.net/DocumentCenter/View/5192 (accessed November 18, 2013).

U.S. Census Bureau. 2013. State and County Quick Facts—South San Francisco, June 17. http://quickfacts.census.gov/qfd/states/06/0673262.html (accessed November 20, 2013).

Schools

This section of the EIR describes school services within the City of South San Francisco and analyzes the potential physical environmental effects related to schools created by construction of new or additional facilities associated with implementation of the proposed Specific Plan.

Data for this section were obtained from the South San Francisco Unified School District (SSFUSD). Full reference-list entries for all cited materials are provided in Section 4.8.15 (References).

4.8.11 Environmental Setting

The Specific Plan study area would be served by the SSFUSD. The SSFUSD administers all public schools in South San Francisco, as well as one elementary school in San Bruno and one in Daly City. The district also has an adult education program, and works on everything from curriculum to facilities management. The SSFUSD operates nine elementary schools (serving grades kindergarten through five); three middle schools (serving grades six through eight); and three high schools (serving grades nine to twelve). Collectively, these facilities in school year 2012/13 had an enrollment of 9,265 students. Of these 9,265 seats, 4,163 are at the elementary school level; 2,069 are at the middle school level and 3,033 are at the high school level (CDOE 2013).

The study area would be served by the following SSFUSD schools: Los Cerritos Elementary, Martin Elementary, Spruce Elementary, Parkway Heights Middle, and South San Francisco High (SSFUSD n.d.a, n.d.b, n.d.c). The current enrollment and location of SSFUSD schools serving the study area are listed in Table 4.8-2 (Capacity and Enrollment of Schools Serving the Study Area). The location of each school is illustrated on Figure 4.8-2 (Schools Serving the Study Area).

According to correspondence with SSFUSD Student Services, the total number enrolled in the district for the most recent year is 9,156 (as of April 4, 2014). SSFUSD has a district-wide enrollment capacity of approximately 9,150 students for the most recent school year, 2013/14. The current class size standard per classroom for grades K–5 and 6–12 are as follows: grades K–3: 24; grades 4–5: 29; and grades 6–12: 33. According to the City's General Plan and per California Department of Education - Education Demographics Unit for the years 2012–2013, enrollment within the school district has been declining in recent years (http://www.cde.ca.gov, accessed 04/15/14). SSFUSD regulates school capacity based on class size rather than school size, and there is no upper limit on enrollment in each elementary, middle or high school. If enrollment increases, the SSFUSD brings modular units onto the school property to accommodate students and ensure that class size remains fairly constant. Currently, there are two schools; Spruce Elementary and Parkway Heights Middle Schools, serving the Specific Plan study area that are over the capacity by the standards set by the District.

No new school facilities are anticipated; however, development impact fees are an essential source of revenue in the provision of additional school resources needed for development. Fee proceeds may be used for construction or renovation of schools. Although it is not likely that any new schools will be built, existing facilities will need to be renovated. According to the District's 2013 Annual Report (SSFUSD 2013) the current fees are $2.24 per residential square foot and $0.18 per commercial square foot, neither of which is at the maximum level permitted by state law (SSFUSD 2013).

At the moment, SSFUSD has some school sites being re-modified/rebuilt under a current bond construction project. This may add some additional classroom space, but not a substantial amount. SSFUSD will also be reviewing their open enrollment/intradistrict transfer requests, and will subsequently be balancing their enrollments across school sites and grade levels to the best of their ability (communication with Mr. Ryan Sebers of SSFUSD).

Table 4.8-2 Schools Serving the Study Area

School	*Location*	*Enrollment (2012/13)*
Elementary		
Los Cerritos Elementary	210 West Orange Ave	306
Martin Elementary	35 School St	443
Spruce Elementary	501 Spruce Ave	645
Middle		
Parkway Heights Middle	650 Sunset Ave	567
High		
South San Francisco High	400 B St	1,442

SOURCES: California Department of Education, Education Demographics Unit, Enrolment by Grade for 2012-13, District and School Enrolment by Grade (May 30, 2013), http://data1.cde.ca.gov/dataquest/Enrollment/GradeEnr.aspx?cChoice= DistEnrGr2&cYear=2012-13&cSelect=4169070--SOUTH%20SAN%20FRANCISCO%20UNIFIED&TheCounty=&cLevel=District&cTopic=Enrollment&myTimeFrame=S&cType=ALL&cGender=B (accessed November 21, 2013); City of South San Francisco, *City of South San Francisco General Plan* (October 1999), Chapter 5 (Parks, Public Facilities, and Services), Prepared by Dyett & Bhatia, p. 194, http://www.ssf.net/index.aspx?NID=360 (accessed November 20, 2013).

4.8.12 Regulatory Framework

Federal

There are no federal regulations related to schools that are applicable to the proposed project.

State

California State Assembly Bill 2926 (AB 2926)—School Facilities Act of 1986

In 1986, AB 2926 was enacted by the state of California authorizing entities to levy statutory fees on new residential and commercial/industrial development in order to pay for school facilities. AB 2926, titled the School Facilities Act of 1986, was expanded and revised in 1987 through the passage of AB 1600, which added Government Code Sections 66000 et seq. Under this statute, payment of statutory fees by developers would serve as total CEQA mitigation to satisfy the impact of development on school facilities.

Source: ArcMap GIS, Bing, basemap 2013; Atkins 2013.

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Figure 4.8-2
Schools Serving the Study Area

ATKINS

California Government Code Section 65995—School Facilities Legislation

The School Facilities Legislation was enacted to generate revenue for school districts for capital acquisitions and improvements.

California Senate Bill 50 (SB 50)

The passage of SB 50 in 1998 defined the Needs Analysis process in Government Code Sections 65995.5 to 65998. Under the provisions of SB 50, school districts may collect fees to offset the costs associated with increasing school capacity as a result of development. The fees (referred to as Level One fees) are assessed based upon the proposed square footage of residential, commercial/industrial, and/or parking structure uses. Level Two fees require the developer to provide one-half of the costs of accommodating students in new schools, while the state would provide the other half. Level Three fees require the developer to pay the full cost of accommodating the students in new schools and would be implemented at the time the funds available from Proposition 1A (approved by the voters in 1998) are expended. School districts must demonstrate to the state their long-term facilities needs and costs based on long-term population growth in order to qualify for this source of funding. However, voter approval of Proposition 55 on March 2, 2004, precludes the imposition of the Level Three fees for the foreseeable future. Therefore, once qualified, districts may impose Level one and Level Two fees, as calculated according to SB 50.

Local

City of South San Francisco General Plan

Parks, Public Facilities and Services Element

The City of South San Francisco Parks, Public Facilities and Services Element outlines the policies and standards relating to parks and recreation, educational facilities, and public facilities that are directly related to the physical development of South San Francisco. Applicable goals and policies of this Element include the following:

Goal 5.2-G-1 Support efforts by the South San Francisco Unified School District to maintain and improve educational facilities and services.

Goal 5.2-G-2 Work with the SSFUSD and local neighborhoods on appropriate land uses for school sites no longer needed for educational purposes.

Goal 5.2-G-3 Continue to coordinate with the District the joint use of school recreational facilities for community-wide use.

- **Policy 5.2-I-1** Work with the SSFUSD on appropriate land uses for school sites no longer needed for educational facilities. Acquire closed school sites for recreation facilities and childcare purposes where appropriate.
- **Policy 5.2-I-2** Investigate creation and application of a single-purpose school zone to all school sites.

Consistency Analysis

Future development under the Specific Plan would increase the population in the City, which could increase demand for schools. All new residential development is required to pay school impact fees to offset increased demand for schools, including development under the Specific Plan. Consequently, the proposed project would not conflict with the applicable goals and policies of the City's General Plan.

4.8.13 Impacts and Mitigation Measures

Analytic Method

Impacts on schools are determined by analyzing the projected increase in the demand for schools as a result of a proposed project and comparing the projected increase with the schools' remaining capacities to determine whether new or altered facilities would be required. Impacts on schools are considered significant if an increase in population or building area would result in inadequate school capacity levels and/or increased demand for services that would require the construction or expansion of new or altered school facilities that might have an adverse physical effect on the environment.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on schools if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 schools

Project Impacts and Mitigation

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 schools?

Impact 4.8-3 **Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 schools. Impacts to school services would be *less than significant*.**

Implementation of the Specific Plan would result in increases in development resulting in direct population growth. The Specific Plan has the potential to add up to 1,435 housing units between 2010

and 2035 and up to 1.2 million sf of new office/R&D uses in the study area. The City of South San Francisco General Plan (1999) provides for build-out of a maximum of 3,620 additional housing units and 12 million sf of additional nonresidential space to the City. The increase in housing units and nonresidential development that would occur with implementation of the Specific Plan would be generally consistent with General Plan projections, resulting in only a slight exceedance (48 persons, or 0.07 percent, of total projected population), and a General Plan Amendment would be adopted as part of the project to ensure consistency with the General Plan.

Due to the size and long-range nature of the proposed project, it is not possible to specify the exact type, location, size, or timing of future development. Instead, the Specific Plan prescribes the type and intensity of development that would be allowed to occur. It is estimated that full build-out under the Specific Plan would result in an increase of new students throughout the schools identified in Table 4.8-2. None of the schools serving the study area would be the sole accommodation for all new students. Instead, new students would be enrolled in schools throughout the school district, depending on the location of residential development and the age of the students.

The SSFUSD does not place caps on enrollment at any of its schools. Rather, the standard for operation is 24 students per classroom for grades K–3, 29 students per classroom for grades 4–5, and 33 students per class for grades 6–12. As enrollment increases, the SSFUSD bring modular units onto the school property to maintain this level of classroom size. Re-modification of specific schools site within the SSFUSD would add additional classroom space. Additionally, SSFUSD will also be reviewing open enrollment/intradistrict transfer requests, and will subsequently be balancing their enrollments across school sites and grade levels. Therefore, new students generated as a result Specific Plan implementation would not result in overcrowding.

The State of California is responsible for the funding of public schools. To assist in providing facilities to serve students generated by new development, the governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement against any construction within the boundaries of the district, for the purposes of funding the construction or reconstruction of school facilities. State law requires project sponsors of future development located within the SSFUSD to pay all applicable development impact fees in effect at the time of building permit issuance to the SSFUSD to cover additional school services required by the new development.

Due to the declining enrollment throughout the district in combination with the availability of multiple school locations that would be available to serve new students generated by implementation of the Specific Plan, new or physically altered school facilities are not expected to be required to serve future development, the construction of which could result in significant environmental impacts. If new schools are required in the future, the payment of fees collected under the authority of SB 50 would offset any additional increase in educational demand at the elementary schools, middle schools, and high schools serving future residential development in the Station Area Plan, and any physical impacts associated with future new school construction would be evaluated on a project-level basis. This impact would be ***less than significant***.

4.8.14 Cumulative Impacts

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 schools?

The geographic context for the consideration of cumulative impacts related to schools is the service area of the SSFUSD. Increases in residential development throughout the City could generate additional demand for enrollment in local schools. The degree to which this demand would be satisfied is dependent upon future enrollment trends. Schools within the service boundaries of the SSFUSD accommodate expansion and contraction of enrollment by utilization of modular units to maintain the standard for class size. All new private development is required to pay development impact fees to the school districts to help fund construction of additional classrooms and offset any additional increases in education demand at elementary, middle, and high schools. Given the SB 50 requirement, the cumulative impact of future development on the SSFUSD, including development under the proposed Specific Plan, would be less than significant. Further, as with any future project proposed within the Specific Plan study area, project-level environmental review would be required should construction of new schools be required. Therefore, the incremental effect of the proposed project on this impact would not be cumulatively considerable, and this cumulative impact would be ***less-than-significant***.

4.8.15 References

California Department of Education (CDOE), Education Demographics Unit. 2013. Enrolment by Grade for 2012-13, District and School Enrolment by Grade, May 30. http://data1.cde.ca.gov/dataquest/Enrollment/GradeEnr.aspx?cChoice=DistEnrGr2&cYear=2012-13&cSelect=4169070--SOUTH%20SAN%20FRANCISCO%20UNIFIED&TheCounty=&cLevel=District&cTopic=Enrollment&myTimeFrame=S&cType=ALL&cGender=B (accessed November 21, 2013).

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Libraries

This section of the EIR describes library services within the City of South San Francisco and analyzes the potential physical environmental effects related to libraries created by construction of new or additional facilities associated with implementation of the proposed project.

Data for this section were taken from City of San Francisco Adopted Operation Budget for the Fiscal Year 2013–2014, U.S. Census Bureau, and Peninsula Library System and full reference-list entries for all cited materials are provided in Section 4.8.25 (References).

4.8.16 Environmental Setting

The South San Francisco Library System is an independent City library system and also part of the Peninsula Library System. The Peninsula Library System is a consortium of thirty-five public and community college libraries working together to provide innovative and cost-effective service to their users in San Mateo County (Peninsula Library System 2008).

The South San Francisco library system has two libraries and two literacy programs that serve the needs of South San Francisco and San Mateo County residents. The South San Francisco Library System locations throughout the City are listed in Table 4.8-3 (South San Francisco Library System).

Table 4.8-3 South San Francisco Library System

Library Branch	*Address*
Main Library	840 West Orange Ave
Grand Avenue Branch Library	306 Walnut Ave
Literacy Program	***Address***
Community Learning Center	520 Tamarack Ln
Project Read	840 West Orange Ave, Lower Level

SOURCE: Peninsula Library System, About PLS (2008), http://plsinfo.org/About-PLS (accessed November 18, 2013).

The Main Library and the Grand Avenue Library provide library and education services and materials for adults, young adults and children. In addition, the Grand Avenue Library includes the South San Francisco historical collection, a large Spanish language collection for adults and children, as well as bilingual references. The Community Learning Center is a literacy program that serves approximately 1,500 children and adults annually (South San Francisco n.d.a). The Community Learning Center's educational programs provide English languages classes, computer instruction, homework assistance, activities for children, native language literacy classes (Spanish), job train and citizenship classes (South San Francisco n.d.b). The Project Read program is located within the Main Library location. The Project Read program is a literacy program provided to library patrons and residents who want to improve their reading, writing and math skills. In addition, Project Read offers a wide variety of programs including family story time, computer lab, and Learning Wheels (a mobile preschool classroom) (South San Francisco n.d.c).

The South San Francisco Library collection contains 189,672 books and audio visual materials, and the Technical Services Division processed 14,629 items (South San Francisco 2013, E-105). There were approximately 730,000 items checked out of the library in fiscal year 2012/13 (South San Francisco 2013, E-105). The South San Francisco Library system currently has a full-time equivalent staff of 45.91, comprised of 37.66 actual full-time and part-time paid staff) and the equivalent of an additional staff of 9.25 members comprised of community volunteers that donated 15,280 hours of services to the library programs (South San Francisco 2013, E-164 to E-165).

4.8.17 Regulatory Framework

Federal

There are no federal regulations related to library services applicable to the proposed project.

State

There are no state regulations related to library services applicable to the proposed project.

Local

There are no local regulations related to library services applicable to the proposed project.

4.8.18 Impacts and Mitigation Measures

Analytic Method

Impacts on library services are considered significant if an increase in population or building area would result in inadequate staffing levels and/or increased demand for services that would require the need for new or physically altered library facilities in order to maintain acceptable service ratios.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on libraries if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 libraries

Project Impacts and Mitigation

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 libraries?

Impact 4.8-4 **Implementation of the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 libraries. This would be a *less-than-significant* impact.**

According to State of California Library Statistics there should be an average service ratio of about 0.00036 full-time employees per resident. Based on the City's current population of 63,632 residents (U.S. Census 2010), the South San Francisco Library currently has a staff of 37 (South San Francisco 2013, E-164 to E-165), which is an excess of 14 staff members according to this standard. As discussed in Section 4.7, the Specific Plan has the potential to add 1,435 housing units between 2010 and 2035. Based on the City's population 2.96 pph (U.S. Census Bureau 2013), implementation of the Specific Plan could add approximately 4,248 residents to the City of South San Francisco. These additional residents would increase the City's population to approximately 67,880 residents. This residential population would require a total of 24 staff members under the Library Statistics standard, and the current staff of 37.66 would be sufficient. In addition, the Peninsula Library System, with a consortium of 35 public and community college libraries for the County of San Mateo, would be available to residents.

Like all areas of the City, the study area is served by the South San Francisco Library system with a combined collection of 189,672 books and audio-visual materials. These library facilities currently provide more than the standard of 2.0 items per capita recommended by the California Library Association. There would, therefore, be no substantial increase in demand on library services with respect to the number of items available to South of San Francisco residents and the existing collection would accommodate the increased demand. In addition, the study area is also served by the Peninsula Library System's consortium for the County of San Mateo. The South San Francisco Library system and the Peninsula Library System are accessible from all portions of the Specific Plan and can cater to the demands of future residents.

In addition, due to the growing use of electronic resources, former service standards (e.g., a certain number of staff or volumes per thousand residents) no longer accurately reflect the needs of a municipal library. Therefore, increased development in the City does not necessarily equate to an increase in demand for volumes or square feet of library space; in addition the Specific Plan anticipates development of 25 percent of parcels in the study area over a 20-year timeframe. Therefore, implementation of the proposed project is not expected to require any new or physically altered library facilities to serve the project, the construction of which could result in significant environmental impacts. This impact would be ***less than significant***.

4.8.19 Cumulative Impacts

Threshold	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or in the 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 libraries?

The geographic context for the analysis of cumulative impacts to library services is the South San Francisco Library System service area in the City of South San Francisco. The analysis accounts for all anticipated cumulative growth within this geographic area, including the list of related projects within the City of South San Francisco as provided in Chapter 3 (Project Description). For the purposes of this analysis, the cumulative demand for library services within the City is anticipated to increase as a result of build-out of the Specific Plan and other cumulative growth. However, the increase in population due to the project would not decrease the ratio of library items below the standard of 2.0 items per capita recommended by the California Library Association, nor would it decrease the ratio of staffing below the average service ratio of 0.00036 full-time employees per resident recommended by the State of California Library. Other future projects would also be required to adhere to standards set forth by the California Library Association. Additionally, the current surplus of library staff to residents would ensure that any additional cumulative development would be met adequately without significant concern. Therefore, the cumulative impact on library services would be ***less than significant***.

4.8.20 References

Peninsula Library System. 2008. About PLS. http://plsinfo.org/About-PLS (accessed November 18, 2013).

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?NID=360.

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———. n.d.a. Community Learning Center—About Us. http://www.ssf.net/index.aspx?NID=548 (accessed November 18, 2013).

———. n.d.b. Community Learning Center—Programs. http://www.ssf.net/index.aspx?NID=556 (accessed November 18, 2013).

———. n.d.c. Project Read—About Us. http://www.ssf.net/index.aspx?NID=588 (accessed November 18, 2013).

U.S. Census Bureau. 2013. State and County Quick Facts—South San Francisco, June 17. http://quickfacts.census.gov/qfd/states/06/0673262.html (accessed November 20, 2013).

4.9 RECREATION

This section of the EIR analyzes the potential environmental effects on recreation from implementation of the proposed project. No comment letters addressing recreation were received in response to the notice of preparation (NOP) circulated for the proposed project.

Data for this section were taken from the Recreation and Open Space Element of the City's General Plan, and the City's website. Full reference-list entries for all cited materials are provided in Section 4.9.5 (References).

4.9.1 Environmental Setting

Existing Conditions

Physical Setting

Parks and Open Space

Parks and recreational open spaces provide opportunities for both active recreation, such as organized or informal sports, and passive recreation. Despite the relatively small quantity of parkland in South San Francisco, a broad range of outdoor recreation opportunities exist, each reflecting the variety of the city's landscape and pattern of development. These range from shoreline open space on San Francisco Bay, to Sign Hill Park, situated at an elevation of more than 600 feet. In addition, the San Bruno Mountain County Park—a major regional open space resource and prominent visual landmark—lies directly north of the city.

The City of South San Francisco Parks and Recreation Department manages twenty-one parks and playgrounds (comprising 70 acres); two linear parks (17.5 acres); 27 acres of open space at Sign Hill Park with trails, a second of the Bay Trail; and a community park. In addition, they operate several faculties, including two recreation centers, one gymnasium, one indoor swimming pool, two preschool buildings, one senior center, and operates before and after school daycare programs on five elementary school campuses.

Given the City population of 63,632 residents, existing facilities provide approximately 3.4 acres of parks and open space per 1,000 residents. Table 4.9-1 (Existing Park Acreage) provides a summary of existing park and recreational facilities within the City. While this amount appears to exceed the General Plan standard of 3.0 acres per 1,000 residents, closer analysis reveals that only 1.2 acres per 1,000 residents of development parkland is actually available.

Table 4.9-1 Existing Park Acreage

	Park	Acres	Address
City Recreation Facilities			
1	Orange Memorial Park	26.9	Orange Avenue & Tennis Drive
2	Westborough Park	11.1	Westborough & Galway
3	Alta Loma Park	9.0	450 Camaritas
4	Avalon Park	2.4	Dorado Way & Old Country Way
5	Brentwood Park	3.0	Rosewood & Briarwood
6	Buri Buri Park	4.2	200 Block of Arroyo
7	Centennial Way	16	SSF BART—San Bruno BART
8	City Hall Playlot	0.1	Miller & Walnut
9	Clay Park	0.8	Clay & Dundee
10	Cypress & Pine Playlot	0.3	Cypress & Pine
11	Francisco Terrace Playlot	0.3	Terrace & S. Spruce
12	Gardiner Playlot	0.1	Gardiner & Randolph
13	Terrabay Ballfield	4.1	Hillside School
14	Paradise Valley Park	0.9	Hillside & Spruce
15	Sellick Park	4.5	Appian Way
16	Sister Hill Park	1.5	Between Orange & Spruce
17	Terrabay Gymnasium	N/A	1121 South San Francisco Drive
18	Elkwood Park	1.8	Duval & Greystone Drives
19	Newman and Gibbs Playlot	0.2	Newman & Gibbs
20	Dundee Playlot	0.2	Dundee & Mansfield
21	Zamora Park	0.7	Zamora Drive
	Common Green Area	49.1	N/A
City Recreation Facilities			
1	Joseph A. Fernekes Recreation Building	N/A	781 Tennis Drive
2	Municipal Services Building	N/A	33 Arroyo Drive
3	Terrabay Recreation Building	N/A	1121 South San Francisco
4	Westborough Recreation Building	N/A	2380 Galway
	Subtotal	*144.9*	
Open Space Recreation			
1	Sign Hill Park	41	Access-Poplar Ave
2	Oyster Point Marina	N/A	N/A
3	Community Garden	N/A	Commercial Avenue & Chestnut Avenue
	Subtotal	*59.5*	

Table 4.9-1 Existing Park Acreage

Park	*Acres*	*Address*
Other Recreational Space		
Athletic Fields	13.6	N/A
Subtotal	*13.6*	
Total	***218***	

SOURCE: City of South San Francisco, Parks & Recreation, http://www.ssf.net/index.aspx?NID=1713 (accessed October 25, 2013).

Recreation Facilities and Programs

Community and recreation centers provide space for many of the classes and services that are central to South San Francisco's recreation programs. The City has six community/recreation buildings, some of which are used for specialized services such as senior programs at the Magnolia Center, public meetings at the Municipal Services Building, and Boys and Girls Club programs at the Paradise Valley Recreation Center. The City also has an indoor public pool at Orange Park. Outdoor pools at South San Francisco High School and El Camino High School supplement Orange Park pool in the summer. A public gymnasium was constructed in 1998 as part of the Terrabay project.

The City offers a variety of recreation and special programs, ranging from preschool to senior activities. Both indoor and outdoor recreational programs occur in a combination of school and City facilities. The types of programs offered range from recreational and competitive swimming to classes and performances in the cultural and performing arts. The City offers programs geared toward specific age groups, such as teenagers or seniors, and day camp, preschool, and after-school programs for children.

Parks

Community parks serve a citywide population and usually include sports facilities, such as lighted fields, courts, swimming pools, recreation buildings, and other special use facilities. Restrooms and off-street parking are generally provided. Although community parks have a much larger service area than neighborhood parks, they often serve a neighborhood function as well. South San Francisco owns and maintains three community parks totaling approximately 39 acres.

Neighborhood parks are devoted primarily to serving a small portion of the city, usually within easy walking and biking distance from residences. These parks are designed for unorganized and unsupervised recreation activities. Play equipment, open turf areas, and picnic tables may be provided, although restrooms and off-street parking may not. Neighborhood parks typically measure between 3 and 7 acres in South San Francisco. There are five existing neighborhood parks in the city, which total approximately 24 acres.

Mini parks are small play areas or green spaces, usually less than 3 acres in size, designed for small children or for visual purposes. In addition to play equipment, these parks may provide active recreation opportunities, such as handball or basketball. There are twelve mini parks scattered throughout South San Francisco totaling approximately 7 acres.

Linear geographic features, such as watercourses and shorelines, public utility and transportation rights-of-way, provide unique opportunities for parks. These corridors often provide formal access to the features they mirror, and provide the basis for a network of formal trails that link other parks and open space areas. While these lands are most often used for passive recreational pursuits, play equipment, open turf areas, and picnic tables may be provided, depending upon the width of the corridor. There is a linear park located along the bayfront and there is also a linear park along the Colma Creek between Orange and Spruce Avenues. The largest linear park in South San Francisco is Centennial Trail, which runs from the South San Francisco to the San Bruno BART Station. It is a 3-mile-long Class I bicycle and pedestrian trail that is a 10-foot-wide asphalt pathway with 2-foot decomposed granite shoulders.

School playground facilities are also available for public use. The City maintains a Joint Powers Agreement with the School District for the use of eleven parks and playfields for school sports and City recreation programs. School playgrounds account for approximately 25 percent of the park and open space area in South San Francisco, measuring between 3 and 11 acres in size. These areas significantly enhance the City's complement of neighborhood parks and athletic fields.

Recreational open space is most often used for passive recreation activities, such as walking or hiking. Improvements are generally not provided. South San Francisco's unusual geographic features provide numerous opportunities for unique open space areas, such as the Sign Hill Park. Over the years, the City has taken advantage of these opportunities, and is continuing to put effort into improving access to the bayfront and the hills.

4.9.2 Regulatory Framework

Federal

There are no federal regulations applicable to parkland or recreational facilities.

State

There are no state regulations regarding parkland or recreational facilities applicable to the proposed project.

Local

Park Recreation and Open Space Master Plan

Under the direction of its 1990 and 1997 Park, Recreation, and Open Space (PROS) Master Plans, the City is addressing specific deficiencies in park and recreational opportunities. Present efforts are focused on improving four existing park sites; Buri Buri Park, Francisco Terrace Playlot, Clay Avenue Playlot, and Elkwood Park. The City has recently selected a consultant and is in the early stages of developing a new Park and Recreation Master Plan.

Orange Memorial Park Master Plan (1990, 2007 Update)

The existing Master Plan establishes a vision and development goals for Orange Memorial Park, which is one of the oldest and largest parks in South San Francisco and offers numerous amenities. In 2007, the Master Plan was updated when property adjacent to the park was purchased by the City, potentially increasing the size of Orange Memorial Park to 36 acres. The Master Plan provides a conceptual design for the adjacent property.

South San Francisco BART Linear Park Master Plan (2003)

The South San Francisco BART Linear Park, now called Centennial Way Linear Park, is to help create a bridge between residents, commuters, and recreationalists within neighboring communities, to the South San Francisco and San Bruno BART Stations. The Master Plan proposes a development program for the entire stretch of the linear park. Construction was completed in 2009.

South San Francisco General Plan

The *South San Francisco General Plan* establishes goals, policies, and programs that serve as a decision-making tool to guide future growth and development in the City.

South San Francisco Municipal Code

The *South San Francisco Municipal Code* establishes permissible limits and permit objective measurement of nuisances, hazards, and objectionable conditions as well as ensuring that all uses will provide necessary control measures to protect the community from nuisances, hazards, and objectionable conditions.

Title 20, Chapter 20.300

Title 20 (Zoning), Chapter 20.300 (Lot and Development Standards) states:

J. Air Contaminants. Uses, activities, and processes shall not operate in a manner that emit excessive dust, fumes, smoke, or particulate matter.
   1. Compliance. Sources of air pollution shall comply with rules identified by the Environmental Protection Agency (Code of Federal Regulations, Title 40), the California Air Resources Board, and the Bay Area Air Quality Management District (BAAQMD).
   2. BAAQMD Permit. Operators of activities, processes, or uses that require "approval to operate" from the BAAQMD, shall file a copy of the permit with the Planning Division within 30 days of permit approval.

Title 15, Chapter 15.08, Appendix Section 3309.13

Title 15 (Buildings and Construction), Chapter 15.08 (California Building Code), Section 3309.13 (Hours) states:

> No grading or any work in connection therewith, including, but not limited to, the import and export of earth or other materials and the delivery, servicing or operation of grading equipment, shall be conducted between the hours of 6:00 p.m. and 8:00 a.m. within or adjacent to residential zones, or between the hours of 6:00 p.m. and 7:00 a.m. within all other areas of the City, of any day, nor on Saturday, Sunday or Municipal holidays at any time without prior written approval of the Director of Public Works.

Title 19, Chapter 19.24

Regulations for dedication of land, payment of fees, or both, for park and recreation land in subdivisions can be found in Sections 19.24.040 through 19.24.120.

General Plan Park Proposals

The General Plan proposes several new parks to meet the needs of new residents and employees, as well as linear parks along old railroad spurs and above the underground BART tracks, such as Centennial Way Trail, which was completed in May 2009. While some of these proposals recognize direction established in the City's PROS Master Plan, others are located to maximize opportunities resulting from change in redevelopment.

Guiding Policies: Parks and Recreation

Policy 5.1-G-1 Develop additional parkland in the city, particularly in areas lacking these facilities, to meet the standards of required park acreage for new residents and employees.

Policy 5.1-G-3 Provide a comprehensive and integrated network of parks and open space; improve access to existing facilities where feasible.

Policy 5.1-G-4 Develop linear parks in conjunction with major infrastructure improvements and along existing public utility and transportation rights-of-way.

Implementing Policies: Parks and Recreation

Policy 5.1-I-1 Maintain the PROS Master Plan as the implementing tool for General Plan park and recreation policies and proposals.

Park proposals and standards in the General Plan should be reflected in the next update of the PROS Master Plan.

Policy 5.1-I-2 Maintain parkland standards of 3.0 acres of community and neighborhood parks per 1,000 new residents, and of 0.5 acre of parkland per 1,000 new employees, to be located in employment areas.

Policy 5.1-I-3 Prefer in-lieu fees to dedications, unless sites offered for dedication provide features and accessibility similar in comparison to sites shown on Figure 5-1.

Policy 5.1-I-4 Develop new parks in locations and sizes shown on Figure 5-1.

The General Plan proposes several new parks in existing residential and employment areas that would meet this need, as indicated in Table 5.1-4. These include:

Residential Areas

- Southwood School (Baden Continuation High School): This site provides an ideal opportunity for the City to jointly use all or a part of this property. Measuring 4 acres, the site is located near El Camino Real and is adjacent the California Golf and Country Club. This site is in an area with parkland deficiency and located within a half-mile of several new residential development sites in the El Camino Real corridor. A Head Start program facility could be included on the site.

- Downtown Park: A two-acre park in the Downtown area would provide important aesthetic benefits to the area. Benches, paths, and an open turf area should be included. Although a specific location for this park has not been designated in the General Plan Diagram, this should be established in the future through the PROS Master Plan process.

Employment Areas

- Railroad Avenue Linear Park. This rail-to-trail conversion, stretching from U.S. 101 to East Grand Avenue would significantly improve access to East of 101 area and the bayfront. Measuring 7.5 acres in size, this park should be of ample width to support the placement benches, paved pathways, and exercise stations. This park is part of the Railroad Avenue Extension proposed in Policy 4.2-I-2 of the Plan.
- Lindenville Linear Park. Another rail-to-trail conversion, this park measures 2.0 acres in size and is located between South Maple Avenue and Tanforan Avenue near the City boundary with San Bruno. This park should provide picnic facilities and benches for nearby office workers.

Policy 5.1-I-5 Use the PROS Master Plan process to achieve additional parkland acreage, as necessary, to meet the residential parkland need at General Plan buildout.

Policy 5.1-I-6 Work with Bay Area Rapid Transit (BART), Pacific Gas and Electric (PG&E), and the SFPUC to lease and develop linear parks on existing public utility and transportation rights-of-way in the city, where appropriate and feasible.

Policy 5.1-I-7 Develop a network of linkages, as shown in Figure 5-1 [of the General Plan], to connect existing and proposed parks and open space, school facilities and other significant features to the greatest extent possible.

Policy 5.1-I-9 Review the current regulations for the dedication of parkland in subdivisions to ensure that requirements are adequate to meet the standards of the General Plan at Plan buildout.

Consistency Analysis

The South San Francisco Downtown Station Area Specific Plan is intended to facilitate a well-designed mix of projects that combine residential and non-residential uses with more open and green space. The Specific Plan is designed to be consistent with the policies contained in the General Plan, including those related to open space, parks, and recreation. New projects constructed in accordance to the standards contained within the Specific Plan will provide for new private open space and an increase in public and private landscaping. Because the overall project is designed to enhance and promote the open space, parks, and recreation resources within the study area, implementation of the proposed project would not conflict with the identified policies.

4.9.3 Impacts and Mitigation Measures

Analytic Method

Impacts on parks and recreation services are considered significant if an increase in population, employment, or building area would require the need for new park facilities in order to maintain acceptable service ratios. The City of South San Francisco has a current park ratio of 3.4 acres per 1,000 residents. The City's Open Space Element of the General Plan requires parkland dedication or in-lieu fees equal to 3 acres per 1,000 residents when establishing future parkland. The impact of the project on park services is evaluated based on this General Plan criterion.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on recreation if it would do any of the following:

- 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
- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment

Project Impacts and Mitigation

Threshold	Would the project 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?

Impact 4.9-1 **Implementation of the proposed project would not 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. This impact would be *less than significant*.**

Implementation of the proposed project could accommodate up to 1,435 dwelling units, approximately 780,000 square feet (sf) of commercial uses, 21,000 sf of industrial uses, and 1.2 million sf of new office/research and development uses within the study area. Therefore, the proposed project could generate additional demand for parkland in the City.

The existing parks-to-population ratio in the City is 3.4, which would appear to exceed the General Plan goal of 3.0 acres per 1,000 residents, although closer analysis reveals that only 1.2 acres per 1,000 residents of development parkland is actually available. Implementation of the Specific Plan could result in an increase in City residents up to 4,248 persons, further reducing the parks-to-population ratio. However, the Specific Plan would add a network of new open space opportunities, and new development within the study area may be required to pay in-lieu fees to support increases in population. While the increased population would result in increased use of existing parks, the increase represents only 6.7 percent of total City population. Therefore, it would not be anticipated that this increase would

result in substantial physical deterioration of existing park facilities. Further, as mentioned in Section 4.7 (Population/Housing), the expected population increase resulting from implementation of the Specific Plan would only slightly exceed the overall City projections for population growth and, with adoption of a General Plan Amendment as part of the proposed project, would be consistent with growth projections in the General Plan.

In addition to requirements for new residential development, the General Plan also includes park standards for new employees generated by proposed development. Given that the Specific Plan would generate approximately 2,400 new jobs, the General Plan requirement of 0.5 acre per 1,000 new employees would necessitate the provision of 1.2 acres of new parks and open space with implementation of the proposed Specific Plan. In general, it is expected that existing facilities serving the study area would satisfy most if not all of the park and open space needs generated by the Specific Plan. More specifically, Orange Memorial Park and Centennial Way, along with 218 total acres of parks and open space, averaging 3.4 acres per 1,000 residents provides a wide range of regional facilities available for the residents of the City. In addition to Orange Memorial Park and Centennial Way, there are a wide variety of City, County, educational, and private recreational facilities within the City, as detailed in Table 4.9-1.

As part of the Specific Plan, open space would be provided in the form of parks, squares, paseos, courtyards and plazas to serve residents and employees within the study area. Also, per Specific Plan guidelines, developers of specific projects within the Specific Plan study area would utilize open space and streetscape improvements in the design of their projects. These improvements would include landscaped medians, sidewalks, pedestrian-oriented street lights, street furniture, trees, shrubs, groundcover, and other amenities. Additionally, the payment of park fees from new development could be allocated to fund the acquisition and/or development of future parks or facility renovations associated with increased use of public facilities.

Due to the variety of existing recreational opportunities within the City, the recreational amenities that are included as part of the Specific Plan, and the fact that some future project developers may be required provide new parks and open space or pay in-lieu fees to help meet the needs generated by their proposed projects, it is expected that new residents would not substantially increase the use of existing neighborhood and regional facilities such that substantial physical deterioration of the facility would occur or be accelerated. Adherence to existing land dedication and in-lieu fee requirements and applicable PROS Master Plan regulations, as well as the on-site open space requirements established in the Specific Plan, would ensure that parks and open space are acquired, developed, improved, and expanded as future residential projects are constructed in the study area. Therefore, this impact would be ***less than significant***.

Threshold	Would the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

Impact 4.9-2 **Development pursuant to the Specific Plan could include recreational facilities or require the construction or expansion of recreational facilities, but these specific components would not have an adverse physical effect on the environment not already included in the overall analysis of Specific Plan impacts. The impact for any recreational component would be *less than significant*.**

Development under the Specific Plan could include recreational components such as gym facilities, parks, or other recreational amenities, the construction of which could result in adverse impacts. However, the analysis of project construction included in the technical sections of this document considers all potential types of development, including construction of recreational facilities. Therefore, on a program level, all impacts related to construction of projects implemented under the Specific Plan have been analyzed, and no separate impacts as a result of recreational facilities would occur. Future projects implemented under the proposed Specific Plan would be required to comply with applicable local regulations and all mitigation measures identified in this EIR. This would include completion of additional environmental review if impacts of a specific project are not adequately analyzed in this program-level EIR. However, as noted above, it is expected that existing parks and recreational facilities would be adequate to meet the needs generated by development in the study area. Therefore, this impact would be ***less than significant***.

4.9.4 Cumulative Impacts

The geographic context for the analysis of cumulative recreation impacts includes the City of South San Francisco. The analysis accounts for all anticipated cumulative growth within this geographic area, as represented by development of the projects within the City of South San Francisco provided in Table 3-2 (Cumulative Projects—Planned East of 101 Development by 2035) in Chapter 3.

Threshold	Would the project 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?

Project development, in combination with other cumulative mixed-use and residential development within the City of South San Francisco, would directly increase the resident population as well as the number of those employed within the City of South San Francisco. Increases in population and employment would generate a higher demand for recreational facilities and programs, and reduce the existing parkland per resident ratio. The Open Space Element of the City's General Plan establishes that the parkland standard for the creation of future parkland is a minimum of 3.0 acres of parkland for every 1,000 residents and 0.5 acre for every 1,000 new employees. The existing parkland per resident ratio for the City is 3.4 acres per 1,000 residents, above the minimum standard. Therefore, it is expected that existing facilities would be adequate to accommodate increased demand. Some future development projects also would be anticipated to include parks or recreational facilities which would at least partially

offset population growth. In addition, new development would be required to dedicate land for parks or pay in-lieu fees to support future park development.

In light of the City's open space policies, cumulative development would not significantly adversely affect recreational facilities in the City. While the Specific Plan does not identify specific recreational facilities, some future development under the proposed project would be expected to include open space, pocket parks, or recreational facilities. In addition, given the adequate amount of existing parks and recreational opportunities in the City, and the General Plan requirement that new development provide its fair-share of park and recreational facilities for future residents and employees, the cumulative impact to existing parks and recreational facilities would be ***less than significant***.

Threshold	Would the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

Development of the Specific Plan along with other related projects in the City of South San Francisco could result in the development of new recreational facilities, the construction of which may cause a significant effect on the environment, particularly with regard to air quality and traffic during construction, as the City of South San Francisco is located in a nonattainment area for criteria pollutants. Improvements to existing recreational facilities could also result in significant environmental impacts. With implementation of best management practices as well as compliance with the City's construction ordinances and limitation of construction hours as contained in Municipal Code Title 15, Chapter 15.08, Section 3309.13, it is likely that the development of most new recreational facilities would be mitigated to less-than-significant levels. Cumulative developments could ultimately require the construction of new parkland, either through land dedication, the payment of fees to improve existing or create new parks, or both. As with development within the Specific Plan, all feasible mitigation measures would be implemented to reduce or avoid significant construction-related impacts, and these impacts would be short term. As a result, while a cumulative impact related to the construction of future parks and recreational facilities could occur, the proposed project's contribution to this cumulative impact would not be cumulatively considerable. Therefore, this impact is ***less than significant***.

4.9.5 References

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4.10 TRANSPORTATION/TRAFFIC

This section evaluates potential transportation and circulation impacts, at a program-level of analysis, which may result from implementing the South San Francisco Downtown Station Area Specific Plan (Specific Plan or proposed project). The evaluation of environmental effects presented in this section focuses on the potential transportation and circulation impacts associated with the full range of transportation concerns, including vehicle traffic circulation, public transit use, bicycle circulation, and pedestrian circulation. Mitigation measures to reduce or eliminate potential significant impacts of the project are included, where feasible and necessary.

4.10.1 Environmental Setting

Implementation of the Specific Plan would include a mix of new residential, retail, and office space in the study area. The Specific Plan would include new land uses in two locations: the West portion of the study area includes all of Downtown, and the adjacent residential and mixed uses located west of Airport Boulevard and north of Railroad Avenue. This area is bounded by Railroad Avenue, Spruce Avenue, Lux Avenue, Maple Avenue, Leo Circle, and Airport Boulevard. The East portion of the study area includes all of the land uses east of Airport Boulevard and south of Railroad Avenue, most of which are separated from the West area by the Caltrain tracks and are more directly connected to the local street network east of the Caltrain tracks. This area is bounded by East Grand Avenue, Gateway Boulevard, South Airport Boulevard, Linden Avenue, 1st Lane, and Airport Boulevard.

Caltrain operates 50 miles of commuter rail between San Francisco and San Jose, and limited service trains to Morgan Hill and Gilroy during weekday commute periods, with the South San Francisco Station currently located below grade, just east of Dubuque Avenue on the north side of East Grand Avenue. The proposed project would extend the station to the intersection of Poletti Way and Grand Avenue.

This section includes descriptions of the scope of analysis, methods used for the analysis, existing setting for multi-modal transportation and circulation issues, assumptions regarding future transportation and circulation conditions, and regulatory context. Transportation and circulation impacts that would likely occur with implementation of the Specific Plan are analyzed and documented following the Setting section, as described below.

This section includes a description of the study locations, the traffic scenarios analyzed, the analysis methods, existing transportation conditions, and the regulatory context. Figure 4.10-1 (Study Intersections and Freeway Segments) illustrates the study area and its relationship to the surrounding road system.

Study Locations

The recommended analysis locations (study intersections and freeway facilities) were selected based on the potential of the project to create significant environmental impacts on important transportation facilities, based on local traffic patterns, input from local authorities, and engineering judgment. This analysis evaluates the impacts of the proposed project on key roadway facilities, including sixteen intersections and eleven freeway segments. The study locations are listed below and shown on Figure 4.10-1. All study intersections are controlled by a traffic signal unless noted below.

- Study Intersections
  1. Miller Avenue/Linden Avenue
  2. Miller Avenue/Airport Boulevard
  3. Miller Avenue/Spruce Avenue
  4. Grand Avenue Overcrossing/Dubuque Avenue
  5. East Grand Avenue/Grand Avenue Overcrossing
  6. East Grand Avenue/Gateway Boulevard
  7. Grand Avenue/Spruce Avenue
  8. Grand Avenue/Maple Avenue
  9. Grand Avenue/Linden Avenue
  10. Grand Avenue/Airport Boulevard
  11. East Grand Avenue/Poletti Way/US-101 NB off-ramp (Side-Street Yield-Controlled)
  12. Baden Avenue/Linden Avenue
  13. Baden Avenue/Airport Boulevard
  14. San Mateo Avenue/Produce Avenue/South Airport Boulevard
  15. South Airport Boulevard/Gateway Boulevard
  16. US-101 NB Ramps/Wonder Color Lane/South Airport Boulevard
- Freeway Segments
  1. US-101 North of Oyster Point Boulevard
  2. US-101 Oyster Point Boulevard to Airport Boulevard/Grand Avenue
  3. US-101 Airport Boulevard/Grand Avenue to South Airport Boulevard
  4. US-101 South Airport Boulevard to I-380

  <u>On-Ramps</u>
  1. Northbound on-ramp from Grand Avenue/Airport Boulevard
  2. Northbound on-ramp from South Airport Boulevard
  3. Southbound on-ramp from Produce Avenue

  <u>Off-Ramps</u>
  1. Southbound off-ramp to Airport Boulevard/Miller Avenue
  2. Northbound off-ramp to East Grand Avenue/Poletti Way
  3. Southbound off-ramp to South Airport Boulevard/Produce Avenue
  4. Northbound off-ramp to South Airport Boulevard

Source: Fehr & Peers, 2014.

Figure 4.10-1

Study Intersections and Freeway Segments

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Analysis Scenarios

Study intersection and the freeway segment operations were evaluated during the time periods when traffic volumes are highest, i.e., during the hours when morning and evening traffic is highest between 7:00 to 9:00 AM and 4:00 to 6:00 PM. The operations of these facilities were evaluated for the following scenarios:

- **Existing Conditions:** Existing traffic volumes on local roadways were obtained from counts collected in 2008 for the East of US-101 Traffic Study (TJKM 2011) supplemented with counts collected in 2013. Several 2008 counts were cross referenced with 2013 counts and factored up to better represent current levels of traffic. Mainline freeway volumes were obtained from the California Department of Transportation (Caltrans) Performance Measurement System (PeMS) database (2013), and ramp volumes were obtained from the East of US-101 Traffic Study and newly collected intersection counts where applicable.
- **Existing Plus Project Conditions:** Existing traffic volumes plus new traffic from the project.
- **Cumulative No Project Conditions:** Projected conditions in 2035 without the project.
- **Cumulative Plus Project Conditions:** Projected conditions in 2035 with the project.

Table 4.10-1 (Land Use Assumptions for the Specific Plan) shows the land uses included in the proposed project for the West and East portions of the study area. As all existing land uses are estimates based on field observations, numbers have been rounded for conservative analysis. Land use categories have been summarized to match the categories used in trip generation calculations:

- Residential land use includes all single family and multi-family housing.
- Office/R&D land use includes all office, and half of business commercial, as well as all future research and development land use.
- Commercial land use includes all general retail and hotel (existing) and half of business commercial. Other includes institutional, public and industrial land uses.

The trip generation is calculated separately for the West and East sub-areas, as their different land use mixes will have different trip generation characteristics. The West portion of the study area includes all of Downtown, and the adjacent residential and mixed uses located west of Airport Boulevard and north of Railroad Avenue. The East portion of the study area includes all of the land uses east of Airport Boulevard and south of Railroad Avenue, most of which are separated from the West area by the Caltrain tracks and are more directly connected to the local street network east of the Caltrain tracks. The West and East sub-areas are shown on Figure 4.10-5A (External Trip Distribution [West]) and Figure 4.10-5B (External Trip Distribution [East]), below. While these land uses are summarized separately for West and East sub-areas in order to calculate trip generation totals, all traffic is distributed across the full study area road network for the traffic analysis.

Table 4.10-1 Land Use Assumptions for the Specific Plan

Land Use Category[a]	*Existing*	*Proposed New Development*	*Total (Existing + Project)*
West			
Residential (du)	1,440	1,435	2,842
Office and R&D (ksf)	219	133	352
Commercial/Other (ksf)	1,182	255	1,437
East			
Residential (du)	0	33	33
Office and R&D (ksf)	136	1,375	1,511
Commercial/Other (ksf)	738	225	962

SOURCE: Transportation Research Board, 2000. Highway Capacity Manual—Special Report 209.

du = dwelling unit; ksf = thousand square feet

a. Land use categories have been summarized as follows: residential land use includes all single family and multi-family housing; office/R&D land use includes all office, and half of business commercial, as well as all future research and development land use; commercial land use includes all general retail and hotel (existing) and half of business commercial. Other includes institutional, public and industrial land uses.

Analysis Methods

Evaluation of traffic conditions on local streets involves analysis of intersection operations, as intersections represent the locations where the roadway capacity is most constrained. Intersection and freeway mainline segment operations were evaluated with level of service calculations. Level of service (LOS) is a qualitative description of operations ranging from LOS A, when the roadway facility has excess capacity and vehicles experience little or no delay, to LOS F, where the volume of vehicles exceeds the capacity, resulting in long queues and excessive delays. Typically, LOS E represents "at-capacity" conditions and LOS F represents "over-capacity" conditions. At signalized intersections operating at LOS F, for example, drivers may have to wait through multiple signal cycles to proceed.

The sixteen study intersections and eleven freeway segments were analyzed during the AM and PM peak hours. Study intersections were analyzed using the Highway Capacity Manual (HCM) 2000 methodology and the Synchro traffic analysis software. Synchro is commonly used for isolated intersections analysis per the HCM guidelines. Mainline US-101 segments were analyzed using volume to capacity ratios per HCM 2010 methodology. Each method is briefly described below. US-101 ramp capacity analysis was analyzed by comparing the volume to the Caltrans maximum acceptable limits for ramp capacities.

HCM 2000 methodology was chosen for intersection analysis based on direction from City staff and to maintain consistency with adopted guidelines and previous studies. For intersection analysis, the HCM 2010 methodology includes multimodal LOS, which has not yet been reviewed, approved, or adopted by the City of South San Francisco. HCM 2010 methodology was selected for freeway analysis based on recent guidance from Caltrans, the controlling operator of US-101.

Vehicle Queuing at Intersections

Chapter 16 of the HCM 2000 outlines a methodology for calculating the 95th percentile queues at signalized intersections. The 95th percentile queue indicates that vehicle backups for each movement will

only extend beyond this length 5 percent of the time during the analysis hour. 95th percentile vehicle queues were analyzed for study intersections in the vicinity of freeway interchanges. The Synchro software program has been used to determine 95th percentile vehicle queues in accordance with the HCM 2000 methodology.

Signalized Intersections

The method from HCM Chapter 16 bases signalized intersection operations on the average control delay experienced by motorists traveling through it. Control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. This method uses various intersection characteristics (such as traffic volumes, lane geometry, and signal phasing) to estimate the average control delay. Table 4.10-2 (Signalized Intersection LOS Criteria) summarizes the relationship between average delay per vehicle and LOS for signalized intersections according to the 2000 HCM methodology.

Table 4.10-2 Signalized Intersection LOS Criteria

Level of Service	*Description*	*Average Control Delay per Vehicle (Seconds)*
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10 and ≤ 20
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20 and ≤ 35
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volume-to-capacity (v/c) ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35 and ≤ 55
E	Operations with high delay values indicating poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55 and ≤ 80
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80

SOURCE: Transportation Research Board, *Highway Capacity Manual—Special Report 209* (2000).

Unsignalized Intersections

Traffic conditions at the unsignalized study intersections (stop sign and yield sign-controlled intersections) were evaluated using the method from 2000 HCM Chapter 17. With this method, operations are defined by the average control delay per vehicle (measured in seconds) for each stop-controlled movement or movement that must yield the right-of-way. At four-way stop-controlled intersections, the control delay is calculated for the entire intersection and for each approach. The delays and corresponding LOS for the entire intersection are reported. At two-way stop-controlled intersections the movement with the highest delay and corresponding LOS is reported. Table 4.10-3 (Unsignalized Intersection LOS Criteria) summarizes the relationship between delay and LOS for unsignalized intersections. Generally, the delay ranges for each LOS are lower than for signalized intersections because drivers expect to have less delay at unsignalized intersections.

Table 4.10-3 Unsignalized Intersection LOS Criteria

Level of Service	*Description*	*Average Control Delay Per Vehicle (Seconds)*
A	Little or no traffic delays	≤ 10
B	Short traffic delays	> 10 and ≤ 15
C	Average traffic delays	> 15 and ≤ 25
D	Long traffic delays	> 25 and ≤ 35
E	Very long traffic delays	> 35 and ≤ 50
F	Extreme traffic delays with intersection capacity exceeded	> 50

SOURCE: Transportation Research Board, *Highway Capacity Manual—Special Report 209* (2000).

Freeway Mainline Operations

Freeway segments on US-101 are analyzed using volume-to-capacity (v/c) ratios. The capacities of the study freeway facilities were obtained from the 2010 HCM. According to the HCM, for a freeway segment with minimum 12-foot travel lane widths, 6-foot shoulder widths, 2-foot median lateral clearance, a traffic stream composed entirely of passenger cars, interchange spacing greater than 2 miles, level terrain, and a driver population composed principally of regular users, the ideal freeway capacity is 2,400 vehicles per hour per lane. However, segments of US-101 through the study area have many features that reduce the capacity flow rates from the ideal, including:

- Heavy vehicles, including trucks, buses, and recreational vehicles, represent approximately 6 percent of vehicles on US-101
- Locations with short merge distances for on-ramps
- Interchange spacing substantially less than 2 miles

Through the Specific study area, US-101 is four lanes in each direction. Table 4.10-4 (Freeway Segment LOS Criteria) summarizes the relationship between v/c and LOS for freeway segments.

Freeway Ramp Operations

Freeway on- and off-ramps on US-101 are analyzed by comparing the ramp volume to the Caltrans maximum acceptable limit for ramp capacity, which is 1,500 vehicles per hour for one-lane off-ramps, 3,000 vehicles per hour for two-lane off-ramps, 2,000 vehicles per hour for one-lane on-ramps, and 3,300 vehicles per hour for two-lane on-ramps, as outlined in the 2010 HCM.

4.10.2 Existing Conditions

This section describes the existing transportation system in the study area encompassing the project site. First, the major components of the transportation system are described. Then the existing AM and PM peak-hour traffic volumes and lane configurations for the study intersections are presented, followed by the operational analysis results (LOS calculations). Existing freeway volumes and operations are also presented.

Table 4.10-4 Freeway Segment LOS Criteria

Level of Service	*Description*	*Maximum Volume-to-Capacity Ratio*
A	Free flow operations with average operating speeds at, or above, the speed limit. Vehicles are unimpeded in their ability to maneuver.	0.30
B	Free flow operations with average operating speeds at the speed limit. Ability to maneuver is slightly restricted. Minor incidents cause some local deterioration in operations.	0.50
C	Stable operations with average operating speeds near the speed limit. Freedom to maneuver is noticeably restricted. Minor incidents cause substantial local deterioration in service.	0.71
D	Speeds begin to decline slightly with increasing flows. Freedom to maneuver is more noticeably restricted. Minor incidents create queuing.	0.89
E	Operations at capacity. Vehicle spacing causes little room to maneuver but speeds exceed 50 miles per hour (mph). Any disruption to the traffic stream can cause a wave of delay that propagates throughout the upstream traffic flow. Minor incidents cause serious breakdown of service with extensive queuing. Maneuverability is extremely limited.	1.00
F	Operations with breakdowns in vehicle flow. Volumes exceed capacity causing bottlenecks and queue formation.	N/A

SOURCE: Transportation Research Board, *Highway Capacity Manual* (2010).
a. Freeway mainline LOS based on a 65 mph free-flow speed.

Public Transit System

Public transit services in the study area include local buses, express buses, shuttles, BART, Caltrain and ferry service, as shown on Figure 4.10-2 (Existing and Proposed Transit System). This figure shows both existing and proposed transit service for the project study area. A majority of the public transit trips through the area are commuters who use the Caltrain station or connect from BART to Downtown and East of US-101 employers via employer shuttles.

Caltrain

Caltrain operates 50 miles of commuter rail between San Francisco and San Jose, and limited service trains to Morgan Hill and Gilroy during weekday commute periods. The South San Francisco Caltrain Station is currently located at 590 Dubuque Avenue, on the east side of US-101, immediately north of East Grand Avenue. It is located just across the highway from the east edge of Downtown South San Francisco, and at the west transition to the East of US-101 area. This station is located within Zone 1 of the Caltrain commuter rail corridor, just over 9 miles from the northern terminus at King Street Station in San Francisco. It serves local and limited stop trains and provides access to commuters with South San Francisco origins, East of US-101 area destinations, and commuters connecting from the newly established ferry service at Oyster Point Ferry Terminal.

The South San Francisco Caltrain Station serves local and limited trains, with 23 northbound and 23 southbound weekday trains. Weekday peak commute headways are between 20 and 60 minutes, with more frequent service for AM northbound and PM southbound trips. During weekday peak commute periods at least one train per hour provides connections to all other Caltrain stations, and several additional trains provide limited service to major hub stations or local train transfer points. The South San Francisco Caltrain Station provides weekday service from 5:40 AM to 12:00 midnight, with 60-minute

headways during off-peak times. Weekend trains run with 60-minute headways at all times, from approximately 8:00 AM to 12:00 midnight on Saturdays and 9:00 AM to 10:00 PM on Sundays.

Travel times between South San Francisco and San Francisco are approximately 15 to 20 minutes and travel times between South San Francisco and San Jose are approximately 60 to 75 minutes for local and limited stop services. Caltrain's Baby Bullet express service does not currently serve the South San Francisco Station. Currently, approximately 360 passengers board and alight daily at the South San Francisco Caltrain station on weekdays (just under 1 percent of the average weekday ridership system total). More passengers get off the train at South San Francisco during morning commute hours and board at South San Francisco during evening commute hours. Weekday ridership has fluctuated from year to year, and has increased approximately 10 percent since 2009.

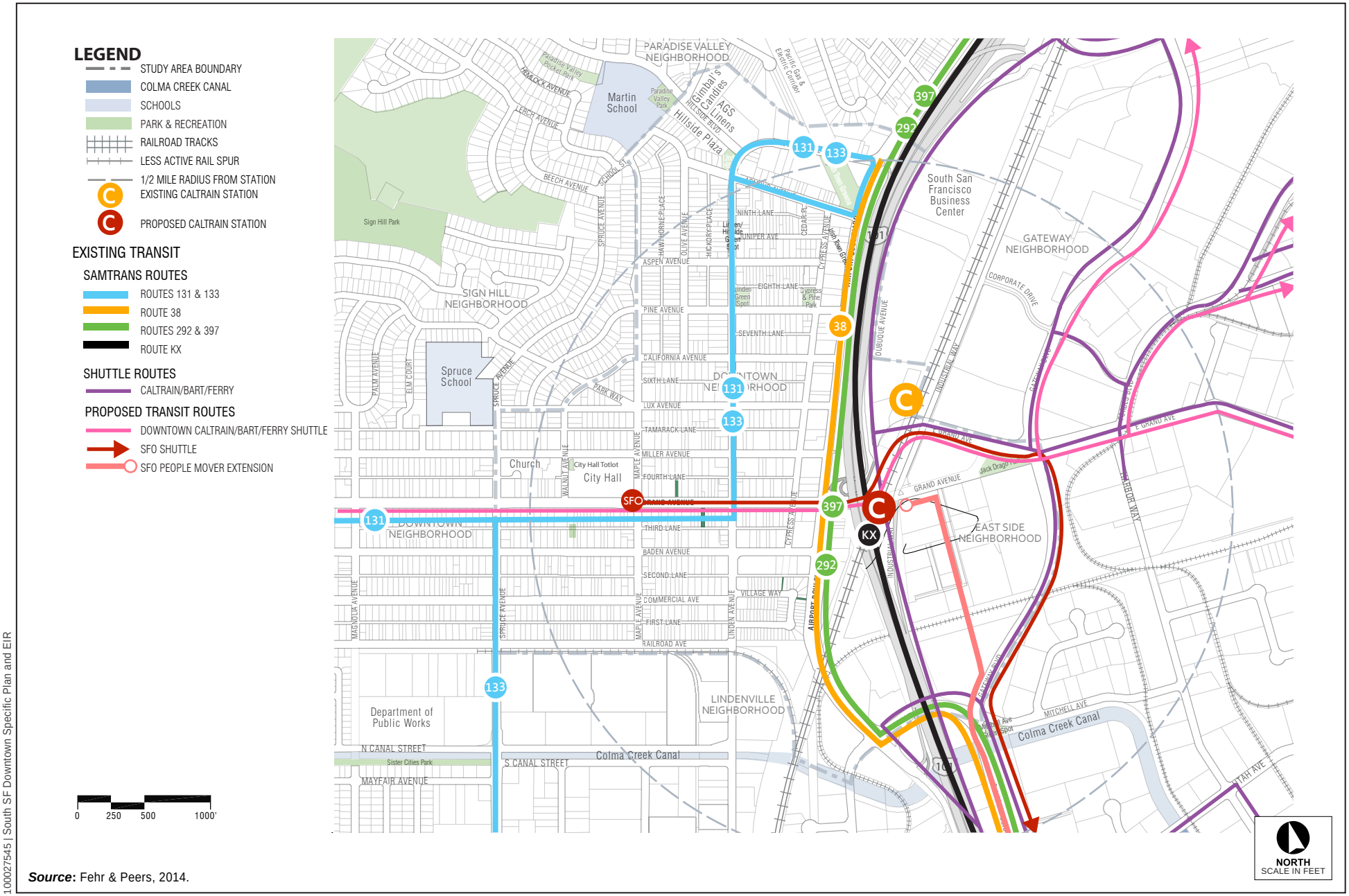
Approximately 50 daily passengers board with bikes. Lockable, sheltered bike parking is provided adjacent to the station platform, and bus and shuttle connections are provided at the station. The immediate 0.5-mile area surrounding the South San Francisco Caltrain Station includes a diverse mix of land uses, including commercial, industrial, institutional, public, residential, and vacant properties, and nearly all of the South San Francisco Priority Development Area Study Area. There are a wide variety of land uses that serve as origins and destinations for Caltrain patrons.

Most of the immediately adjacent land uses surrounding the station to the north, east and south are low density commercial office park and light industrial. Genentech, a major regional employer, is located 2 miles east of the station at the bayshore, and many other employers are located in the office park development between the station and the waterfront. Employer sponsored shuttles connect to employment destinations east of the station and other commuter connections in the area. These shuttles are available to individual riders not associated with sponsor employers for a monthly fee.

Bus Service

Bus service in South San Francisco is provided by SamTrans. SamTrans operates five bus lines that serve Downtown South San Francisco:

- SamTrans 38 stops at the Airport Boulevard/Linden Avenue intersection, and connects to Safe Harbor, Colma BART station, and San Bruno BART station. This line provides limited northbound service between 6:00 AM and 7:00 AM, and limited southbound service between 4:45 PM and 7:15 PM.
- SamTrans 131 stops at the Linden Avenue/Airport Boulevard intersection, and connects to Downtown South San Francisco, South San Francisco BART station, and Daly City. This line provides service in both directions between 5:45 AM and 10:45 PM with 15-minute headways during peak weekday hours.
- SamTrans 133 stops at the Linden Avenue/Airport Boulevard intersection and connects to Downtown South San Francisco and San Bruno BART station. This line provides service in both directions between 6:00 AM and 7:00 PM with 30-minute headways during peak weekday hours.



Source: Fehr & Peers, 2014.

Figure 4.10-2

Existing and Proposed Transit System

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- SamTrans 292 stops at the Airport Boulevard/Grand Avenue, Airport Boulevard/Baden Avenue, and Airport Boulevard/Linden Avenue intersections and connects to San Francisco to the north and Hillsdale/San Mateo to the south. This line provides service in both directions between 4:00 AM and 2:00 AM, with 20- to 30-minute headways during peak weekday hours.
- SamTrans 397 stops at the Airport Boulevard/Baden Avenue intersection, and connects to San Francisco to the north and Palo Alto to the south. This line provides service between 1:00 AM and 6:00 AM with 60-minute headways.

Additional commuter bus service is provided by Peninsula Alliance. These provide commuter connections between the Caltrain Station and East of US-101 employers:

- Oyster Point Shuttle connects the Caltrain station to Oyster point, Forbes Boulevard and Eccles Avenue. This line provides service during peak commute hours, between 6:30 AM and 10:00 AM, and between 3:00 PM and 6:00 PM with 30-minute headways.
- Utah-Grand Shuttle connects the Caltrain station to East Grand Avenue and Utah Avenue. This line provides service during peak commute hours, between 5:30 AM and 9:30 AM, and between 4:00 PM and 6:15 PM with 30-minute headways.

BART

Bay Area Rapid Transit (BART) operates regional rail in the Bay Area, connecting between San Francisco International Airport and Millbrae Intermodal Station to the south, San Francisco to the north, and Oakland, Richmond, Pittsburgh/Bay Point, Dublin/Pleasanton and Fremont in the East Bay. The BART stations closest to the South San Francisco Caltrain station area are the San Bruno Station located near Huntington Avenue east of El Camino Real, and the South San Francisco Station, located on Mission Road and McLellan Drive. Both stations are located within 3 miles of the Caltrain station, and SamTrans provides service from the stations to Downtown South San Francisco. BART trains operate on 15-minute headways during peak hours and 20-minute headways during off-peak hours.

Ferry Services

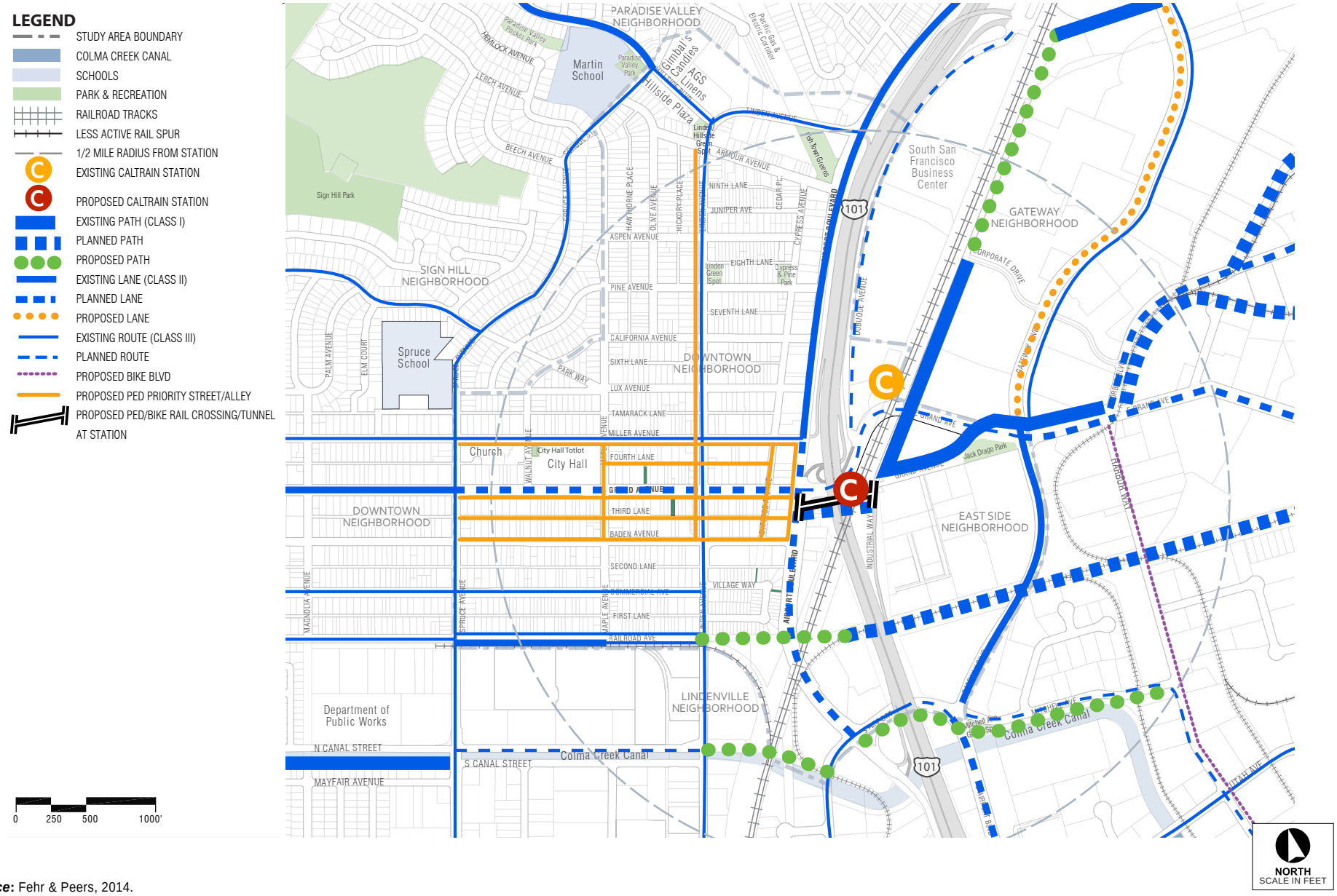
In addition to the regional train and BART service, and local bus service, ferry service is provided via the South San Francisco Ferry Terminal, which provides commuter service connecting to the Oakland/Alameda terminal. There are three morning departures from Oakland/Alameda to South San Francisco, and two evening departures from South San Francisco to Oakland/Alameda. There are free shuttles open to the public that connect the South San Francisco Ferry Terminal to the Utah-Grand and Oyster Point area office buildings during the commute hours.

Bicycle System

The City of South San Francisco adopted its Citywide bicycle master plan in 2010. The major theme of the plan was to expand the bicycle network to make it easier and safer for people to bicycle through the City. The plan also had a goal of encouraging bicycling by promoting bicycling within transportation demand management ordinances and with local committees, such as the Bicycle and Pedestrian Advisory Committee. Bicycles are an important component of any city's transportation network. Cities throughout the Bay Area continue to experience strong growth in bicycling as a means of transportation. South San

Francisco has a network of signed bicycle routes consisting of several different types of facilities, including San Mateo County Bikeway System (San Mateo County 2000) numbered routes. These facilities are based on Caltrans standards, which provide for three distinct types of bikeway facilities, as generally described below, and shown in Figure 4.10-3 (Existing and Proposed Pedestrian and Bicycle Facilities):

- **Class I Bikeway (Multi-Use Path):** Class I bikeways have independent rights-of-way physically separated from vehicle travel lanes. Motorized vehicle activity is prohibited. Paths are typically 10 to 12 feet wide.
  - > **Grand Avenue** has a Class II bike path that extends from Poletti Way, crosses over East Grand Avenue and ending at Harbor Way. This path connects to the Class II bike lanes that begin on Gateway Boulevard south of Grand Avenue. This path is physically separated from the roadway and sidewalk by a landscape strip; however, at signalized intersections bicyclists must use crosswalks with pedestrians.
- **Class II Bikeway (Bike Lane):** Class II bike lanes are on-street lanes dedicated and demarcated for bicycle travel. A bicycle lane is a portion of a road or highway that is designated by striping, signing, and pavement markings to provide preferential or exclusive use of the lane by bicyclists. Bike lanes are typically four to six feet wide. Due to their multi-modal function, improved roadway maintenance is particularly important to improve rider safety. In some cases, a curbside parking lane can be striped to allow a shared parking lane and bicycle travel. This is typically done in areas where a full bicycle lane is not feasible; however, it is discouraged where alternative means of providing a bicycle lane are possible. Numbered routes are part of the San Mateo County Bikeway System.
  - > **Airport Boulevard** is part of Bicycle Route 15 and has Class II bike lanes in both directions that begin north of Miller Avenue. These lanes connect to the Class III bicycle routes on Miller Avenue and Linden Avenue.
  - > **Gateway Boulevard** is designated as Bicycle Route 5 and has Class II bike lanes in both directions which begin south of Grand Avenue and extend to South Airport Boulevard.
  - > **Grand Avenue** has Class II bike lanes in both directions that begin west of Spruce Avenue. These lanes connect to the Class III bicycle route on Spruce Avenue.
  - > **Railroad Avenue** has a Class II bike lane in the eastbound direction that extends east from Spruce Avenue to Maple Avenue, after which it becomes a Class III bicycle route with sharrows. This lane connects to the Class III bicycle route on Spruce Avenue.
  - > **Hillsdale Boulevard** is designated as Bicycle Route 82 and has Class II bike lanes in both directions that begin west of Spruce Avenue to Sister Cities Boulevard. These lanes connect to the Class III bicycle route on Spruce Avenue.



Source: Fehr & Peers, 2014.

Figure 4.10-3

Existing and Proposed Pedestrian and Bicycle Facilities

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- **Class III Bikeway (Bike Route):** Class III bikeways provide for a right-of-way designated by signs or pavement markings for shared use with pedestrians or motor vehicles. These are often located along roadways where dedicated bicycle lanes cannot fit or are not needed (for example, on a low volume street), but where providing continuity in a bicycle system is nevertheless important. A shared-use arrow, or "sharrow," can be marked in the outside lane on a Class III route to show the suggested path of travel for bicyclists. This is often done when the route has on-street parking, in order to encourage cyclists to ride a safe distance away from the parked vehicles' "door zone." Many of South San Francisco's Class III bikeways are not marked with sharrows, but are designated local bicycle routes. Numbered routes are part of the San Mateo County Bikeway System.
  - > **San Mateo Avenue** is part of Bicycle Route 15 and is a Class III bicycle route without sharrow markings. The route extends south from Airport Boulevard past South Linden Avenue, connecting to the Class III bicycle route on Linden Avenue.
  - > **Linden Avenue** is designated as a Class III bicycle route without sharrow markings. The route extends south from Airport Boulevard to San Mateo Avenue, connecting to the Class III route on that roadway.
  - > **Spruce Avenue** is designated as a Class III bicycle route without sharrow markings. The route extends south from Hillsdale Boulevard to El Camino Real. The route connects to Class II bicycle lanes on Hillsdale Boulevard, Grand Avenue, and Railroad Avenue and Class III routes on Hillsdale Boulevard, Park Way, and Commercial Avenue.
  - > **Hillsdale Boulevard** is designated as Bicycle Route 82 and is a Class III bicycle route without sharrow markings between Spruce Avenue and Linden Avenue. The route on Hillsdale Avenue connects the Class III routes on these streets.
  - > **Park Way** is designated as a Class III bicycle route without sharrow markings. The route extends west from Spruce Avenue to Orange Avenue, where it connects to the Class III route on that roadway.
  - > **Miller Avenue** is designated as a Class III bicycle route without sharrow markings. The route extends west from Airport Boulevard to Chestnut Avenue, passing by City Hall. The route connects to Class II bicycle lanes on Airport Boulevard and Class III routes on Linden Avenue and Spruce Avenue.
  - > **Commercial Avenue** is designated as Bicycle Route 80 and is a Class III bicycle route without sharrow markings. The route extends west from Linden Avenue to Chestnut Avenue, connecting to other Class III routes on Linden Avenue and Spruce Avenue.
  - > **Railroad Avenue** is designated as a Class III bicycle route with sharrow markings. The route extends west from Linden Avenue to Orange Avenue, connecting to Class III routes on Linden Avenue, Spruce Avenue, and Orange Avenue.

Bicycle access improvements are proposed throughout the study area as a part of the South San Francisco Bicycle Master Plan and Specific Plan. Proposed improvements associated with other plans or potential projects in and adjacent to the study area are included in Figure 4.10-3.

Pedestrian Facilities

West of US-101, the Downtown area has a dense street grid and generally good walkability. Sidewalks are provided on all streets. Grand Avenue has several special pedestrian treatments, such as mid-block crosswalks, special pavement markings at crosswalks, curb extensions, and pedestrian scale lighting to make the street more attractive. Grand Avenue also has cut-ins for angled parking. Some streets have narrow sidewalks (e.g., Baden Avenue) or unmaintained sidewalks. The City recently adopted a Pedestrian Master Plan in February 2014 to identify and prioritize pedestrian infrastructure improvements throughout the City, as well as to provide general design guidance for facilities.

East of US-101, the larger street grid makes walking less desirable because routes can be circuitous and long. Additionally, Grand Avenue and Produce Avenue/South Airport Boulevard are the only two pedestrian connections between the west and east sides of US-101 in the study area. Streets east of US-101 do not always have sidewalks, and in some locations, sidewalks meander and do not follow the street. Additionally, many of the wider streets in the East of US-101 area have long pedestrian crossings that increase pedestrian delay at intersections. Some streets in the east of the US-101 area (Poletti, Grand, Gateway) have side paths that could be used for pedestrian activity, but in some cases they are not well marked or maintained.

Pedestrian access improvements are proposed in the area covered under the Specific Plan and citywide under the South San Francisco Pedestrian Master Plan. The plan calls for area-wide improvements, such as establishing a Downtown pedestrian-priority zone, making pedestrian-friendly alley improvements to Downtown lanes and completing the street grid to reduce block lengths immediately surrounding the Caltrain station. Downtown improvements include widening of sidewalks, improved pedestrian crossings, pedestrian-scaled lighting, street trees and planting, street furniture and amenities, wayfinding signage and public art. The Pedestrian-Friendly and Accessible Design Standards (November 2012) provide detailed guidance, and principle and specific intersection improvements are outlined in the Specific Plan. Pedestrian-priority streets and alleys and the pedestrian and bicycle rail crossing underpass connecting the Grand Avenue/Airport Boulevard intersection to the new Caltrain station, are shown in Figure 4.10-3.

Roadway Network

Regional auto access to the study area is provided by US-101, I-280, and SR-82 (El Camino Real) while local access is provided by several arterials and collector streets.

The South San Francisco General Plan defines major and minor arterials throughout the City. Major arterials located within the study area include: Grand Avenue (east of Airport Boulevard), Airport Boulevard, Gateway Boulevard, Produce Avenue, and South Airport Boulevard (Oyster Point Boulevard and Sister Cities Boulevard are located outside of the study area, immediately north). Minor arterials within the station study area are: Linden Avenue, Grand Avenue (west of Airport Boulevard), Spruce Avenue (south of Grand Avenue), Harbor Way and Forbes Boulevard.

South San Francisco collectors connect arterials with local streets. Collector streets within the study area are Miller Avenue, Spruce Avenue (north of Grand Avenue), Baden Avenue (west of Linden Avenue),

Commercial Avenue, Park Way, Maple Avenue between Park Way and Grand Avenue, Dubuque Avenue and Mitchell Avenue.

Local streets provide direct access to abutting properties. The dense street grid network west of US-101 is primarily local streets, and several local streets connect major arterials east of US-101. Select roadways in the study area are described in further detail below.

US-101 is the major freeway through eastern San Mateo County between San Francisco and San Jose and bisects the study area. It is the primary north/south route connection to I-280 and I-80 north of South San Francisco. South San Francisco has multiple on- and off-ramps and some of these ramps provide access to specific neighborhoods that are only accessible via circuitous routes on the local street network. US-101 is typically congested in both directions during both peak periods as people commute to and from San Francisco and the Silicon Valley.

Grand Avenue is the Downtown area's "main street" and is one of the few continuous east/west routes through the City. Within the Downtown area west of US-101, Grand Avenue has one travel lane in each direction with on-street angled parking on both sides of the street. Grand Avenue is a major connection to the US-101 Northbound on-ramp located at Airport Boulevard. East of US-101, Grand Avenue widens to six lanes (three in each direction) and crosses under US-101 and over the Caltrain right-of-way. Grand Avenue continues east to the Bay. SamTrans operates along Grand Avenue west of Linden Avenue. Previous streetscape improvements have made Grand Avenue east of Spruce Avenue a pedestrian-focused commercial Downtown with decorative sidewalks, mid-block crosswalks, landscaping, and pedestrian-scale lighting. West of Spruce Avenue to Chestnut Avenue, Grand Avenue has Class II bike lanes in both directions. However, front-in angled parking and generally higher traffic volumes (particularly eastbound between Linden and Airport) make Grand Avenue more stressful or uncomfortable for bicyclists because front-in angled parking limits visibility between drivers exiting spaces and bicyclists vying for limited right-of-way with vehicle traffic.

Airport Boulevard is a major north/south arterial route through South San Francisco parallel to US-101. North of Grand Avenue, Airport Boulevard has two travel lanes in each direction and Class II bicycle lanes. There is on-street parking on the west side of the street and a planted median. SamTrans operates several routes along Airport Boulevard. Northbound traffic can use Airport Boulevard to connect to US-101 on-ramps at Grand Avenue and north of Sister Cities Boulevard. South of Grand Avenue, Airport Boulevard has three travel lanes in each direction and no on-street parking. Curbside lanes are generally much wider in this segment. Although the bicycle master plan shows bicycle lanes on this segment, they have not been striped. The higher speed traffic (35 mph) and multiple travel lanes generally make bicycling less attractive on this segment. Airport Boulevard connects to San Mateo Avenue and Produce Avenue, where it turns east to become South Airport Boulevard. South Airport Boulevard connects to the San Francisco International Airport, as well as a number of other industrial and "big-box" commercial uses. Airport Boulevard also passes under the Caltrain right-of-way. Airport Boulevard is currently a designated truck route through the City; however, the City has analyzed and considered removing this designation and remove trucks from Airport Boulevard and the US-101 off-ramp at Miller Avenue.

Spruce Avenue is a north/south collector street north of Grand Avenue and as a minor arterial south of Grand Avenue. It provides access from residential areas in South San Francisco to the Lindenville industrial area and El Camino Real corridor to the south. North of Railroad Avenue, Spruce Avenue has one travel lane in each direction and on-street parking is allowed on both sides of the street in most areas. South of Railroad Avenue, Spruce Avenue has two travel lanes in each direction and on-street parking is prohibited. Spruce Avenue is classified as a Class III bike route, but does not have sharrow markings.

Maple Avenue is a north/south, two-lane collector street one block west of Linden Avenue. Outside of this segment, it is classified as a local street. It provides north/south access to residential areas in South San Francisco between Linden Avenue and Spruce Avenue. On-street parking is provided on both sides of the street.

Linden Avenue is a two-lane north/south minor arterial. On-street parking is provided on both sides of the street in most areas. South of Grand Avenue, Linden Avenue provides access to the Lindenville industrial area and the City of San Bruno. North of Grand Avenue, Linden has several smaller retail and small office type uses. SamTrans operates on Linden Avenue north of Grand Avenue. At Baden Avenue, Linden Avenue has a wide double right-turn lane to allow vehicles, especially larger vehicles, to make a right turn. This makes the crosswalk longer and the eastern sidewalk narrower. Linden Avenue is a Class III bicycle route (without sharrow markings).

Dubuque Avenue is a north/south local street that parallels US-101 to the west, with one through lane in each direction and one left-turn lane for southbound traffic. Dubuque Avenue provides access to the South San Francisco Caltrain Station from Grand Avenue to the south and from Sister Cities Boulevard to the north.

Poletti Way is a one-way, northbound local street that parallels the Caltrain right of way to the west and Gateway Boulevard to the east. It has two travel lanes and on-street parking is prohibited.

Gateway Boulevard is a north/south major arterial that provides access to office parks north of Grand Avenue and industrial uses south of Grand Avenue. Gateway Boulevard has two travel lanes in each direction with a planted median. On-street parking is prohibited. Gateway Boulevard has Class II bike lanes in both directions between South Airport Boulevard and Grand Avenue.

Miller Avenue is an east/west collector street one block north of Grand Avenue. It is the primary access route to City Hall and the new Miller Avenue parking structure. Between Airport Boulevard and Spruce Avenue, there are very few driveways, and parking is limited between Linden Avenue and Maple Avenue. Sidewalks are generally narrow, particularly along the south side of the street between Maple Street and Spruce Avenue, making the pedestrian environment less attractive. As part of the Miller Avenue parking garage project, sidewalk improvements along the garage's frontage have widened the sidewalk and improved the streetscape somewhat; however, parking removal was required for this improvement. Miller Avenue is also classified as a Class III bicycle route (without sharrow markings). In general, the wider vehicle lanes allow for more space for bicyclists; however, the grade of the street going westbound and the speed of traffic generally makes cycling less attractive on this street.

Baden Avenue is an east/west road one block south of Grand Avenue that is classified as collector street west of Linden Avenue and as a local street east of Linden Avenue. Between Airport Boulevard and Linden Avenue, Baden Avenue has two travel lanes in each direction and no on-street parking. In this block, the southern sidewalk is narrow (4 feet). This block also connects vehicles traveling north on Linden Avenue to Airport Boulevard to access the northbound on-ramp at Grand Avenue. West of Linden Avenue, Baden has one lane and on-street parking in each direction. The portion west of Linden is predominately residential in character.

San Mateo Avenue is a north/south local street that connects South San Francisco to the Lindenville industrial area via Airport Boulevard. San Mateo Avenue has one travel lane in each direction and on-street parking is allowed. San Mateo Avenue is classified as a Class III bicycle route without sharrow markings.

Produce Avenue is a short north/south major arterial that becomes a Southbound US-101 on-ramp south of the intersection of Airport Boulevard. Produce Avenue has two southbound travel lanes and one northbound travel lane, with few on-street parking areas.

Intersection Traffic Volumes and Lane Configurations

Traffic count locations are illustrated in Figure 4.10-4A (Existing Intersection Peak-Hour Volumes, Lane Configurations, and Traffic Control Devices). Figure 4.10-4A and Figure 4.10-4B (Existing Intersection Peak-Hour Volumes, Lane Configurations, and Traffic Control Devices) show AM and PM peak hour vehicle turning movement counts, lane geometries, and intersection control for the study intersections. The counts were conducted during typical weekdays (Tuesday through Thursday) in 2008, June 2013, and October 2013 while schools were in session. The peak hour reflects the hour of the day that observes the highest traffic volumes for that intersection, typically occurring between 7:00–9:00 AM and 4:00–6:00 PM. The counts collected in 2008 and 2013 are shown in Appendix E (Traffic Data, Traffic Counts). Each study intersection was analyzed using existing lane configurations and existing traffic signal timing data provided by the City of South San Francisco or Caltrans.

Existing Intersection Operations

The City of South San Francisco defines LOS A through D as acceptable, and LOS E and F unacceptable. The following guidelines have been outlined in the City of South San Francisco General Plan (City of South San Francisco 1999):

- Strive to maintain LOS D or better on arterial and collector streets.
- Accept LOS E or F after finding that there is no feasible and practical way to mitigate the lower level of service, and the uses resulting in the lower level of service are of clear overall public benefit.
- Exempt development within 0.25 mile of a Caltrain of BART station or a ferry terminal from LOS standards.

The results of the existing intersection LOS analysis are presented in Table 4.10-5 (Existing Intersection LOS Results) and are included in Appendix E (Traffic Data, LOS Worksheets). The table shows that

during the AM and PM peak hours, the following intersection currently operates at an unacceptable level (LOS E or F):

12. Baden Avenue/Linden Avenue—LOS F during the PM peak hour

Table 4.10-5 Existing Intersection LOS Results

Intersection	*Control*	*AM Peak Hour*		*PM Peak Hour*	
		Delay[a]	*LOS*	*Delay[a]*	*LOS*
1. Miller Ave/Linden Ave	Signal	21.2	C	34.9	C
2. Miller Ave/Airport Blvd	Signal	28.2	C	19.3	B
3. Miller Ave/Spruce Ave	Signal	18.3	B	20.0	B
4. Grand Ave/Dubuque Ave	Signal	5.9	A	4.2	A
5. Grand Ave/E. Grand Ave	Signal	19.5	B	16.8	B
6. E. Grand Ave/Gateway Blvd	Signal	33.5	C	36.0	D
7. Grand Ave/Spruce Ave	Signal	16.5	B	19.2	B
8. Grand Ave/Maple Ave	Signal	9.3	A	9.7	A
9. Grand Ave/Linden Ave	Signal	11.5	B	12.7	B
10. Grand Ave/Airport Blvd	Signal	40.7	D	44.6	D
11. E. Grand Ave/US-101 NB off-ramp/Poletti Way	SSS	18.3	C	10.7	B
12. Baden Ave/Linden Ave	Signal	39.2	D	**0.92**	**F**
13. Baden Ave/Airport Blvd	Signal	26.7	C	29.6	C
14. San Mateo Ave/Airport Blvd	Signal	37.1	D	51.2	D
15. South Airport Blvd/Gateway Blvd	Signal	38.4	D	42.5	D
16. S. Airport/US-101 NB ramps/Wondercolor Lane	Signal	30.4	C	33.3	C

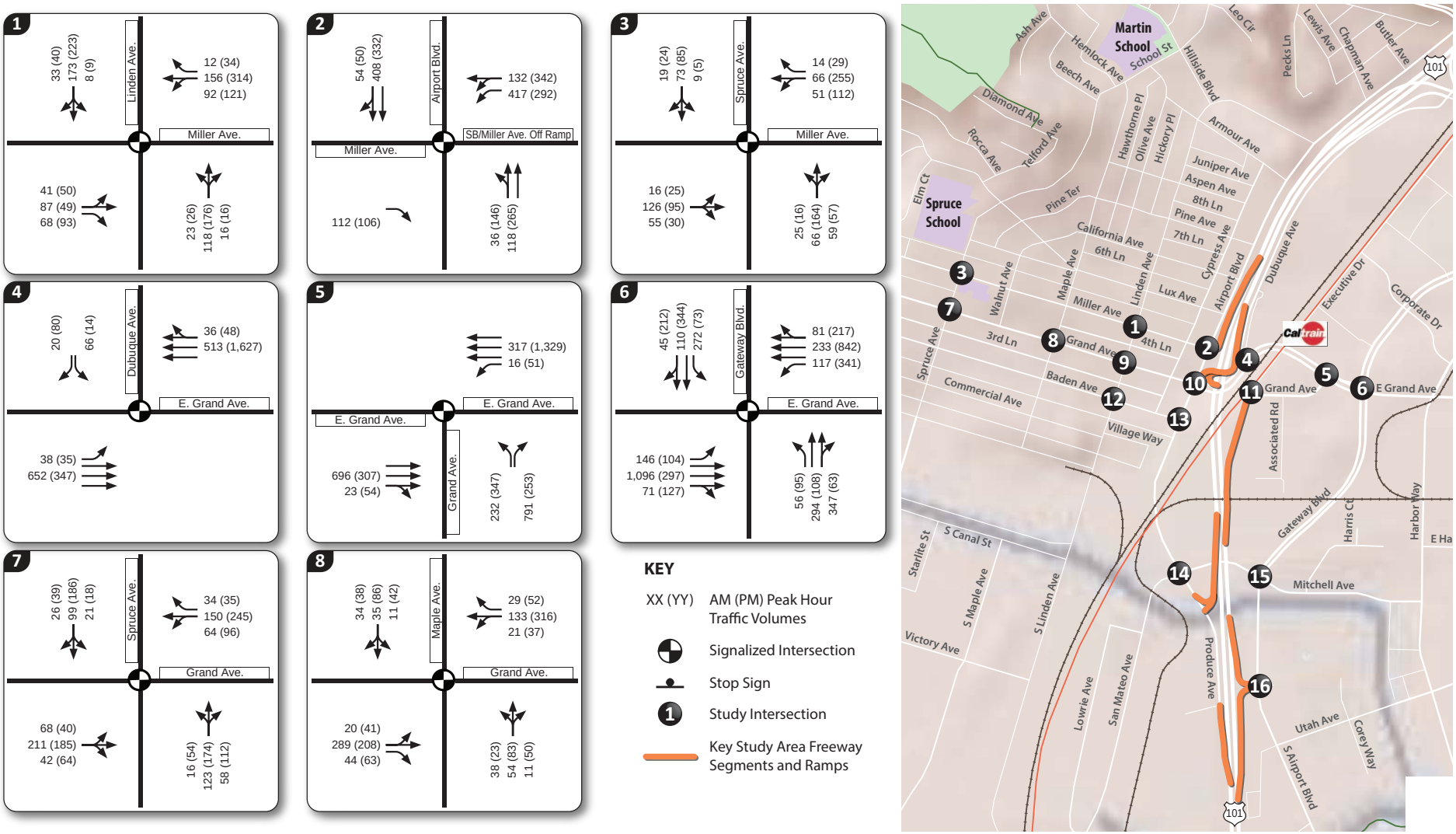
SOURCE: Fehr & Peers (2014).

Bold = unacceptable LOS; SSS = side-street stop

a. For signalized and all-way stop controlled intersections, the delay shown is the weighted average for all movements in seconds per vehicle. For side-street stop controlled intersection, the delay shown is the worst-operating approach delay. For intersections performing at LOS F, Volume/Capacity ratio for the overall intersection is shown in parentheses.

The poor intersection operations at the intersection of Baden Avenue and Linden Avenue during the PM peak hour is primarily due to the high westbound left-turn traffic volume and permitted signal phasing at this intersection.

In addition to this intersection, several intersections operate at LOS D during peak hours. Although LOS C or D conditions are typical during peak hours and considered acceptable by the City's General Plan, occasionally traffic operates at near-capacity conditions along Airport Boulevard. It is important to note that the LOS standard is calculated based on the average vehicle delay for all the vehicle movements over the course of the peak hour at the study intersections. Therefore, some vehicle movements may operate worse than the total intersection at different times of the peak hour, which causes congestion and queues to develop on some approaches but not others.

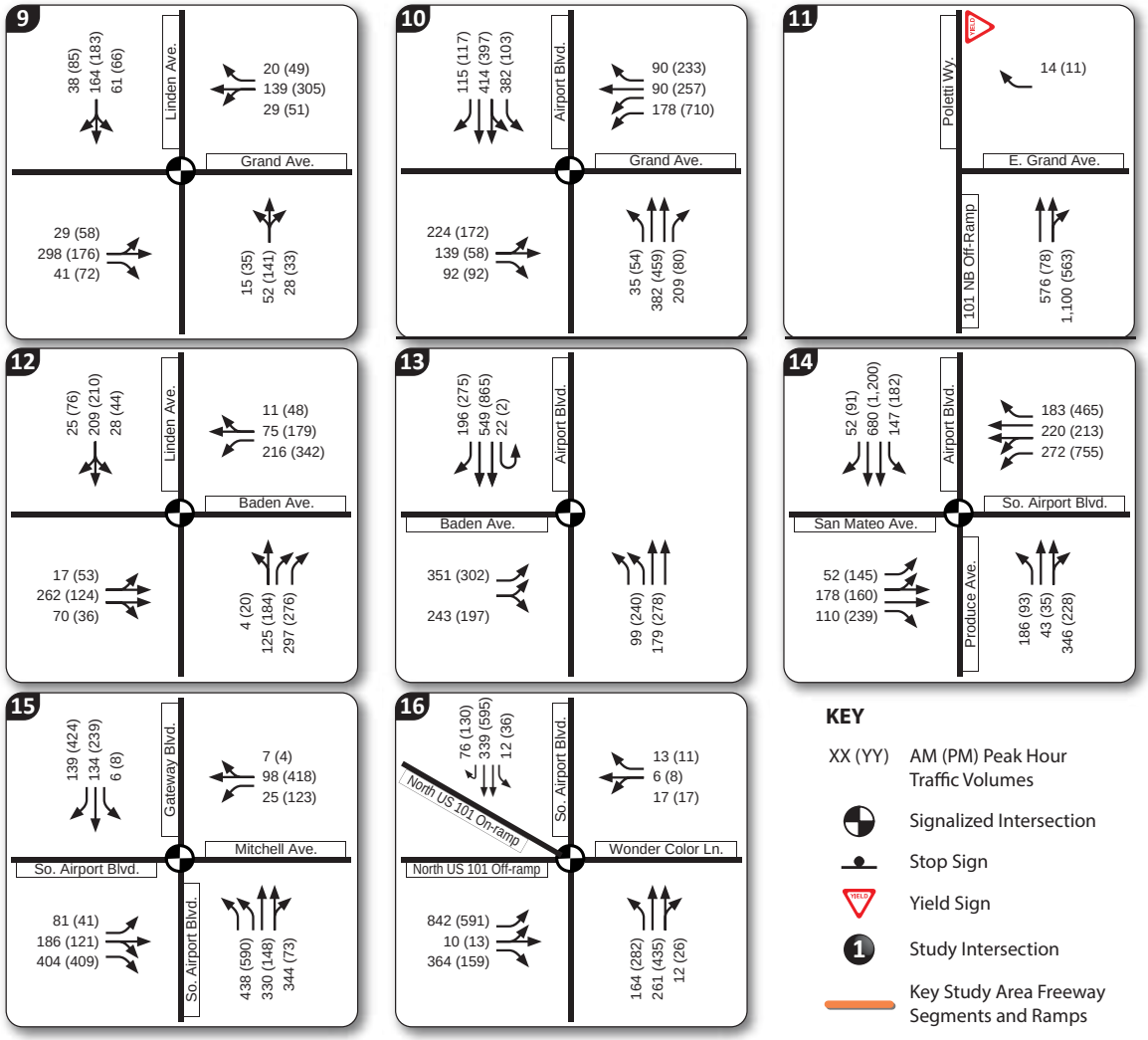


Source: Fehr & Peers, 2014.

Figure 4.10-4A

Existing Intersection Peak-Hour Volumes, Lane Configurations, and Traffic Control Devices

ATKINS



NORTH
NOT TO SCALE

Source: Fehr & Peers, 2014.

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Figure 4.10-4B

Existing Intersection Peak-Hour Volumes, Lane Configurations, and Traffic Control Devices

ATKINS

The existing intersection LOS results generally match observed congestion at the study intersections and are generally consistent with previous studies performed in the area.

The detailed LOS calculations for the vehicle movements at all study intersections are shown in Appendix E (Traffic Data, LOS Worksheets).

Existing Vehicle Queuing at Freeway Interchange Intersections

The standard adopted by the City of South San Francisco and Caltrans is that the 95th percentile vehicle queue must be accommodated within available storage for each off-ramp and on the approaches to intersections adjacent to or nearby off-ramp intersections that accommodate a significant amount of off-ramp traffic. In addition, no off-ramp traffic is allowed to back up to the freeway mainline during the entire AM or PM peak traffic hour. Ninety-fifth percentile vehicle queues were analyzed for six of the study intersections that were in the vicinity of freeway interchanges:

- #2: Miller Avenue/Airport Boulevard
- #10: Grand Avenue/Airport Boulevard
- #11: East Grand Avenue/Poletti Way/US-101 Northbound off-ramp
- #14: San Mateo Avenue/Produce Avenue/South Airport Boulevard
- #15: South Airport Boulevard/Mitchell Avenue/Gateway Boulevard
- #16: US-101 Northbound Ramps/Wonder Color Lane/South Airport Boulevard

The results of the existing intersection queuing analysis are presented in Table 4.10-6 (Existing Intersection Vehicle Queuing at Freeway Interchange Intersections). The table shows intersection movements that have 95th percentile queues that exceed their storage capacity during the AM and PM peak hours in **bold**. Currently the only intersection that has queues exceed storage is #14 San Mateo Avenue/Produce Avenue/South Airport Boulevard.

Table 4.10-6 Existing Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*	
		AM Peak Hour	*PM Peak Hour*
2. Miller Avenue/Airport Boulevard			
Eastbound Right Turn	680	124	68
Westbound Left Turn	465	213	153
Westbound Through	465	217	254
Northbound Through	220	77	82
Southbound Through	360	200	77

Table 4.10-6 Existing Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*	
		AM Peak Hour	*PM Peak Hour*
10. Grand Avenue/Airport Boulevard			
Eastbound Through	665	392	222
Eastbound Right Turn	665	38	39
Westbound Left Turn	670	49	425
Westbound Through	670	56	269
Westbound Right Turn	240	7	52
Northbound Left Turn	150	41	49
Northbound Through	410	188	261
Northbound Right Turn	410	119	15
Southbound Left Turn	390	334	118
Southbound Through	390	229	228
Southbound Right Turn	180	45	43
11. E. Grand Avenue/US-101 NB off-ramp/Poletti Way			
Side-Street Stop Intersection, no queues reported	—	—	—
14. San Mateo Avenue/Airport Boulevard			
Eastbound Left Turn	150	69	121
Eastbound Through	370	97	102
Eastbound Right Turn	150	49	104
Westbound Left Turn	225	196	**528**
Westbound Through	810	164	339
Westbound Right Turn	85	**100**	**250**
Northbound Left Turn	130	**177**	109
Northbound Through	300	56	40
Southbound Left Turn	150	119	**178**
Southbound Through	1550	359	546
Southbound Right Turn	1550	22	30
15. So. Airport Boulevard/Mitchell Avenue/Gateway Boulevard			
Eastbound Left Turn	140	88	56
Eastbound Through	730	294	248
Eastbound Right Turn	730	147	91
Northbound Left Turn	300	98	183
Northbound Through	930	72	42
Northbound Right Turn	930	0	0

Table 4.10-6 Existing Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*	
		AM Peak Hour	*PM Peak Hour*
16. US-101 NB/So. Airport Boulevard Off-Ramp/So. Airport Boulevard			
Eastbound Left Turn	800	358	272
Eastbound Through	800	349	273
Eastbound Right Turn	150	84	43
Westbound Through	200	43	46
Westbound Right Turn	200	20	18
Northbound Left Turn	295	70	156
Northbound Through	635	130	190
Southbound Left Turn	100	18	42
Southbound Through	1080	221	431
Southbound Right Turn	125	44	84

SOURCE: Fehr & Peers (2014).
Bold = 95th percentile queue exceeds storage length

Freeway Volumes and Operations

Freeway mainline volumes were collected from the PeMS (Performance Measuring System Database 2013). Ramp volumes were collected from the East of US-101 Study, recent intersection counts, and the San Mateo City/County Association of Governments (C/CAG) travel demand model. PeMS is an online Caltrans database for traffic counts that includes traffic volume data from detectors embedded in the freeway at certain points. Volume data was collected from the detector station located in South San Francisco just north of the Oyster Point Boulevard off-ramp. The PeMS data gathered included AM (7:00–9:00 AM) and PM (4:00–6:00 PM) peak period counts for all midweek days (Tuesday through Thursday) in October 2013. After discarding days where less than 100 percent of traffic was observed (potentially due to faults in the detector readings), the average of the peak hours was taken for each day to determine the overall average mainline peak hour volume.

The resulting freeway analysis results are presented in Table 4.10-7 (Existing Freeway Segment LOS Results). The freeway operations vary depending on the peak hour, direction, and segment, ranging from LOS A to LOS E. Several segments on US-101 currently exceed their Congestion Management Program (CMP) LOS standard (LOS E), as outlined in the Regulatory Context discussion below:

- Northbound US-101 North of Oyster Point Boulevard—LOS F (AM and PM peak hours)
- Southbound US-101 between Oyster On and Miller Off—LOS F (AM and PM peak hours)
- Southbound US-101 between Produce on and I-380 west—LOS F (AM and PM peak hours)

Table 4.10-7 Existing Freeway Segment LOS Results

Freeway Segment	*Type*	*Peak Hour*	*Volume*	*V/C*[a]	*Density*[b]	*LOS*	*CMP Standard*
Northbound US-101							
I-380 to South Airport Blvd Off	Basic	AM	9,480	0.73	26.93	D	E
		PM	7,281	0.56	20.24	C	E
Between S Airport Blvd Ramps	Basic	AM	8,264	0.76	28.53	D	E
		PM	6,518	0.60	21.75	C	E
South Airport Blvd On Ramp to E Grand Ave/Poletti Way	Weave	AM	8,264	**0.92**	**46.36**	**E**	**E**
		PM	6,518	0.73	30.65	D	E
Between Grand ramps	Basic	AM	6,892	0.79	30.18	D	E
		PM	6,387	0.74	27.29	D	E
Grand/Airport On to Oyster Off	Weave	AM	6,892	**0.99**	**45.60**	**E**	**E**
		PM	6,387	**0.95**	**43.10**	**E**	**E**
Between Oyster Point ramps	Basic	AM	6,826	0.79	29.78	D	E
		PM	6,735	0.78	29.24	D	E
North of Oyster Point	Weave	AM	6,826	**>1.00**	**—**	**F**	**E**
		PM	6,735	**>1.00**	**—**	**F**	**E**
Southbound US-101							
Oyster Point Blvd Off Ramp	Basic	AM	8,605	0.99	44.28	E	**E**
		PM	6,494	0.75	27.87	D	E
Between Oyster Off and Airport On	Basic	AM	7,340	0.85	33.12	D	E
		PM	6,340	0.73	27.04	D	E
Airport Blvd On Ramp	Basic	AM	7,340	0.85	33.12	D	**E**
		PM	6,340	0.73	27.04	D	E
Between Oyster On and Miller Off	Weave	AM	8,040	**>1.00**	**—**	**F**	**E**
		PM	6,960	**>1.00**	**—**	**F**	**E**
Produce/Airport Off	Basic	AM	8,004	0.92	38.33	E	**E**
		PM	7,692	0.89	35.73	E	**E**
Between Produce Ramps	Basic	AM	7,796	0.90	36.57	E	**E**
		PM	7,273	0.84	32.65	D	**E**
Between Produce on and I-380 west	Weave	AM	7,796	**>1.00**	**—**	**F**	**E**
		PM	7,273	**>1.00**	**—**	**F**	**E**

SOURCE: Fehr & Peers (2014).

Bold = unacceptable LOS

a. Freeway segment level of service based on volume to capacity ratio according to the Highway Capacity Manual. Highway Capacity Manual, Transportation Research Board, 2010.

b. Density for each segment is shown in passenger car equivalents per mile of roadway per lane (pcpmpl).

Poor freeway operations along US-101 are due primarily to very high mainline volumes traveling through South San Francisco, which is located in the center of a major employment corridor for commuters traveling between San Francisco, the Peninsula and the South Bay.

Freeway ramp volume-to-capacity results are shown in Table 4.10-8 (Existing Freeway Ramp Volume-to-Capacity Results). The northbound US-101 off-ramp to East Grand Avenue/Poletti Boulevard is currently serving volumes over the theoretical capacity.

Table 4.10-8 Existing Freeway Ramp Volume-to-Capacity Results

Freeway Ramp	*Peak Hour*	*Capacity (veh/hr)*	*Volume (veh/hr)*
Northbound US-101			
On-ramp from Grand Avenue/Airport Boulevard	AM	2,000	650
	PM		842
On-ramp from South Airport Boulevard	AM	2,000	246
	PM		405
Off-ramp to East Grand Avenue/Poletti Way	AM	1,500	**1,618**
	PM		536
Off-ramp to South Airport Boulevard	AM	1,500	1,216
	PM		763
Southbound US-101			
On-ramp from Produce Avenue	AM	3,300	934
	PM		1,733
Off-ramp to Airport Boulevard/Miller Avenue	AM	1,500	531
	PM		531
Off-ramp to South Airport Boulevard/Produce Avenue	AM	1,500	208
	PM		419

SOURCE: Fehr & Peers (2014).
Bold = volume exceeds capacity

4.10.3 Regulatory Framework

Applicable state and local laws, regulations, and orders that pertain to project-related transportation issues are presented below. The City of South San Francisco has jurisdiction over all City streets and City-operated traffic signals. State Routes, including US-101, are under the jurisdiction of Caltrans. Public transit agencies with operations in the study area are SamTrans, Caltrain, and BART. In addition, there are several regional and local agencies with jurisdiction related to transportation in the study area.

Federal

There are no federal regulations applicable to transportation/traffic for the proposed project.

State

California Department of Transportation

Caltrans is responsible for the maintenance and operation of State routes and highways. In South San Francisco, Caltrans's facilities include US-101. Caltrans maintains a volume monitoring program and reviews local agency planning documents (such as EIRs) to assist in its forecasting of future volumes and congestion points. The Guide for the Preparation of Traffic Impacts Studies (December 2002) published by Caltrans is intended to provide a consistent basis for evaluating traffic impacts to State facilities. The City recognizes that "Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State highway facilities"; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. In addition, Caltrans states that for existing State highway facilities operating at less than the target LOS, the existing LOS should be maintained.

Local

Metropolitan Transportation Commission

The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area (Bay Area). It is responsible for developing the regional transportation plan and prioritizing regional transportation projects for State and federal funding. In July 2013, MTC approved Plan Bay Area, a long-range regional transportation and land-use/housing strategy, which identified priority development areas (PDA) throughout the Bay Area. The project study area is located in a PDA, where development is encouraged in order to be consistent with regional sustainability and transportation plans.

City/County Association of Governments

The C/CAG is the Congestion Management Agency for San Mateo County, which includes maintaining a Congestion Management Plan (CMP). The CMP monitors levels of service on the County's roadways and works to improve all methods of transportation locally and regionally

South San Francisco General Plan

The City's General Plan currently in place was adopted in October of 1999, with amendments noted as applicable. The applicable circulation and bicycle/pedestrian goals, policies, and programs related to transportation impacts in the project study area are included below:

Guiding Policies

Street System

Policy 2-G-1 Undertake efforts to enhance transportation capacity, especially in growth and emerging employment areas such as in the East of US-101 area.

Policy 2-G-2 Improve connections between different parts of the city. These would help integrate different parts of the city. Connections between areas west and east of US-101 (currently limited to streets that provide freeway access) would also free-

up capacity along streets such as Grand Avenue and Oyster Point Boulevard that provide access to US-101. Connections are also critical across El Camino Real and Junipero Serra Boulevard and from Westborough to Downtown.

Policy 2-G-3 Where appropriate, use abandoned railroad rights-of-way and the BART right-of-way to establish new streets.

Policy 2-G-5 Use South San Francisco Street Classifications, to identify, schedule, and implement roadway improvements.

Policy 2-G-6 Make efficient use of existing transportation facilities and, through the arrangement of land uses, improved alternate modes, and enhanced integration of various transportation systems serving South San Francisco, strive to reduce the total vehicle-miles traveled.

Policy 2-G-7 Coordinate local actions with regional agencies, and undertake active efforts to undertake transportation improvements.

Policy 2-G-8 Provide fair and equitable means for paying for future street improvements including mechanisms such as development impact fees. (Amended by City Council Resolution 98-2001, Adopted September 26, 2001)

Traffic Operations and Service Standards

Policy 2-G-9 Strive to maintain LOS D or better on arterial and collector streets, at all intersections, and on principal arterials in the CMP during peak hours.

Policy 2-G-10 Accept LOS E or F after finding that:

- There is no practical and feasible way to mitigate the lower level of service; and
- The uses resulting in the lower level of service are of clear, overall public benefit.

Policy 2-G-11 Exempt development within one-quarter mile of a Caltrain or BART station, or a City-designated ferry terminal, from LOS standards.

Implementing Policies

Street System and Improvements

Policy 2-I-1 Continue using the Capital Improvement Program to program and implement needed improvements to the street system.

Policy 2-I-2 Undertake street improvements identified in General Plan Figures 4-1 and 4-2. (Amended by City Council Resolution 31-2002, Adopted April 24, 2002)

Improvements identified include:

- Railroad Avenue extension from South Linden Avenue to East Grand Avenue, following the general alignment of an abandoned railroad right-of-way. This would be the first non-freeway related connection between the areas east and west of US-101. The street will go under US-101. Either a depressed intersection at Railroad Avenue or an elevated section that goes above the Caltrain tracks would be needed. This will probably be an expensive improvement ($15-20 million), requiring detailed studies. However, it is

expected to accommodate more than 20,000 trips per day and existing structures will not need to be removed. Consideration should be given to providing a bikeway in conjunction with the street design.

- Victory Avenue extension from South Linden Avenue to South Airport Boulevard. This will need to be undertaken in conjunction with development of the regional commercial facilities designated on the General Plan Diagram.
- New interchange at Victory Avenue and US-101. This will provide direct connection between Lindenville and US-101, and be the primary truck ingress/egress point in South San Francisco, obviating the need for trucks to negotiate Downtown streets. As with Victory Avenue extension, development will need to occur in conjunction with development of regional commercial facilities.

Policy 2-I-3 Undertake studies to establish precise alignments for streets in order to identify future right-of-way needs. Locate future arterials and collectors according to the general alignments shown outlined in the General Plan. (Minor variation from the depicted alignments will not require a General Plan amendment.)

Policy 2-I-4 Establish priorities for transportation improvements, and prepare an action program to implement identified street improvements. This would require working with other agencies, including BART for the Mission Road extension on the BART right-of-way, Caltrans on the new US-101 interchange, and with C/CAG on several other projects.

Policy 2-I-5 Establish accessibility requirements for all streets designated as arterial or collector in the General Plan. As part of development review of all projects along these streets, ensure that access to individual sites does not impede through traffic flow. The General Plan anticipates development along several arterial and collector streets, including in much of Downtown, and along El Camino Real, Gellert Boulevard, Arroyo Drive, Victory Avenue extension, Hillside Boulevard, Mission Road extension, and East Grand Avenue. Accessibility requirements should ensure that ingress/egress from sites along arterial and collector streets is limited to a few locations, and residential developments do not have driveways lined up along the streets, which would represent a safety hazard and impede traffic flow.

Policy 2-I-6 Incorporate as part of the City's Capital Improvement Program (CIP) needed intersection and roadway improvements to enhance mobility in the East of US-101 area. (Amended by City Council Resolution 98-2001, Adopted September 26, 2001.) The East of US-101 traffic study, prepared by the City in April 2001, identifies improvements that would result in better traffic flow and a reduction of congestion during peak hours. The following improvements have been proposed and evaluated:

- Bayshore Boulevard and US-101 South Hook Ramp(s);
- Bayshore Boulevard and Sister Cities/Oyster Point Boulevard;
- Dubuque Avenue and Oyster Point Boulevard;
- Eccles Avenue and Oyster Point Boulevard;
- Gull Drive and Oyster Point Boulevard;

- Airport Boulevard and Miller Avenue/US-101 Southbound off-ramp;
- Airport Boulevard and Grand Avenue;
- Dubuque Avenue and East Grand Avenue;
- Gateway Boulevard and East Grand Avenue;
- Forbes Boulevard/Harbor Way and East Grand Avenue;
- East Grand Avenue and Grandview Drive;
- Airport Boulevard and San Mateo Avenue;
- South Airport Boulevard/Mitchell Avenue and Gateway Boulevard;
- South Airport Boulevard and Utah Avenue;
- Harbor Way;
- Mitchell Avenue.

Policy 2-I-7 Continue to require that new development pays a fair share of the costs of street and other traffic and transportation improvements, based on traffic generated and impacts on service levels. Explore the feasibility of establishing impact fee, especially for improvements required in the Lindenville area. (Amended by City Council Resolution 98-2001, Adopted September 26, 2001)

Policy 2-I-7a Establish a traffic improvement fee to fund transportation improvements in the East of US-101 area. (Amended by City Council Resolution 98-2001, Adopted September 26, 2001)

Policy 2-I-8 Develop and implement a standard method to evaluate the traffic impacts of individual developments. Currently, the City does not have an adopted LOS calculation method or a traffic analysis procedure. Therefore, it is difficult to ensure that impacts and appropriate mitigation measures are identified and that developers pay their fair-share of the transportation system improvement costs.

Policy 2-I-9 Where appropriate, consider upfronting portions of improvement costs where the City's economic development interests may be served. This technique may be appropriate for improvements such as the Victory Avenue extension, the Railroad extension and US-101 interchange to facilitate development of a regional commercial center, sales tax revenues from which (potentially in excess of $1 million per year) could help retire the improvement debt.

Level of Service

Policy 2-I-10 Design roadway improvements and evaluate development proposals based on LOS standards.

Policy 2-I-11 Implement, to the extent feasible, circulation system improvements illustrated in the General Plan prior to deterioration in levels of service below the stated standard.

South San Francisco General Plan

The General Plan lays out the general principles for transportation planning within South San Francisco, including improving safety for pedestrians and bicyclists, improving connectivity between East of

US-101 and Downtown, and establishing key corridors between residential neighborhoods and transit centers. To achieve this, the following policies are included in the General Plan:

- Exempt development within 0.25 mile of a Caltrain or BART station, or a City-designated ferry terminal, from Level of Service (LOS) standards.
- Accept LOS E or F if the uses resulting in the lower level of service are of clear, overall public benefit
- The General Plan recommends locations for traffic calming as part of development in Lindenville or East of US-101: require project proponents to provide sidewalks and street trees as part of frontage improvements for new development and redevelopment projects.
- The General Plan recommends improvements to pedestrian connections between the rail stations and the surroundings: install handicapped ramps at all intersections as street improvements are being installed; construct wide sidewalks where feasible to accommodate increased pedestrian use; providing intersection "bulbing" to reduce walking distances across streets in Downtown; continue with the City's current policy of providing pedestrian facilities at all signalized intersections; and provide landscaping that encourages pedestrian use.
- The General Plan also includes a new pedestrian and bicycle connection (undercrossing at the Caltrain Station). The crossing would begin on the southeast corner of the intersection of Airport and Grand and connect to the east side of the Caltrain right of way, near Poletti Way and East Grand Avenue.

East of US-101 Area Plan and Traffic Study

The East of US-101 Area Plan focuses on the unique character and economic resources located east of US-101. The plan outlines circulation goals for future development in the East of US-101 area, which include mitigating vehicular impacts, encouraging transportation modes other than single occupancy vehicles, and promoting use of public transit to and within the area. The plan also includes a design element and policies that identify the need for a streetscape plan for several key streets and encourages campus planning (e.g. Genentech Master Plan). Within the Downtown Specific Plan study area, the East of US-101 Traffic Study identifies a number of intersection capacity modifications to reduce automobile level of service impacts associated with future development in the East of US-101 area. These capacity increases would affect intersections along Airport Boulevard, East Grand Avenue, and Gateway Boulevard. Due to their focus on maintaining traffic operations, many of these intersection capacity modifications are incongruent with circulation goals associated with improving pedestrian and bicycle modes.

South San Francisco Bicycle Master Plan

A detailed Bicycle Master Plan was adopted by the City Council in 2010. This plan prioritizes improvements and was adopted as an amendment to the City of South San Francisco General Plan Transportation and Circulation Element. Specific routes proposed in this plan will be discussed in the existing conditions section.

South San Francisco/San Bruno Community-Based Transportation Plan

The South San Francisco San Bruno Community Based Transportation Plan identified specific transportation needs and strategies and action items to address those needs. The outreach process resulted in the identification of twenty-five overarching unmet transportation needs expressed by project area residents and stakeholders. These needs were split into two tiers based on the number of times they were brought up. Nine transportation strategies were identified, based on community and stakeholder input, to address the "Tier 1" transportation needs. Chapter 4 includes a description and preliminary evaluation of each of the nine strategies. The nine transportation strategies are:

- Improve Transit Stop Amenities and Security
- Improve the Affordability of Public Transit for Low-income Users
- Improve Bicycle Amenities
- Provide Free or Low-cost Bicycles
- Improve Pedestrian Amenities, particularly along Grand, Cypress, Linden, and Baden
- Increase Public Access to Information about Transportation Options
- Increase SamTrans Bus Service
- Improve Connectivity of Existing Transit Service
- Improve access to the South San Francisco Caltrain Station, including a new Caltrain pedestrian access tunnel to a relocated/elongated train platform

Downtown Strategy

The Downtown Design Strategies developed in South San Francisco's Urban Design Charrette were released in March of 1998. The Strategies were the result of a one-day event in which residents, community leaders, and planners gathered to discuss ways in which the City could improve the design of its Downtown. Many of the strategies in the Transportation and Circulation section are pertinent to this Community-Based Transportation Plan, and are listed below:

- Install parallel parking on the south side of Grand Avenue
- Eliminate cut-in parking spaces in favor of sidewalk amenities and cafes; add decked parking in lots on Miller and Baden Avenues
- Develop a streetcar or shuttle along Grand Avenue
- Slow cars with cobbled paving
- Prohibit driveways or parking entrances from Grand Avenue
- Concentrate truck and through-traffic on Miller and Baden Avenues; Grand Avenue should be a destination point for shoppers

Caltrain Electrification

The Caltrain Modernization Program will electrify and upgrade the performance, operating efficiency, capacity, safety and reliability of Caltrain's commuter rail service. The Caltrain Modernization Program is

scheduled to be complete by 2019. Electrification has been a part of Caltrain's long-term vision for several years and is reflected in Caltrain's strategic plans. The program includes:

- **Service Enhancements:** Modernization will allow Caltrain to operate quieter, cleaner, more frequent and/or faster train service to more riders. Increased capacity and improved service will help Caltrain meet increasing ridership demand and alleviate local and regional traffic congestion.
- **Financial Sustainability:** Modernization will also help support the financial sustainability of the system by increasing ridership and fare revenue, and reducing operating costs associated with replacing diesel fuel with electricity.
- **Economic Benefits:** Modernization also creates regional job opportunities and other valuable economic benefits that are critical to the economic welfare of our region and state.

California High-Speed Rail

The Caltrain Modernization Program will help prepare the corridor to eventually accommodate California's statewide high-speed rail service, which is planned for 2029. Caltrain and high-speed rail will primarily share Caltrain's existing tracks, operating on a blended system. Caltrain, along with local stakeholders and the California High Speed Rail Authority, is currently working to define what additional system upgrades will be required to support blended Caltrain and high-speed rail service.

Within the study area, the Caltrain right-of-way is nine tracks wide at the widest point and narrows to two tracks north and south of the Station. Most of these existing tracks are layover and non-passenger freight rail tracks. These uses will need to be relocated under future scenarios; however, the exact plan is not known at this time. It is unlikely that additional right-of-way would be required in the study area because of the existing width of the right-of-way.

US-101/Miller Avenue Interchange Alternative Analysis

The South San Francisco Engineering Division developed conceptual plans to convert Miller and Grand Avenue into a one-way couplet to address traffic congestion in the Downtown area and at the Miller, Grand, and Baden intersections on Airport Boulevard. Miller Avenue would become the primary westbound corridor and Grand Avenue would become the primary eastbound corridor through the Downtown. Airport Boulevard would also be reconfigured to accommodate additional northbound left turns onto Miller Avenue. Conversion of Baden Avenue to one-way was also reviewed; however, it was not ultimately included in the alternatives analysis. Southbound Airport Boulevard would be widened as well. No operational analysis was conducted for the plan; however, the plan notes that right-of-way and design requirements would be challenging and public outreach would need to be conducted. This analysis also considered the operational benefits of restricting large trucks on Airport Boulevard and the Miller Avenue off-ramp.

4.10.4 Impacts and Mitigation Measures

Analytic Method

This section evaluates the transportation-related impacts related to implementation of the Specific Plan and identifies appropriate mitigation measures where feasible. Traffic impacts are evaluated under existing and cumulative conditions.

Thresholds of Significance

The following thresholds of significance are based on the 2013 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on recreation if it would do any of the following:

- 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 nonmotorized 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?
- Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?
- 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?
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
- Result in inadequate emergency access?
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

The significance criteria below are used to determine whether implementation of the Specific Plan results in significant environmental impacts that require mitigation.

Intersection Impact Criteria

A project will result in a significant traffic impact at intersections:

- If a signalized intersection with baseline traffic volumes is operating at an acceptable LOS (LOS D or better) deteriorates to an unacceptable operation (LOS E or F) with the addition of project traffic and the total traffic volume through the intersection increases by at least two percent; or
- If an unsignalized intersection with baseline traffic volumes is operating at an acceptable LOS (LOS E or better) deteriorates to LOS F with the addition of project traffic and the total traffic volume through the intersection increases by at least two percent; or

- If the addition of project traffic at an unsignalized intersection would cause the intersection to meet the Caltrans peak hour or pedestrian/school crossing signal warrant criteria; or
- If a signalized or unsignalized intersection is already operating at an unacceptable LOS and the proposed project increases the total traffic volume at the intersection by at least two percent; or
- If the addition of project traffic at intersections in the vicinity of freeway interchanges would increase acceptable baseline 95th percentile vehicle queues to unacceptable levels (as determined by the Synchro software program and the storage length of each movement), or, if baseline 95th percentile vehicle queues are already at unacceptable levels, the project would increase the traffic volume on the queuing volume by at least 1 percent.

The South San Francisco General Plan outlines two relevant exceptions to the above impact criteria, which they may deem applicable to the project:

- Accept LOS E or F after finding that there is no feasible and practical way to mitigate the lower level of service, and the uses resulting in the lower level of service are of clear overall public benefit; and
- Exempt development within 0.25 mile of a Caltrain of BART station or a ferry terminal from LOS standards.

Freeway Segment Impact Criteria

A project will result in a significant traffic impact on freeway segments and ramps:

- If operations on US-101 mainline segments or ramps deteriorate from LOS E or better under baseline conditions to LOS F during the AM or PM peak hour with an increase of at least 1 percent in total traffic volume due to the project; or
- If operations on US-101 mainline segments or ramps are already at LOS F, the project would increase traffic volumes by more than 1 percent

Design Review Considerations

A roadway design impact is considered significant when the project introduces a design feature that presents safety concerns.

Emergency Access Impact Criteria

An emergency vehicle access impact is considered to be significant if the proposed project would provide inadequate design features to accommodate emergency vehicle access and circulation.

Pedestrian and Bicycle Impact Criteria

When jurisdictions do not have specific adopted significance criteria for pedestrian and bicycle impacts, the overall impact on pedestrian and bicycle facilities should be assessed. If implementation of mitigation measures for other significant impacts would potentially negatively affect pedestrians, impacts may be considered significant and unavoidable. Pedestrian and bicycle impacts would be considered significant if the proposed project results in any of the following:

- Project alters existing facilities with a negative impact on pedestrians

- Project extends pedestrian walking distance at signalized intersections
- Project creates greater pedestrian exposure at signalized intersections
- Project significantly increases delay to pedestrians at signalized intersections
- Is inconsistent with adopted plans and programs

Transit Impact Criteria

Public transit impacts would be significant if the demand for public transit service increases above that which local transit operators or agencies could accommodate. In addition, an impact would be significant if the project conflicts with adopted policies, plans or programs supporting alternative transportation. An impact is also significant if the project disrupts existing transit service or does not provide amenities necessary to accommodate transit demand.

Effects Not Found to Be Significant

Threshold	Would the project 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?
Threshold	Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
Threshold	Would the project result in inadequate emergency access?

The study area is located approximately 2.5 miles north of the San Francisco International Airport. The proposed project would represent infill development that results in increased height limits and densities; however, building heights are still within the FAA limits and would not result in a change in air traffic patterns. Further, the proposed roadway improvements would not include design features such as sharp curves or dangerous intersections or incompatible uses that would increase hazards in the study area. Emergency vehicles would be able to use the roadways surrounding the project site and through the project site, maintaining existing emergency access. Therefore, the proposed project would result in ***no impacts*** related to air traffic, design hazards, or emergency vehicle access.

Project Impacts and Mitigation

The following section summarizes the analysis of various study area transportation circulation factors. This section includes and analyzes existing plus project and cumulative (2035) plus project conditions and compares them to the appropriate without project conditions.

Existing Plus Project Conditions

This section presents the methodologies used to estimate project-related trips and the results of the intersection and freeway level of service analysis for existing plus project conditions. Existing conditions form the baseline against which project-related impacts are evaluated.

The Specific Plan includes several physical changes to the road network, including major changes to the geometry at the intersection of Grand Avenue/Airport Boulevard:

- Convert northbound curbside lane into a through-right -turn shared lane, where only through movements onto US-101 on-ramp are permitted
- Modify southbound approach lanes to include two southbound through lanes and one right-turn lane
- Removal of the northbound left-turn lane and redirect vehicles to Miller Avenue

Vehicle Trip Generation Estimates

Fehr & Peers estimated trip generation based on the proposed project land use using the mixed-use trip generation methodology known as Plan+. The Plan+ method accounts for build environment factors such as the density and diversity of land uses, design of the pedestrian and bicycling environment, demographics of the site, and distance to transit to develop more realistic trip generation estimates for mixed-use and transit oriented developments than traditional traffic engineering methods. Appendix E (Traffic Data, Plan+ Application for Study Area and Methodology Validation: EIR Transportation Analysis Assumptions) contains detailed documentation of the Plan+ application for the proposed project and validation of the methodology.

Table 4.10-9 (Specific Plan Trip Generation) summarizes the estimated trip generation for the existing and existing plus project, based on the land use summary presented in Appendix E (Traffic Data, Plan+ Application for Study Area and Methodology Validation: EIR Transportation Analysis Assumptions). As shown in Table 4.10-9, the proposed project is estimated to generate about 2,100 AM peak hour vehicle trips and about 2,500 PM peak hour vehicle trips. The proposed project would generate approximately 58 percent more daily trips than the existing land uses. Plan+ does not calculate trip generation for each separate land use and mode, so the tool output was proportionally extrapolated to estimate vehicle trips for each land use. The external vehicle trips for the West and East portions of the study area were used as inputs for the traffic impact analysis, and the transit, bicycle, and pedestrian trips are included as estimates of non-vehicle trips in the study area. Transit, bicycle and pedestrian trip generation estimates remain aggregated for all land uses because disaggregating the smaller numbers would be overly precise and not accurate.

Table 4.10-10 (Project Trips) summarizes new vehicle, transit, and walk/bike trip generation for the proposed project land uses, based on the above trip generation summary. This table provides the differences between existing and existing plus project, from the above table, with the same assumptions and level of detail. Transit, bicycle and pedestrian trips remain aggregated for all land uses.

In/Out Split of Generated Trips

The in/out split of land uses was determined by applying the most appropriate splits from the ITE Trip Generation Manual (Institute of Transportation Engineers 2012). The trip generation in/out splits were applied to the number of external vehicle trips calculated using Plan+ to give total trip generation for in and out, as shown in Table 4.10-11 (Trip Generation In/Out Splits External Vehicle Trips).

Table 4.10-9 Specific Plan Trip Generation

Intersection	*Existing*			*Existing Plus Project*		
	Daily	*AM*	*PM*	*Daily*	*AM*	*PM*
External Vehicle Trips[a]						
West	28,200	1,330	2,310	38,420	1,930	3,160
Residential	*7,335*	*542*	*580*	*13,358*	*987*	*1,050*
Office/R&D	*1,803*	*254*	*208*	*2,510*	*356*	*297*
Commercial/Other	*19,062*	*534*	*1,522*	*22,552*	*587*	*1,813*
East	12,920	880	1,330	26,770	2,380	2,990
Residential	*0*	*0*	*0*	*272*	*17*	*28*
Office/R&D	*1,467*	*219*	*193*	*9,976*	*1,591*	*1,383*
Other	*11,453*	*661*	*1,137*	*16,523*	*771*	*1,579*
Total	***41,120***	***2,210***	***3,640***	***65,190***	***4,310***	***6,150***
Net New Vehicle Trips	24,070	2,100	2,510			
External Transit Trips						
West	1,187	93	179	1,799	153	271
East	436	45	83	1,062	145	217
Total	***1,620***	***140***	***260***	***2,860***	***300***	***490***
Net New Transit Trips	1240	160	230			
External Walk/Bike Trips						
West	2,390	192	218	3,891	316	346
East	400	49	47	1,061	141	127
Total	***2,790***	***240***	***270***	***4,950***	***460***	***470***
Net New Walk/Bike Trips	2,160	220	200			
Internal Trips (Walk/Bike)						
West	5,458	264	884	8,186	442	1,262
East	874	14	128	3,005	98	430
Total	***6,330***	***280***	***1,010***	***11,190***	***540***	***1,690***
Net New Internal Trips	4,860	260	680			

SOURCE: Fehr & Peers (2014).

a. Trip generation forecasts account for the diversity of land uses, density, design, distance to transit, and accessibility of the study area. These factors contribute to an approximately 20% reduction in vehicle trips being generated compared to typical ITE trip generation rates.

Table 4.10-10 Project Trips

Period	*Daily*	*AM*	*PM*
External Vehicle Trips			
West	10,220	600	850
Residential	6,023	445	470
Office/R&D	707	102	89
Commercial/Other	3,490	53	291
East	13,850	1,500	1,660
Residential	272	17	28
Office/R&D	8,509	1,372	1,190
Commercial/Other	5,070	110	442
Total	***24,070***	***2,100***	***2,510***
External Transit Trips			
West	612	60	92
East	626	100	134
Total	***1,240***	***160***	***230***
External Walk/Bike Trips			
West	1,501	124	128
East	661	92	80
Total	***2,160***	***220***	***200***
Internal Trips (Walk/Bike)			
West	2,728	178	378
East	2,131	84	302
Total	***4,860***	***260***	***680***

SOURCE: Fehr & Peers (2014).

Vehicle Trip Distribution and Assignment

Trip distribution refers to the directions from which the trips generated by the proposed project will approach and depart, using the in/out movement summarized in Table 4.10-9. Proposed project trip distribution estimates were developed based on the locations of complementary land uses, existing travel patterns in the area, the MTC regional travel demand model, census data, and nearby project assumptions including the East of US-101 Traffic Study. These sources were used to inform two separate composite trip distribution profiles: one each for the West and East areas. In addition, care was taken to estimate the trips that are identified as traveling in between the West and East areas due to complementary land uses between the two sites. Origins and destinations are related to home and work trips connected to the study area. Some residential trips originate in the West area or west of the study area, and connect to the north, south, west and east area. However, a small number of residential trips originate in the East area and connect to east of the study area.

Table 4.10-11 Trip Generation In/Out Splits External Vehicle Trips

Land Use	*AM*			*PM*		
	In	*Out*	*Total*	*In*	*Out*	*Total*
West						
Residential	85	360	445	300	170	470
Commercial/Other	33	20	53	140	152	292
Office/R&D	90	14	104	14	75	88
Total	***208***	***394***	***600***	***454***	***397***	***850***
East						
Residential	3	14	17	18	10	28
Commercial/Other	68	42	110	212	230	442
Office/R&D	1,195	178	1,373	222	967	1,189
Total	***1,266***	***234***	***1,500***	***452***	***1,207***	***1,659***

SOURCE: Fehr & Peers (2014).

The proposed project trip distribution for each of the areas is shown on Figure 4.10-5A (External Trip Distribution [West]) and Figure 4.10-5B (External Trip Distribution [East]). Study intersections are shown on Figure 4.10-1 (Study Intersections and Freeway Segments). Project trips are then assigned to the roadway network and study intersections, as shown in Figure 4.10-6A and Figure 4.10-6B (Project Trip Assignment).

Intersection Operations

Intersection volumes for existing plus project vehicle are shown on Figure 4.10-7A and Figure 4.10-7B (Existing Plus Project Intersection Peak Hour Volumes). Existing plus project intersection operations are shown in Table 4.10-12 (Existing Plus Project Intersection LOS Results). New vehicle trips generated by the proposed project would add traffic to all study intersections, including some movements that currently operate at LOS E or F. These added project trips would cause the degradation of the overall intersection LOS at several intersections along Grand Avenue and Airport Boulevard and throughout Downtown compared to existing conditions. These are considered significant impacts as described below.

Vehicle Queuing at Freeway Interchange Intersections

Existing Plus Project vehicle queues at freeway interchange intersections are shown in Table 4.10-13 (Existing Plus Project Intersection Vehicle Queuing at Freeway Interchange Intersections). Under Plus Project conditions, the following intersections have movements with 95th percentile queues that exceed their storage capacity during the AM and/or PM peak hours:

- #10: Grand Avenue/Airport Boulevard
- #14: San Mateo Avenue/Produce Avenue/South Airport Boulevard
- #15: South Airport Boulevard/Mitchell Avenue/Gateway Boulevard
- #16: US-101 Northbound/South Airport Blvd Off Ramp/South Airport Boulevard

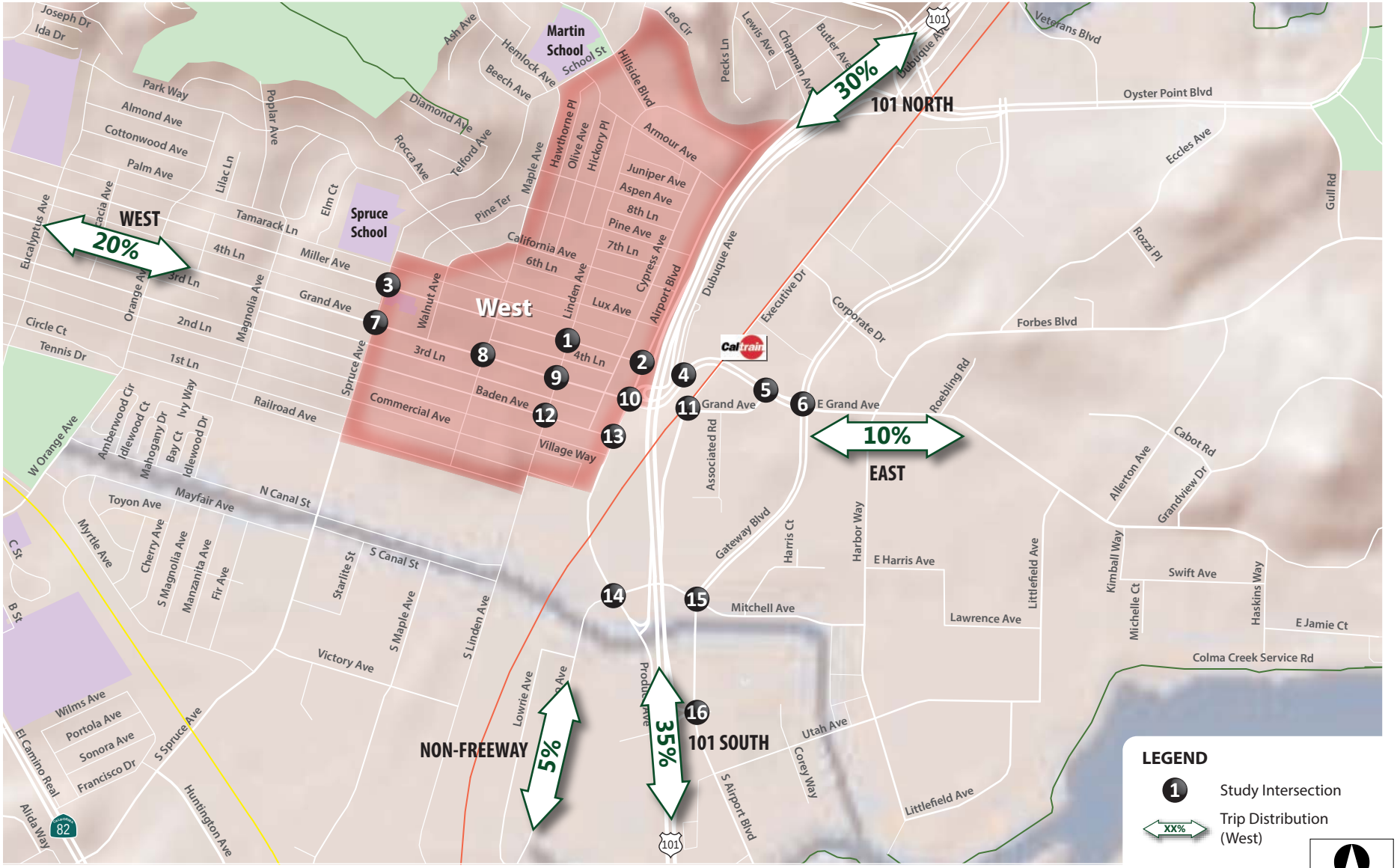
Table 4.10-12 Existing Plus Project Intersection LOS Results

Intersection	*Control*	*Existing*				*Existing Plus Project*			
		AM		*PM*		*AM*		*PM*	
		Delay[a]	*LOS*	*Delay[a]*	*LOS*	*Delay[a]*	*LOS*	*Delay[a]*	*LOS*
1. Miller Ave/Linden Ave	Signal	21.2	C	34.9	C	23.2	C	**55.6**	**E**
2. Miller Ave/Airport Blvd	Signal	28.2	C	19.3	B	29.1	C	26.7	C
3. Miller Ave/Spruce Ave	Signal	18.3	B	20.0	B	25.1	C	21.4	C
4. Grand Ave/Dubuque Ave	Signal	5.9	A	4.2	A	6.1	A	6.4	A
5. Grand Ave/E. Grand Ave	Signal	19.5	B	16.8	B	23.2	C	42.0	D
6. E. Grand Ave/Gateway Blvd	Signal	33.5	C	36.0	D	35.7	D	**61.7**	**E**
7. Grand Ave/Spruce Ave	Signal	16.5	B	19.2	B	18.5	B	21.9	C
8. Grand Ave/Maple Ave	Signal	9.3	A	9.7	A	11.1	B	10.6	B
9. Grand Ave/Linden Ave	Signal	11.5	B	12.7	B	19.4	B	44.5	D
10. Grand Ave/Airport Blvd	Signal	40.7	D	44.6	D	**>80 (1.12)**	**F**	**>80 (1.13)**	**F**
11. E. Grand Ave/US-101 NB off-ramp/Poletti Way	SSS	18.3	C	10.7	B	23.8	C	11.6	B
12. Baden Ave/Linden Ave	Signal	39.2	D	**>80 (0.92)**	**F**	43.2	D	**>80 (1.03)**	**F**
13. Baden Ave/Airport Blvd	Signal	26.7	C	29.6	C	24.3	C	31.1	C
14. San Mateo Ave/Airport Blvd	Signal	37.1	D	51.2	D	37.1	D	**>80 (1.20)**	**F**
15. South Airport Blvd/ Gateway Blvd	Signal	38.4	D	42.5	D	**67.7**	**E**	**>80 (1.32)**	**F**
16. US-101 NB/South Airport Blvd Off Ramp/ South Airport Blvd	Signal	29.4	C	34.8	C	28.2	C	48.5	D

SOURCE: Fehr & Peers (2014).

Bold = unacceptable LOS; shaded = potentially significant impact; SSS = side-street stop

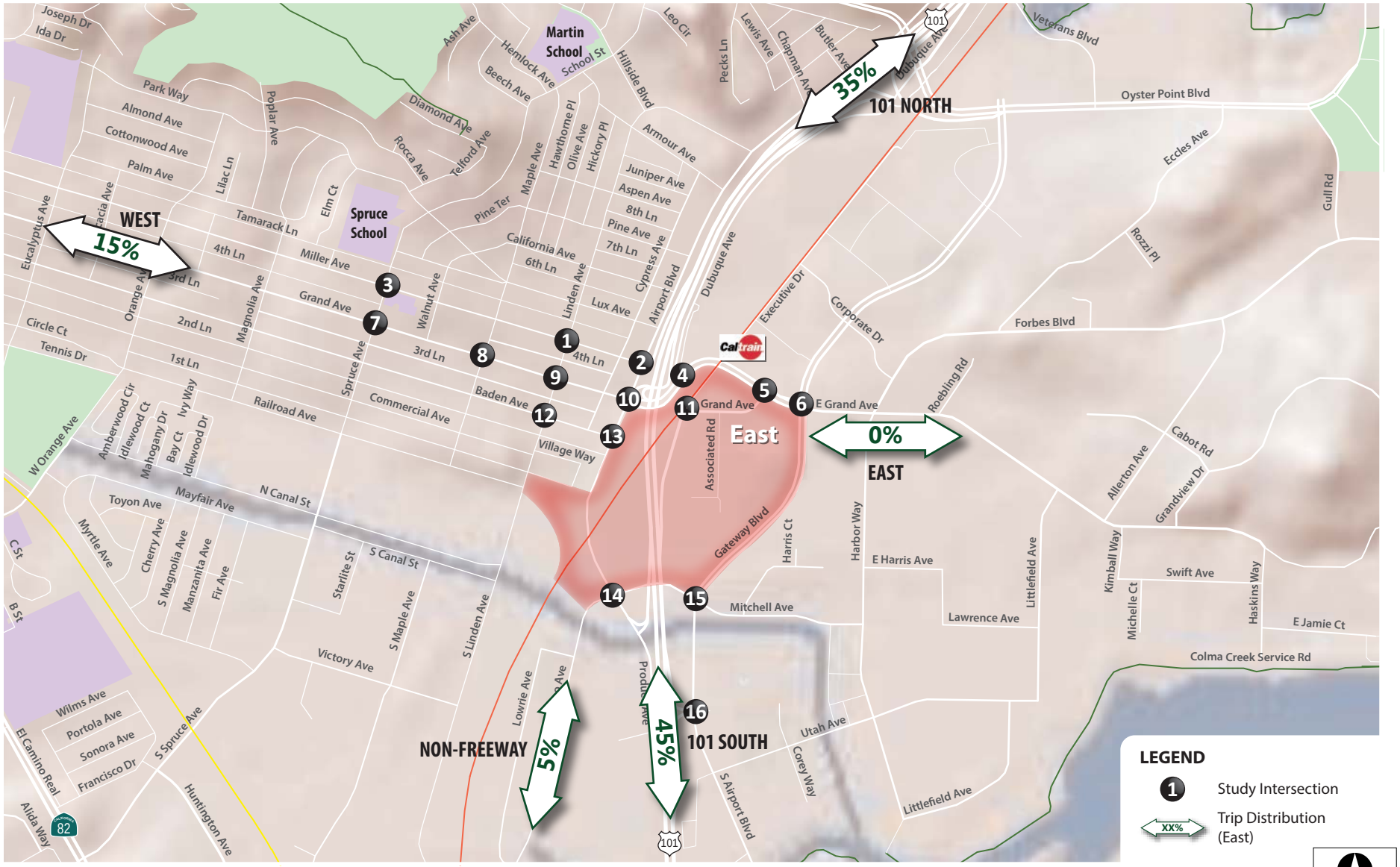
a. For signalized and all-way stop controlled intersections, the delay shown is the weighted average for all movements in seconds per vehicle. For side-street stop controlled intersection, the delay shown is the worst-operating approach delay. For intersections performing at LOS F, Volume/Capacity ratio for the overall intersection is shown in parentheses.



Source: Fehr & Peers, 2014.

Figure 4.10-5A
External Trip Distribution (West)

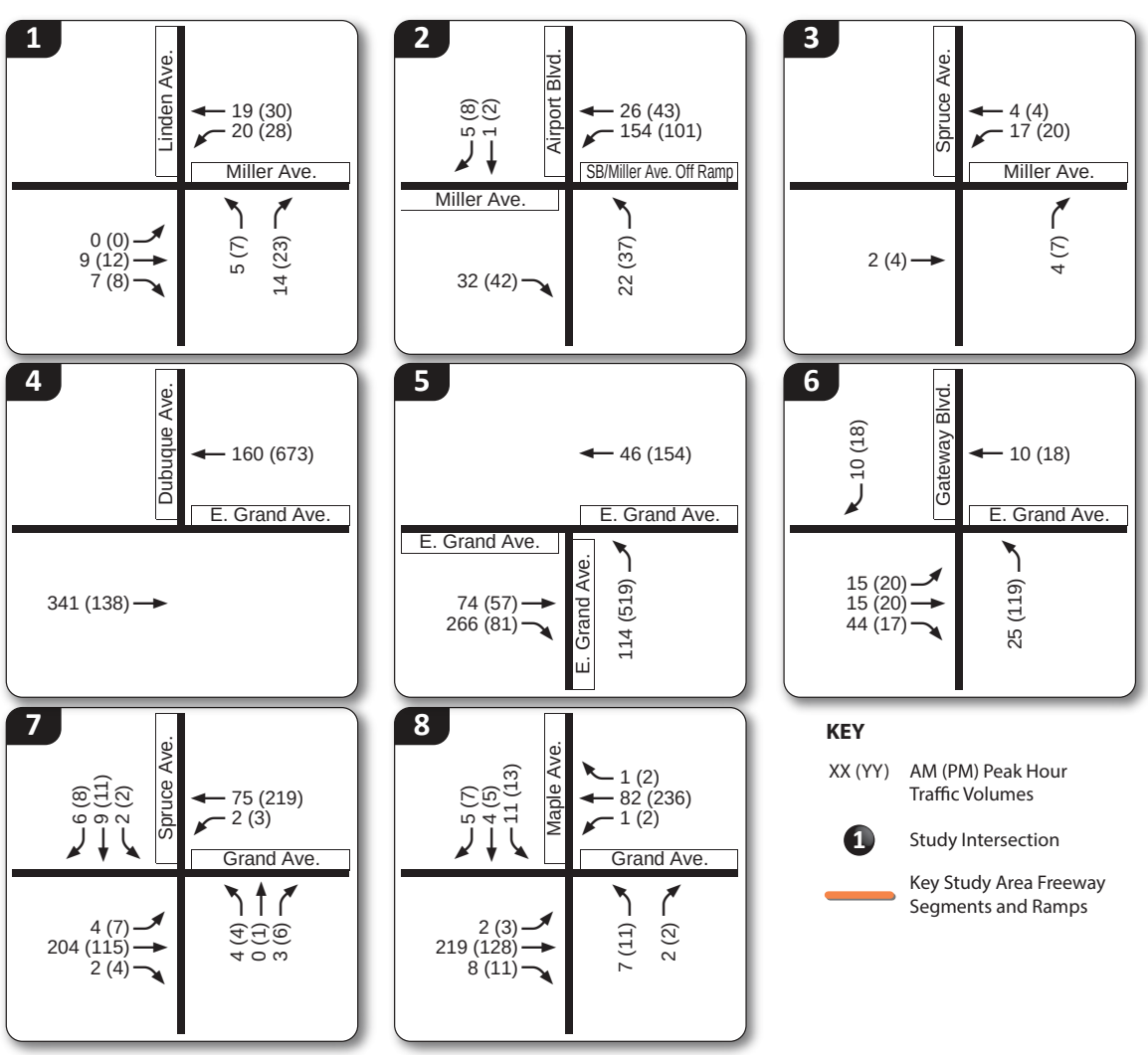
ATKINS



Source: Fehr & Peers, 2014.

Figure 4.10-5B
External Trip Distribution (East)

ATKINS

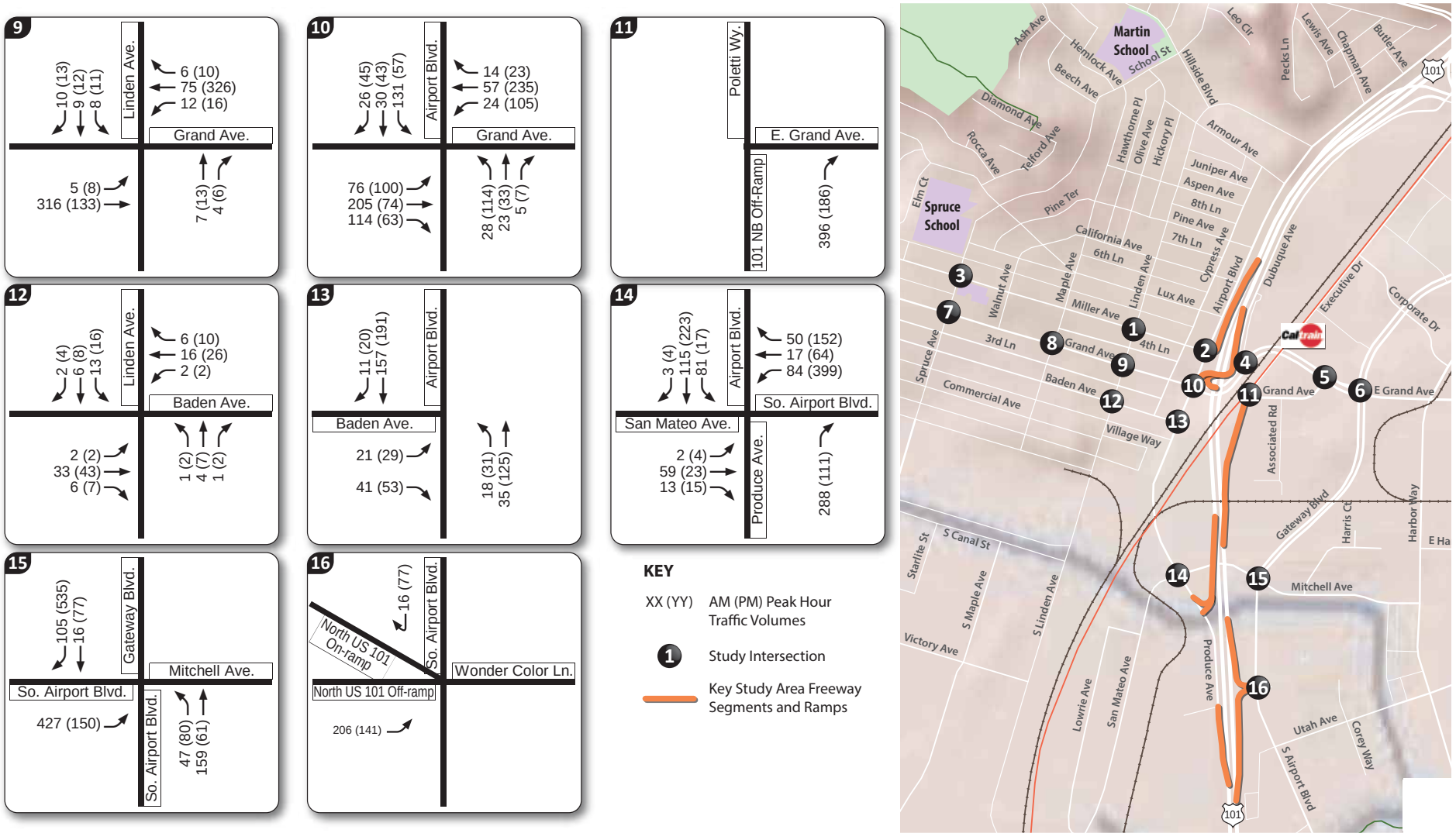


NORTH
NOT TO SCALE

Source: Fehr & Peers, 2014.

Figure 4.10-6A
Project Trip Assignment

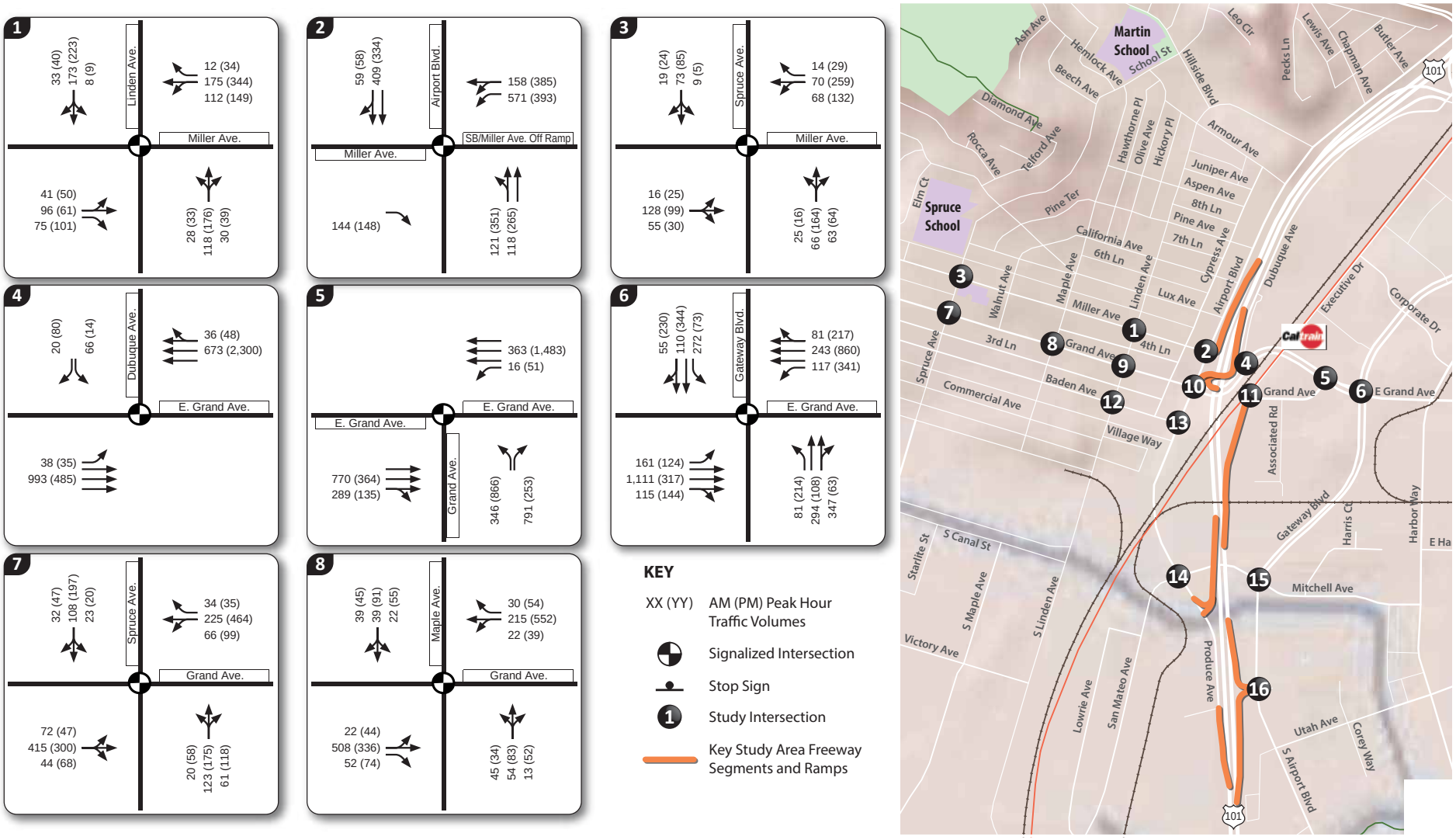
ATKINS



Source: Fehr & Peers, 2014.

Figure 4.10-6B
Project Trip Assignment

ATKINS



Source: Fehr & Peers, 2014.

Figure 4.10-7A

Existing Plus Project Intersection Peak Hour Volumes

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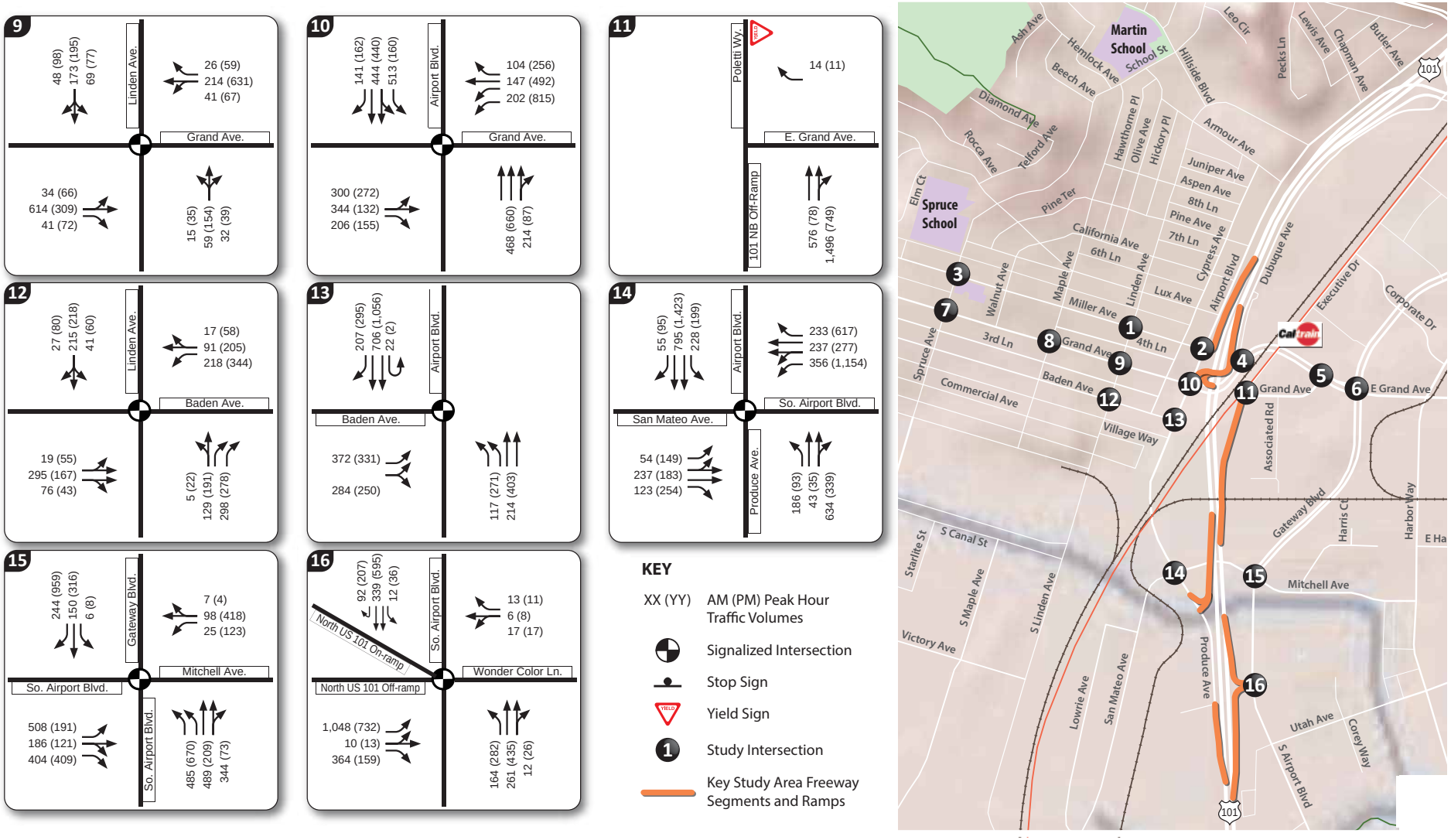

Source: Fehr & Peers, 2014.

Figure 4.10-7B

Existing Plus Project Intersection Peak Hour Volumes

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Table 4.10-13 Existing Plus Project Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*				*Volume Increase[a]*	
		Existing		*Existing Plus Project*			
		AM Peak Hour	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*
2. Miller Avenue/Airport Boulevard							
Eastbound Right Turn	680	124	68	162	107	—	—
Westbound Left Turn	465	213	153	281	248	—	—
Westbound Through	465	217	254	287	302	—	—
Northbound Through	220	77	82	95	151	—	—
Southbound Through	360	200	77	202	78	—	—
10. Grand Avenue/Airport Boulevard							
Eastbound Through	665	392	222	**813**	493	—	—
Eastbound Right Turn	665	38	39	81	122	—	—
Westbound Left Turn	670	49	425	62	515	—	—
Westbound Through	670	56	269	187	663	—	—
Westbound Right Turn	240	7	52	46	68	—	—
Northbound Left Turn	150	41	49	—	—	—	—
Northbound Through	410	188	261	228	284	—	—
Northbound Right Turn	410	119	15	—	—	—	—
Southbound Left Turn	390	334	118	**449**	143	—	—
Southbound Through	390	229	228	361	246	—	—
Southbound Right Turn	180	45	43	64	26	—	—
11. E. Grand Avenue/US-101 NB off-ramp/Poletti Way.							
Side-Street Stop Intersection, so no queues reported	—	—	—	—	—	—	—
14. San Mateo Avenue/Airport Boulevard							
Eastbound Left Turn	150	69	121	68	129	—	—
Eastbound Through	370	97	102	119	111	—	—
Eastbound Right Turn	150	49	104	50	124	—	—
Westbound Left Turn	225	196	**528**	219	**552**	—	53%
Westbound Through	810	164	339	194	332	—	—
Westbound Right Turn	85	**100**	**250**	**111**	**208**	27%	33%
Northbound Left Turn	130	**177**	109	**186**	110	0%	—
Northbound Through	300	56	40	92	46	—	—
Southbound Left Turn	150	119	**178**	**244**	**175**	—	9%
Southbound Through	1550	359	546	445	729	—	—
Southbound Right Turn	1550	22	30	15	36	—	—

Table 4.10-13 Existing Plus Project Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*				*Volume Increase[a]*	
		Existing		*Existing Plus Project*			
		AM Peak Hour	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*
15. So. Airport Boulevard/Mitchell Avenue/Gateway Boulevard							
Eastbound Left Turn	140	88	56	**790**	**279**	—	—
Eastbound Through	730	294	248	311	247	—	—
Eastbound Right Turn	730	147	91	81	82	—	—
Northbound Left Turn	300	98	183	129	190	—	—
Northbound Through	930	72	42	208	48	—	—
Northbound Right Turn	930	0	0	0	0	—	—
16. US-101 NB/So. Airport Boulevard Off Ramp/So. Airport Blvd							
Eastbound Left Turn	800	358	272	418	329	—	—
Eastbound Through	800	349	273	433	326	—	—
Eastbound Right Turn	150	84	43	107	42	—	—
Westbound Through	200	43	46	43	46	—	—
Westbound Right Turn	200	20	18	20	18	—	—
Northbound Left Turn	295	70	156	216	276	—	—
Northbound Through	635	130	190	139	201	—	—
Southbound Left Turn	100	18	42	20	44	—	—
Southbound Through	1080	221	431	221	428	—	—
Southbound Right Turn	125	44	84	60	**133**	—	—

SOURCE: Fehr & Peers (2014).

Bold = 95th percentile queue exceeds storage length; shaded = potentially significant impact

a. Volume Increased is calculated as the increase in volume for that particular movement, and is only shown for movements that are already exceeding storage under baseline conditions.

Threshold	Would the project 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 nonmotorized 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?

Impact 4.10-1 **Implementation of the Specific Plan could conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system. This is considered a potentially significant impact. Implementation of mitigation would reduce impacts to most intersections to *less than significant*, but impacts would remain *significant and unavoidable* for five intersections.**

Implementation of the Specific Plan would result in the addition of project traffic to intersection #1 Miller Avenue/Linden Avenue and cause it to degrade from LOS C to LOS E in the PM peak hour under existing plus project conditions. Implementation of mitigation measure MM4.10-1 would reduce this impact to a ***less-than-significant*** level.

MM4.10-1 *A signal timing adjustment to redistribute green time to better serve future vehicle volumes would reduce delay at the intersection, and improve operations at #1 Miller Avenue/Linden Avenue. This would cause the intersection to operate at an acceptable LOS D in the PM peak hour.*

Implementation of the Specific Plan would result in the addition of project traffic to intersection #6 E. Grand Avenue/Gateway Boulevard and cause it to degrade from LOS D to LOS E in the PM peak hour under existing plus project conditions. Implementation of mitigation measure MM4.10-2 would reduce this impact to a ***less-than-significant*** level. This lane modification would not require any additional right-of-way. This lane modification and signal timing adjustment would reduce vehicle delay at the intersection, and improve operations at #6 E. Grand Avenue/Gateway Boulevard. This would cause the intersection to operate at an acceptable LOS D in the PM peak hour.

MM4.10-2 *Convert one westbound through lane to a second westbound left-turn lane, and retime and optimize the traffic signal at E. Grand Avenue/Gateway Boulevard.*

Implementation of the proposed project would result in the addition of project traffic to intersection #10 Grand Avenue/Airport Boulevard and cause it to degrade from LOS D to LOS F in the AM and PM peak hours under existing plus project conditions. In addition, during the AM peak hour the eastbound through and southbound left turn 95th percentile queues would exceed the respective storage capacity for the movements.

Implementation of mitigation measure MM4.10-3 would reduce this impact to a ***less-than-significant*** level during the AM peak hour, but would be considered ***significant and unavoidable*** during the PM peak hour. This lane modification and signal timing adjustment would reduce delay at the intersection, and improve operations at #10 Grand Avenue/Airport Boulevard. This lane modification would not require any additional right-of-way. This would cause the intersection to continue to operate at an unacceptable LOS E in the AM peak hour. This mitigation measure would improve operations during the AM and PM peak hours; however, the intersection would still operate at an unacceptable LOS E.

Additionally, implementation of the identified mitigation measure does not reduce the southbound left-turn queuing impact.

MM4.10-3 *Modify the eastbound approach to include one left-turn pocket and one through-right shared lane, and retime and optimize the traffic signal at Grand Avenue/Airport Boulevard to reallocate green time.*

Implementation of the proposed project would result in the addition of project traffic to intersection #12 Baden Avenue/Linden Avenue and would exacerbate unacceptable LOS F in the PM peak hour under existing plus project conditions.

Implementation of MM4.10-4 would reduce this impact to a ***less-than-significant*** level. This modification and signal timing adjustment would reduce vehicle delay at the intersection, and improve operations at #12 Baden Avenue/Linden Avenue. This would cause the intersection to operate at an acceptable LOS D in the PM peak hour.

MM4.10-4 *Add a southbound left-turn pocket by removing existing parking and retime and optimize the traffic signal at Baden Avenue/Linden Avenue to reallocate green time to better serve future volumes.*

Implementation of the proposed project would result in the addition of project traffic to intersection #14 San Mateo Avenue/Airport Boulevard and cause it to degrade from LOS D to LOS F in the PM peak hour under existing plus project conditions. Furthermore, the project would exacerbate the 95th percentile queues for several movements during the AM and PM peak hours. Implementation of mitigation measure MM4.10-5 would reduce this impact on motor vehicle traffic to a less-than-significant level. This lane modification and signal timing adjustment would reduce delay at the intersection, and improve operations at #14 San Mateo Avenue/Airport Boulevard. This would cause the intersection to operate at an acceptable LOS D in the PM peak hour.

The inclusion of three left-turn lanes is not typically recommended as an urban intersection treatment; therefore, alternative mitigation measures may need to be explored, or unacceptable operations may be accepted.

MM4.10-5 *Modify the westbound approach to add a left-turn pocket, modifying the approach to include three left-turn lanes, one through lane, and one right-turn lane, and optimize the traffic signal at San Mateo Avenue/Airport Boulevard to reallocate green time to better serve future volumes.*

Implementation of the proposed project would result in the addition of project traffic to intersection #15 South Airport Boulevard/Gateway Boulevard and cause it to degrade from LOS D to LOS E in the AM peak hour and LOS D to F in the PM peak hour under existing plus project conditions. Furthermore, the project would result in the eastbound left turn 95th percentile queue exceeding storage capacity for the movement during the AM and PM peak hours.

Implementation of MM4.10-6 would reduce this intersection LOS impact to a ***less-than-significant*** level, but would be considered ***significant and unavoidable*** as it relates to queuing. This lane modification and signal timing adjustment would reduce delay at the intersection, and improve operations at #15 South Airport Boulevard/Gateway Boulevard. This would cause the intersection to operate at an acceptable LOS D in the AM and PM peak hours. Implementation of mitigation measure MM4.10-6 would improve queuing at the eastbound left turn movement; however, queues would

continue to exceed available storage capacity, resulting in a significant and unavoidable impact to queuing at this intersection.

MM4.10-6 *Include an additional westbound through lane, add a second southbound right-turn pocket, and retime and optimize the traffic signal at South Airport Boulevard/Gateway Boulevard to reallocate green time to better serve future traffic volumes.*

Implementation of the proposed project would result in the addition of project traffic to intersection #16 US-101 Northbound/South Airport Blvd Off Ramp/South Airport Blvd that would result in the southbound right turn 95th percentile queue exceeding the storage capacity for the movement during the PM peak hour under existing plus project conditions. Implementation of mitigation measure MM4.10-7 would reduce this impact to a ***less-than-significant*** level.

MM4.10-7 *A signal timing adjustment to redistribute green time to better serve future vehicle volumes would reduce queuing at the southbound right-turn movement. This would cause the intersection to operate at an acceptable LOS D and with acceptable queue lengths during the PM peak hour.*

Other Transportation Impacts and Mitigations

This section includes a discussion of the potential impacts of the project related to pedestrian, bike, and transit facilities; emergency access; construction; transportation demand management; and parking.

Public Transit Facilities

As discussed previously, public transit service in the area is provided by Caltrain, SamTrans, BART, and employer shuttles. Caltrain, SamTrans, and employer shuttles provide service within the project study area and bus connections to BART serve the study area. Public transit trips generated by the proposed project were determined based on existing regional transit mode split data and the Plan+ trip generation forecasts.

The Plan+ forecasts include transit ridership forecasts based on the project site characteristics and the accessibility of transit services at the site to employment. Based on these forecasts, the project will result in approximately 1,240 new daily transit trips. Implementation of the Specific Plan is intended to increase transit access and transit use, and will be accompanied by future investments in transit service and expanded services in the study area. Therefore, impacts to public transit conditions would be ***less than significant***.

Pedestrian Facilities

Implementation of the Specific Plan would result in increased pedestrian activity in and around the study area. In general, the Specific Plan would enhance pedestrian operations through new and improved pedestrian access at the Grand Avenue/Airport Boulevard intersection, additional sidewalks along study area roads, and a network of pedestrian-oriented streets throughout the project study area. Proposed on-site pedestrian improvements are shown in Figure 4.10-3.

Future project designs will be reviewed to ensure consistency with design standards. Considering the improvements shown in Figure 4.10-3 and proposed as part of the Specific Plan and citywide Pedestrian Master Plan, implementation of the project would improve existing pedestrian and bicycle facilities,

minimize on-site potential conflicts between various modes, and provide safe and efficient pedestrian connections between the Caltrain station, Downtown and the East of US-101 area.

Implementation of mitigation at identified intersections (#6, #9, #12, #14, and #15) would potentially increase crossing distance for pedestrians, create greater pedestrian exposure, and increase delay to pedestrians. Pedestrian and bicycle impacts would be considered significant if the proposed project would alter existing facilities with a negative impact on pedestrians or is inconsistent with adopted plans and programs. Since implementation of this mitigation would likely increase crossing distance and delay for pedestrians, the impact would be ***significant and unavoidable*** at these five intersections.

Bicycle Facilities

Implementation of the Specific Plan would result in increased bicycle activity in and around the study area. In general, the Specific Plan would enhance bicycle operations through new and improved bicycle access at the Grand Avenue/Airport Boulevard intersection, additional sidewalks along study area roads, and a network of bicycle-oriented streets throughout the project study area. Proposed on-site pedestrian improvements are shown in Figure 4.10-3.

Future project designs will be reviewed to ensure consistency with design standards. Considering the improvements shown in Figure 4.10-3 and proposed as part of the Specific Plan and citywide Pedestrian Master Plan, implementation of the project would improve existing bicycle facilities, minimize on-site potential conflicts between various modes, and provide safe and efficient pedestrian, bicycle, and vehicle connections between the Caltrain station, Downtown and the East of US-101 area.

A summary of applicable policies and plans was provided previously. The Specific Plan is designed to be consistent with these policies, plans, and programs and would not preclude the development of bicycle facilities described in these plans. In addition, the proposed project would not cause a significant impact to existing bicycle facilities. Therefore, impacts to bicycle conditions would be ***less than significant***.

Threshold	Would the project conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Impact 4.10-2 **Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on two northbound segments and one southbound segment of US-101 and would add traffic greater than 1 percent to a freeway segment already operating at LOS F under No Project Conditions for one northbound segment and two southbound segments, resulting in a significant project contribution under Existing Plus Project Conditions.**

Existing freeway volumes plus new vehicle trips due to the proposed project are shown in Table 4.10-14 (Existing Plus Project Freeway Segment LOS Results). The freeway operation LOS would vary depending on the peak hour, direction, and segment, ranging from LOS C to LOS F. Several segments on US-101 would exceed their CMP LOS standard (LOS E) with the proposed project under existing plus project conditions:

- Northbound US-101 South Airport Blvd On Ramp to E. Grand Ave/Poletti Way—LOS F (AM peak hour)
- Northbound US-101 Grand Ave/Airport On to Oyster Off—LOS F (AM and PM peak hours)
- Northbound US-101 North of Oyster Point Boulevard—LOS F (AM and PM peak hours)
- Southbound US-101 Oyster Off—LOS F (AM peak hour)
- Southbound US-101 between Oyster On and Miller Off—LOS F (AM and PM peak hours)
- Southbound US-101 between Produce on and I-380 west—LOS F (AM and PM peak hours)

Existing Plus Project freeway ramp volume-to-capacity results are shown in Table 4.10-15 (Existing Plus Project Freeway Ramp Volume-to-Capacity Results). Under Plus Project conditions, the northbound US-101 off-ramp to East Grand Avenue/Poletti Way would continue to be over capacity.

Widening of northbound US-101 mainline from four to five mixed-flow lanes from Airport Boulevard to Oyster Point Boulevard would expand roadway capacity, thus providing acceptable operations. However, this portion of the freeway is under the jurisdiction of Caltrans, which would be responsible for funding and approving this improvement. No additional feasible mitigation measures are available to reduce this impact. Therefore, this would be a ***significant and unavoidable*** impact.

Table 4.10-14 Existing Plus Project Freeway Segment LOS Results

Freeway Segment	*Type*	*Peak Hour*	*Existing*				*Existing Plus Project*				*CMP Standard*
			Volume	*V/C[a]*	*Density[b]*	*LOS*	*Volume*	*V/C[a]*	*Density[b]*	*LOS*	
Northbound US-101											
I-380 to South Airport Blvd off-ramp	Basic	AM	9,480	0.73	26.93	D	10,082	0.78	29.16	D	E
		PM	7,281	0.56	20.24	C	7,608	0.59	21.15	C	E
Between S Airport Blvd ramps	Basic	AM	8,264	0.76	28.53	D	8,660	0.80	30.40	D	E
		PM	6,518	0.60	21.75	C	6,704	0.62	22.38	C	E
South Airport Blvd on-ramp to E Grand Ave/Poletti Way	Weave	AM	8,264	0.92	46.36	E	8,660	**>1.00**	**—**	**F**	E
		PM	6,518	0.73	30.65	D	6,704	0.76	33.61	D	E
Between Grand ramps	Basic	AM	6,892	0.79	30.18	D	6,908	0.80	30.28	D	E
		PM	6,387	0.74	27.29	D	6,464	0.75	27.70	D	E
Grand/Airport on-ramp to Oyster off-ramp	Weave	AM	6,892	0.99	45.60	E	6,908	**>1.00**	**—**	**F**	E
		PM	6,387	0.95	43.10	E	6,464	**>1.00**	**—**	**F**	E
Between Oyster Point ramps	Basic	AM	6,826	0.79	29.78	D	6,999	0.81	30.85	D	E
		PM	6,735	0.78	29.24	D	7,241	0.84	32.44	D	E
North of Oyster Point	Weave	AM	6,826	**>1.00**	**—**	**F**	6,999	**>1.00**	**—**	**F**	E
		PM	6,735	**>1.00**	**—**	**F**	7,241	**>1.00**	**—**	**F**	E
Southbound US-101											
Oyster Point Blvd off-ramp	Basic	AM	8,605	0.99	44.28	E	9,079	**>1.00**	**—**	**F**	E
		PM	6,494	0.75	27.87	D	6,758	0.78	29.38	D	E
Between Oyster off-ramp and Airport on-ramp	Basic	AM	7,340	0.85	33.12	D	7,808	0.90	36.66	E	E
		PM	6,340	0.73	27.04	D	6,594	0.76	28.43	D	E
Airport Blvd on-ramp	Basic	AM	7,340	0.85	33.12	D	7,808	0.90	36.66	E	E
		PM	6,340	0.73	27.04	D	6,594	0.76	28.43	D	E
Between Oyster on-ramp and Miller off-ramp	Weave	AM	8,040	**>1.00**	**—**	**F**	8,508	**>1.00**	**—**	**F**	E
		PM	6,960	**>1.00**	**—**	**F**	7,214	**>1.00**	**—**	**F**	E

Table 4.10-14 Existing Plus Project Freeway Segment LOS Results

Freeway Segment	*Type*	*Peak Hour*	*Existing*				*Existing Plus Project*				*CMP Standard*
			Volume	*V/C[a]*	*Density[b]*	*LOS*	*Volume*	*V/C[a]*	*Density[b]*	*LOS*	
Produce/Airport Off-ramp	Basic	AM	8,004	0.92	38.33	E	8,292	0.96	41.00	E	E
		PM	7,692	0.89	35.73	E	7,803	0.90	36.62	E	E
Between Produce ramps	Basic	AM	7,796	0.90	36.57	E	7,796	0.90	36.57	E	E
		PM	7,273	0.84	32.65	D	7,273	0.84	32.65	D	E
Between Produce on-ramp and I-380 west	Weave	AM	7,796	**>1.00**	**—**	**F**	7,796	**>1.00**	**—**	**F**	E
		PM	7,273	**>1.00**	**—**	**F**	7,273	**>1.00**	**—**	**F**	E

SOURCE: Fehr & Peers (2014).

Bold = unacceptable LOS. shaded = Potentially significant impact.

a. Freeway segment level of service based on volume-to-capacity ratio according to the Highway Capacity Manual (Transportation Research Board, *Highway Capacity Manual*, 2010).

b. Density for each segment is shown in passenger-car equivalents per mile of roadway per lane (pcpmpl).

Table 4.10-15 Existing Plus Project Freeway Ramp Volume-to-Capacity Results

Freeway Ramp	*Peak Hour*	*Capacity (veh/hr)*	*Volume (veh/hr)*	
			Existing	*Existing Plus Project*
Northbound US-101				
On-ramp from Grand Avenue/Airport Boulevard	AM	2,000	650	807
	PM		842	1,271
On-ramp from South Airport Boulevard	AM	2,000	246	262
	PM		405	482
Off-ramp to East Grand Avenue/Poletti Way	AM	1,500	**1,618**	**2,014**
	PM		536	722
Off-ramp to South Airport Boulevard	AM	1,500	1,216	1,422
	PM		763	904
Southbound US-101				
On-ramp from Produce Avenue	AM	3,300	934	1,145
	PM		1,733	2,370
Off-ramp to Airport Boulevard/Miller Avenue	AM	1,500	531	711
	PM		531	674
Off-ramp to South Airport Boulevard/Produce Avenue	AM	1,500	208	496
	PM		419	530

SOURCE: Fehr & Peers (2014).
Bold = volume exceeds capacity; shaded = potentially significant impact

Impact 4.10-3 **Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway ramp volume for the northbound US-101 off-ramp to East Grand Avenue/Poletti Way, a ramp already operating at LOS F under No Project Conditions, resulting in a significant project contribution under Existing Plus Project Conditions.**

Recent improvements to the northbound US-101 off-ramp to East Grand Avenue/Poletti Way from one lane to two expand roadway capacity and provide acceptable operations, thus reducing the impact to ***less than significant***.

MM4.10-8 *Add a second off-ramp lane from northbound US-101 at Grand Avenue/Poletti Way to increase capacity of the off-ramp to serve future demand.*

4.10.5 Cumulative Impacts

A cumulative impact analysis is only provided for those thresholds that result in a less-than-significant, potentially significant, or significant and unavoidable impact. A cumulative impact analysis is not provided for Effects Found Not to Be Significant, which result in no project-related impacts.

Cumulative Baseline Conditions

Cumulative baseline turning movement and freeway segment volumes for a majority of the study facilities were obtained from the East of US-101 Traffic Study representing the Long Term Cumulative (2035) plus Oyster Point Redevelopment Conditions. These volumes were developed using a traffic model that was built from the C/CAG model framework with a specific refinement to its trip distribution assumptions based on recent surveys and knowledge of traffic patterns in the study area. The model was calibrated to account for local conditions prior to generating the future travel demand forecasts. The future year model includes planned infrastructure projects and accounts for the increase in traffic demand served through the study area due to these improvements. This model utilizes the EMME/2 software platform along with recent land use and road network information to forecast the regional and local demand to 2035.

For the study facilities that were not studied as part of the East of US-101 Traffic Study, adjustments based on regional growth factors were applied to ensure consistent baseline volumes.

Cumulative Land Use Assumptions and Roadway Improvements

The cumulative baseline conditions described in the East of US-101 Traffic Study contain land use forecasts that account for growth envisioned as part of the South San Francisco General Plan and other guiding documents. The land use assumptions were provided by the City of South San Francisco in March 2009. None of the land use or development changes associated with the proposed project are included in the East of US-101 cumulative baseline conditions. These baseline conditions represent cumulative no project conditions for the proposed project.

Cumulative Plus Project Conditions

Intersection turning movement volumes for cumulative no project conditions are shown on Figure 4.10-8A and Figure 4.10-8B (Cumulative No Project Conditions Intersection Peak Hour Volumes). Project volumes are added to cumulative no project volumes for cumulative plus project conditions. The cumulative plus project volumes are shown on Figure 4.10-9A and Figure 4.10-9B (Cumulative Plus Project Conditions Intersection Peak Hour Volumes).

Cumulative No Project Intersection Operations

The intersection LOS analysis results for cumulative conditions are presented in Table 4.10-16 (Cumulative Plus Project Intersection LOS Result). The LOS results show that the following study intersections are expected to operate at unacceptable intersection operations due to the cumulative traffic growth without the study area:

1. Miller Avenue/Linden Avenue—LOS F during the PM peak hour
6. E. Grand Avenue/Gateway Boulevard—LOS F during the AM and PM peak hours
10. Grand Avenue/Airport Boulevard—LOS F during the AM and PM peak hours
12. Baden Avenue/Linden Avenue—LOS F during the AM and PM peak hours
14. San Mateo Avenue/Airport Boulevard—LOS F during the PM peak hour
15. South Airport Boulevard/Gateway Boulevard—LOS E during the AM peak hour

16. US-101 NB/South Airport Boulevard Off Ramp/South Airport Boulevard—LOS F during the AM and PM peak hours

Table 4.10-16 Cumulative Plus Project Intersection LOS Results

Intersection	*Control*	*Cumulative*				*Cumulative Plus Project*			
		AM		*PM*		*AM*		*PM*	
		Delay[a]	*LOS*	*Delay[a]*	*LOS*	*Delay[a]*	*LOS*	*Delay[a]*	*LOS*
1. Miller Ave/Linden Ave	Signal	47.6	D	**>80 (1.17)**	**F**	**72.6**	**E**	**>80 (1.27)**	**F**
2. Miller Ave/Airport Blvd	Signal	27.7	C	22.0	C	29.2	C	32.9	C
3. Miller Ave/Spruce Ave	Signal	18.2	B	24.6	C	21.5	C	20.6	C
4. Grand Ave/Dubuque Ave	Signal	8.1	A	11.4	B	7.9	A	18.9	B
5. Grand Ave/E. Grand Ave	Signal	24.2	C	17.5	B	27.0	C	**62.8**	**E**
6. E. Grand Ave/Gateway Blvd	Signal	**>80 (1.35)**	**F**	**>80 (1.12)**	**F**	**>80 (1.45)**	**F**	**>80 (1.34)**	**F**
7. Grand Ave/Spruce Ave	Signal	17.9	B	27.9	C	24.8	C	**78.2**	**E**
8. Grand Ave/Maple Ave	Signal	10.4	B	11.9	B	13.3	B	22.4	C
9. Grand Ave/Linden Ave	Signal	14.0	B	21.6	C	**>80 (1.12)**	**F**	**>80 (2.74)**	**F**
10. Grand Ave/Airport Blvd	Signal	**>80 (1.17)**	**F**	**>80 (1.01)**	**F**	**>80 (1.53)**	**F**	**>80 (1.39)**	**F**
11. E. Grand Ave/US-101 NB off-ramp/Poletti Way	SSS	11.7	B	8.5	A	11.7	B	8.5	A
12. Baden Ave/Linden Ave	Signal	**>80 (1.37)**	**F**	**>80 (1.28)**	**F**	**>80 (1.47)**	**F**	**>80 (1.43)**	**F**
13. Baden Ave/Airport Blvd	Signal	31.6	C	26.0	C	40.0	D	52.6	D
14. San Mateo Ave/Airport Blvd	Signal	38.0	D	**>80 (1.13)**	**F**	39.3	D	**>80 (1.35)**	**F**
15. South Airport Blvd/ Gateway Blvd	Signal	**74.6**	**E**	42.5	D	**>80 (1.11)**	**F**	**>80 (1.07)**	**F**
16. US-101 NB/South Airport Blvd Off Ramp/ South Airport Blvd	Signal	**>80 (1.12)**	**F**	**>80 (1.01)**	**F**	**>80 (1.20)**	**F**	**>80 (1.06)**	**F**

SOURCE: Fehr & Peers (2014).

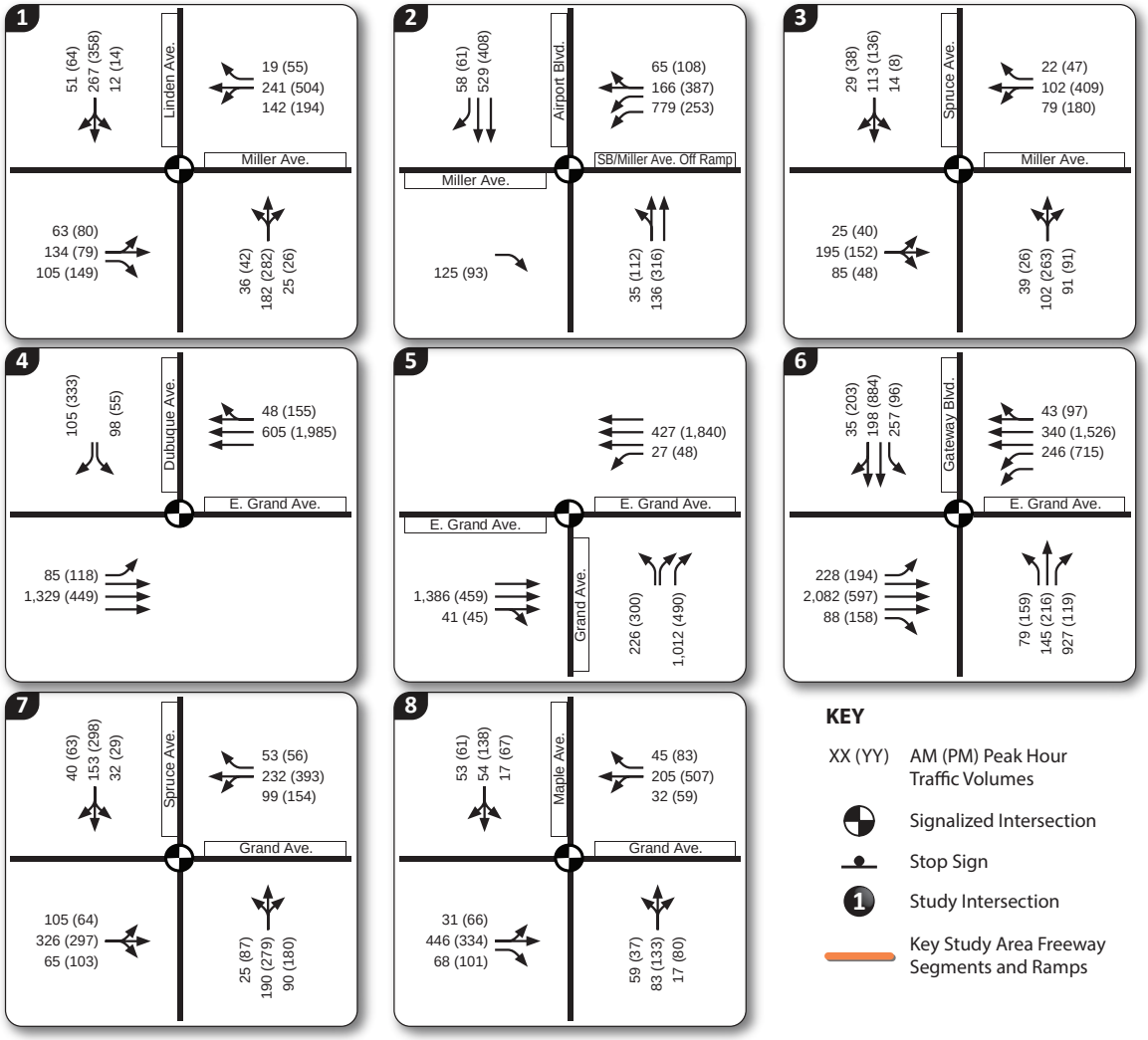
Bold = unacceptable LOS; shaded = potentially significant impact; SSS = side-street stop

a. For signalized and all-way stop controlled intersections, the delay shown is the weighted average for all movements in seconds per vehicle. For side-street stop controlled intersection, the delay shown is the worst-operating approach delay. For intersections performing at LOS F, Volume/Capacity ratio for the overall intersection is shown in parentheses.

These results are generally consistent with previous studies in the area.

Cumulative Plus Project Intersection Operations

New vehicle trips generated by the proposed project would add traffic to all study intersections, including some movements that are expected to operate at LOS E or F without the project. These added project trips would cause the overall intersection LOS at several intersections throughout the study area to significantly worsen compared to the cumulative no project conditions. These are considered significant impacts as described below.



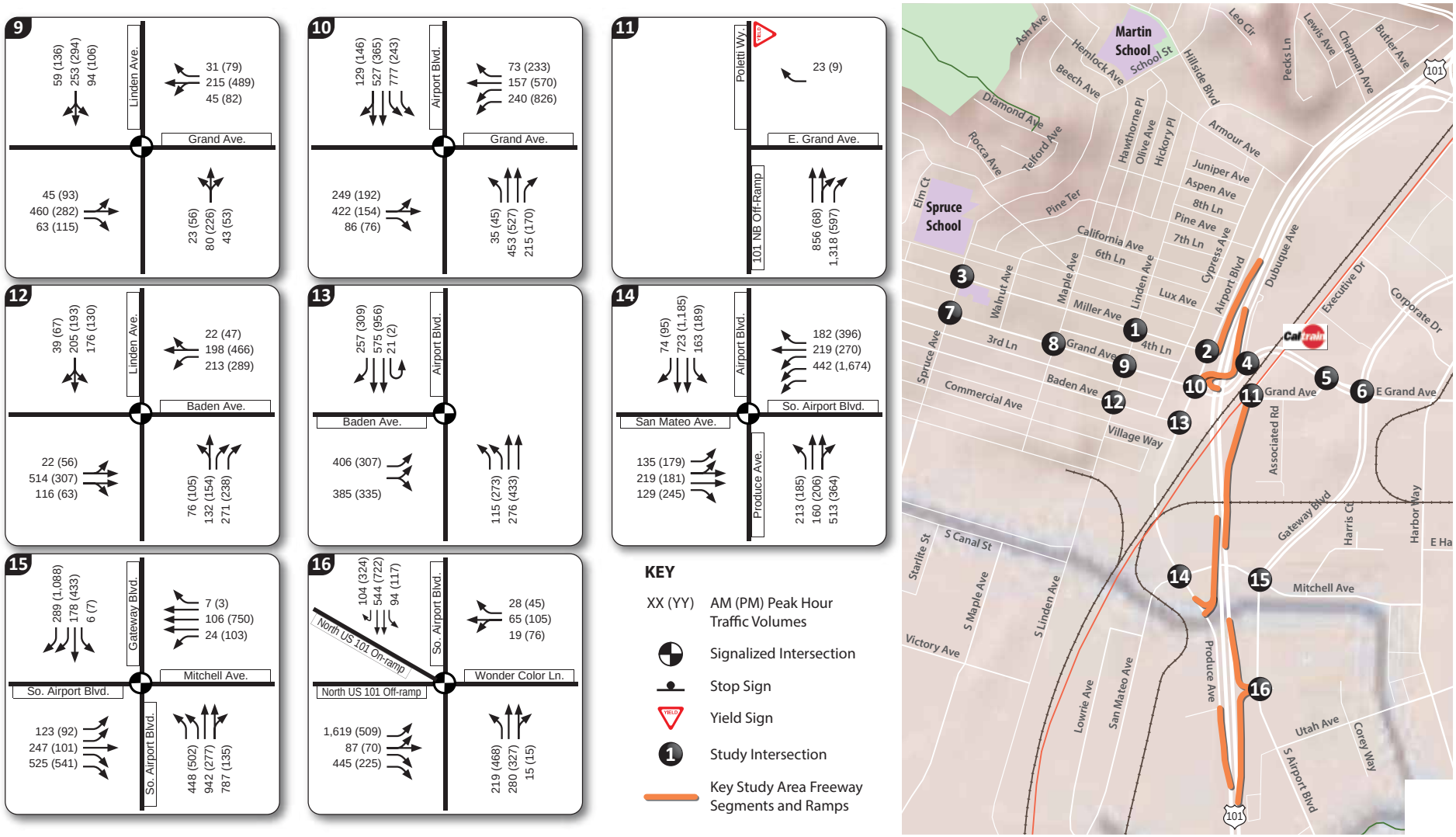
NORTH
NOT TO SCALE

Source: Fehr & Peers, 2014.

Figure 4.10-8A

Cumulative No Project Conditions Intersection Peak Hour Volumes

ATKINS

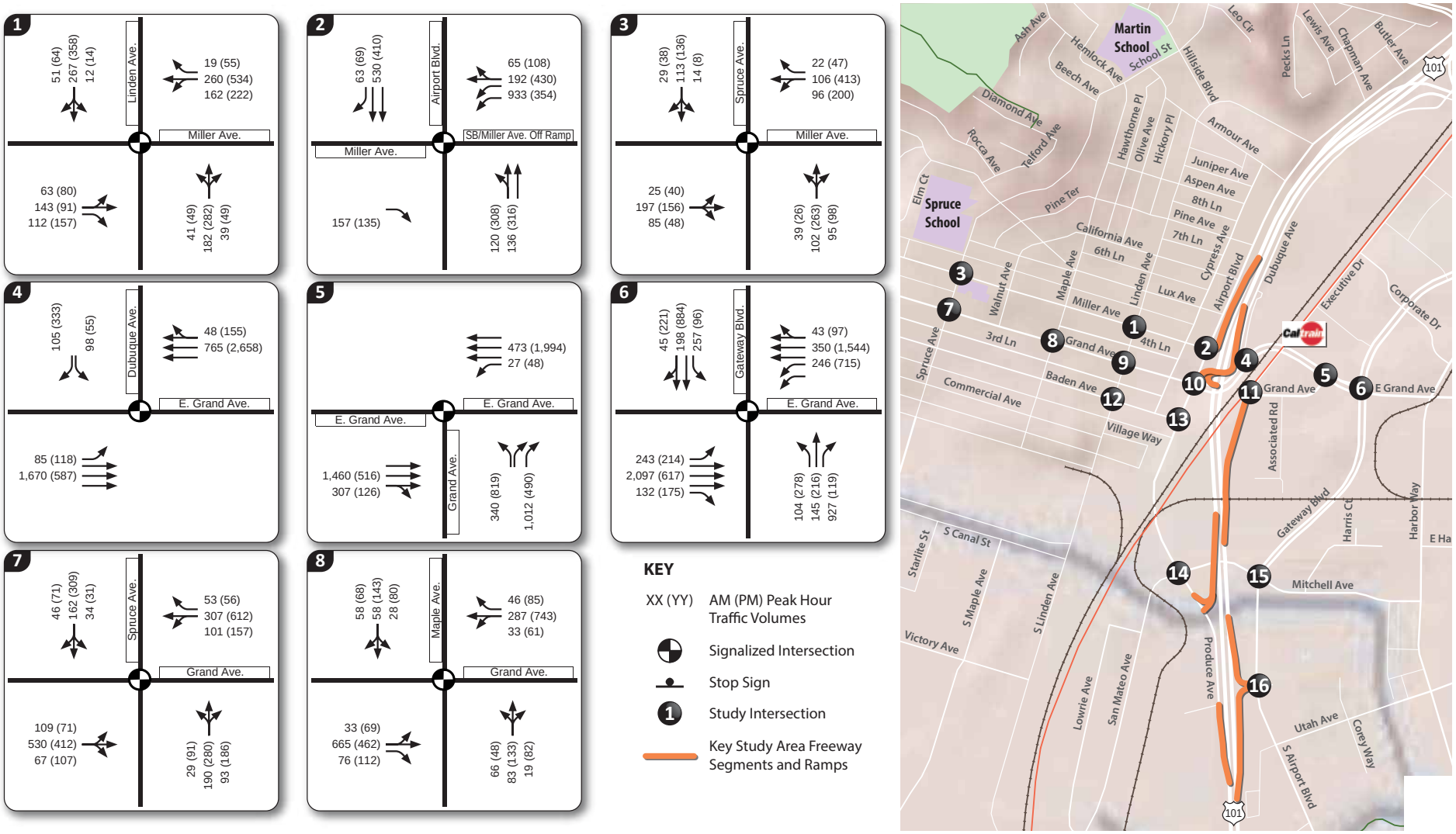


Source: Fehr & Peers, 2014.

Figure 4.10-8B

Cumulative No Project Conditions Intersection Peak Hour Volumes

ATKINS

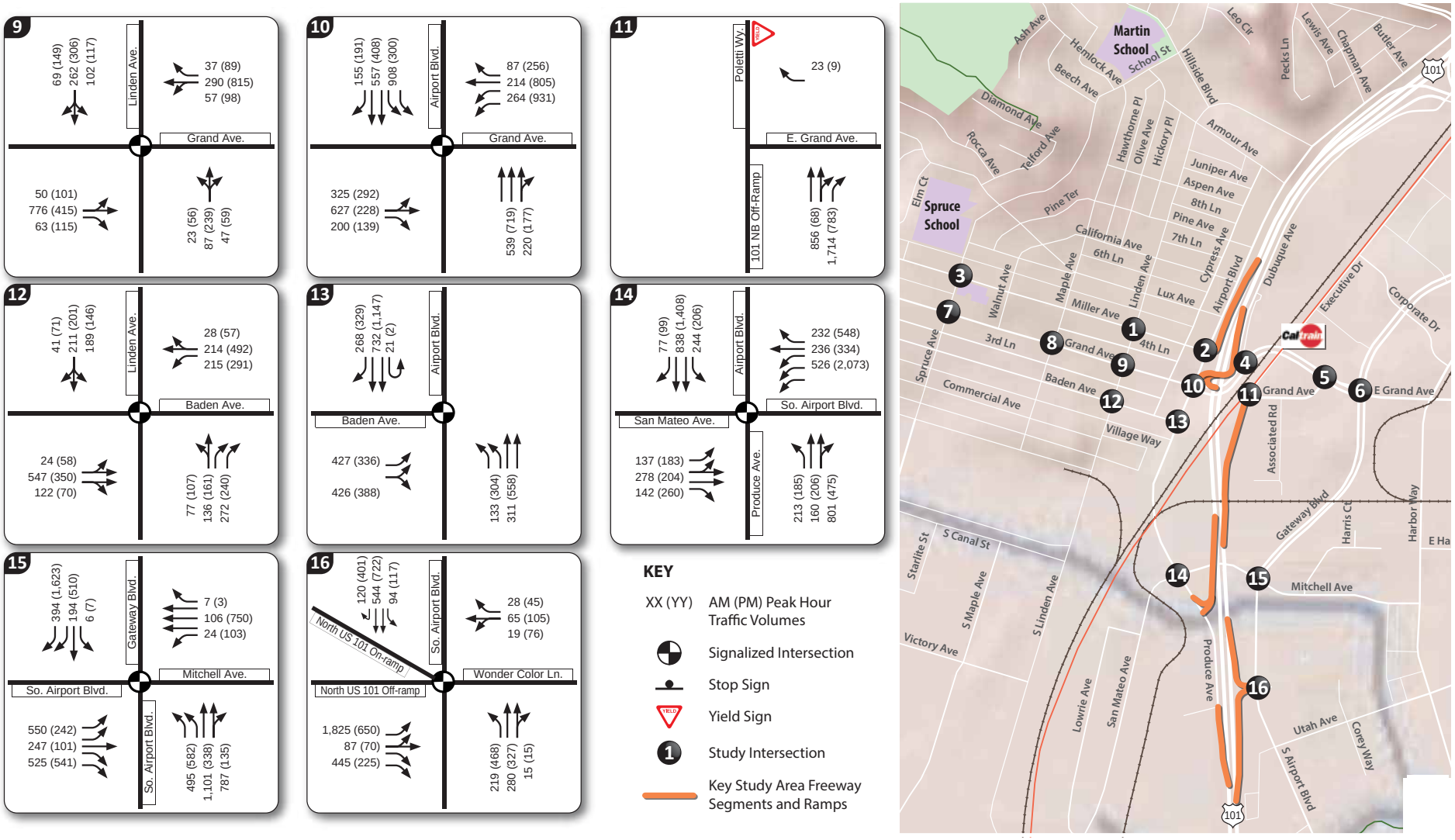


Source: Fehr & Peers, 2014.

Figure 4.10-9A

Cumulative No Project Conditions Intersection Peak Hour Volumes

ATKINS



Source: Fehr & Peers, 2014.

Figure 4.10-9B

Cumulative No Project Conditions Intersection Peak Hour Volumes

ATKINS

Vehicle Queuing at Freeway Interchange Intersections

Cumulative No Project and Cumulative Plus Project vehicle queues at freeway interchange intersections are shown in Table 4.10-17 (Cumulative Plus Project Intersection Vehicle Queuing at Freeway Interchange Intersections). Under No Project conditions, the following intersections have movements with 95th percentile queues that exceed their storage capacity during the AM and/or PM peak hours:

- #10: Grand Avenue/Airport Boulevard
- #14: San Mateo Avenue/Produce Avenue/South Airport Boulevard
- #16: US-101 Northbound/South Airport Blvd Off Ramp/South Airport Boulevard

Under Plus Project conditions, several movements which already have 95th percentile queues exceeding capacity under No Project conditions are expected to worsen with the addition of Project traffic. Additionally, several new movements will have 95th percentile queues that exceed storage capacity during the AM and/or PM peak hours at the following intersections:

- #2: Miller Avenue/Airport Boulevard
- #10: Grand Avenue/Airport Boulevard
- #14: San Mateo Avenue/Produce Avenue/South Airport Boulevard
- #15: South Airport Boulevard/Mitchell Avenue/Gateway Boulevard
- #16: US-101 Northbound/South Airport Blvd Off Ramp/South Airport Boulevard

Table 4.10-17 Cumulative Plus Project Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*				*Volume Increase[a]*	
		Cumulative		*Cumulative Plus Project*			
		AM Peak Hour	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*
2. Miller Avenue/Airport Boulevard							
Eastbound Right Turn	680	137	61	179	146	—	—
Westbound Left Turn	465	235	54	273	92	—	—
Westbound Through	465	132	307	138	346	—	—
Northbound Through	220	66	111	94	**356**	—	—
Southbound Through	360	218	80	231	176	—	—
Southbound Right Turn	360	31	20	35	36	—	—

Table 4.10-17 Cumulative Plus Project Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*				*Volume Increase[a]*	
		Cumulative		*Cumulative Plus Project*			
		AM Peak Hour	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*
10. Grand Avenue/Airport Boulevard							
Eastbound Through	665	**755**	375	**1,161**	535	49%	—
Eastbound Right Turn	665	36	36	90	40	—	—
Westbound Left Turn	670	189	469	209	**720**	—	—
Westbound Through	670	276	**716**	376	**1,263**	—	41%
Westbound Right Turn	240	61	85	61	**257**	—	—
Northbound Left Turn	150	38	56	—	—	—	—
Northbound Through	410	255	335	302	320	—	—
Northbound Right Turn	410	188	80	—	—	—	—
Southbound Left Turn	390	**446**	124	**547**	111	17%	—
Southbound Through	390	271	195	188	98	—	—
Southbound Right Turn	180	—	—	39	20	—	—
11. E. Grand Avenue/US-101 NB off-ramp/Poletti Way.							
Side-Street Stop Intersection, no queues reported	—	—	—	—	—	—	—
14. San Mateo Avenue/Airport Boulevard							
Eastbound Left Turn	150	135	139	143	148	—	—
Eastbound Through	370	115	119	139	125	—	—
Eastbound Right Turn	150	50	111	52	69	—	—
Westbound Left Turn	225	136	**667**	156	**577**	—	24%
Westbound Through	810	217	195	228	174	—	—
Westbound Right Turn	85	**88**	**86**	**105**	82	27%	—
Northbound Left Turn	130	**222**	**258**	**222**	**183**	0%	0%
Northbound Through	300	110	111	**303**	128	—	—
Southbound Left Turn	150	**154**	**163**	**233**	134	50%	—
Southbound Through	1,550	395	538	481	873	—	—
Southbound Right Turn	1,550	30	29	13	17	—	—

Table 4.10-17 Cumulative Plus Project Intersection Vehicle Queuing at Freeway Interchange Intersections

Intersection—Movement	*Storage Distance (feet)*	*95th Percentile Queue (feet)*				*Volume Increase[a]*	
		Cumulative		*Cumulative Plus Project*			
		AM Peak Hour	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*	*AM Peak Hour*	*PM Peak Hour*
15. So. Airport Boulevard/Mitchell Avenue/Gateway Boulevard							
Eastbound Left Turn	140	59	52	**336**	122	—	—
Eastbound Through	730	243	95	206	101	—	—
Eastbound Right Turn	730	114	40	73	73	—	—
Northbound Left Turn	300	93	153	91	166	—	—
Northbound Through	930	550	112	808	126	—	—
Northbound Right Turn	930	0	0	0	0	—	—
16. US-101 NB/So. Airport Boulevard Off-Ramp/So. Airport Blvd							
Eastbound Left Turn	800	**1,017**	257	**1,154**	321	13%	—
Eastbound Through	800	**997**	254	**1,172**	326	0%	—
Eastbound Right Turn	150	98	27	105	27	—	—
Westbound Through	200	106	186	106	186	—	—
Westbound Right Turn	200	24	27	24	27	—	—
Northbound Left Turn	295	**299**	**682**	**299**	**698**	0%	0%
Northbound Through	635	143	162	143	162	—	—
Southbound Left Turn	100	**151**	**154**	**148**	**143**	0%	0%
Southbound Through	1,080	374	512	374	447	—	—
Southbound Right Turn	125	63	**240**	70	**254**	—	24%

SOURCE: Fehr & Peers (2014).

Bold = 95th percentile queue exceeds storage length. Shaded = Potentially significant impact.

a. Volume Increased is calculated as the increase in volume for that particular movement, and is only shown for movements that are already exceeding storage under baseline conditions.

Impact 4.10-4 **Implementation of the Specific Plan could conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system under cumulative plus project conditions. This is a potentially significant impact. Implementation of mitigation would reduce impacts to most intersections to *less than significant*, but impacts would remain *significant and unavoidable* for one intersection.**

The proposed project would result in the addition of project traffic to intersection #1 Miller Avenue/Linden Avenue and cause it to degrade from LOS D to LOS E in the AM peak hour. During the PM peak hour, the addition of project traffic (6 percent increase) would exacerbate unacceptable LOS F under Cumulative Plus Project Conditions, which would exacerbate unacceptable LOS F in the PM peak hour under cumulative plus project conditions.

Implementation of mitigation measure MM4.10-9 would reduce this impact to a ***less-than-significant*** level. This lane modification and signal timing adjustment would reduce delay at the intersection, and improve operations at #1 Miller Avenue/Linden Avenue. This would cause the intersection to operate at an acceptable LOS D in the AM peak hour and LOS B in the PM peak hour.

MM4.10-9 *Repurpose the eastbound and westbound approaches to include one left-turn pocket and one through-right shared lane, and retime and optimize the traffic signals at Miller Avenue/Linden Avenue. This lane modification would not require any additional right-of-way.*

Implementation of the proposed project would result in the addition of project traffic to intersection #2 Miller Avenue/Airport Boulevard that would cause the 95th percentile queue for the northbound through to exceed its storage capacity during the PM peak hour under cumulative plus project conditions. This would cause the intersection to operate at an acceptable LOS C and with acceptable queue lengths during the PM peak hour. Implementation of the following mitigation measure would reduce this impact to a ***less-than-significant*** level.

MM4.10-10 *A signal timing adjustment to optimize cycle length and redistribute green time to better serve future vehicle volumes would reduce delay at the intersection, and improve operations at this intersection.*

Implementation of the Station Area Plan would result in the addition of project traffic to intersection #5 Grand Avenue/East Grand Avenue that would increase total traffic volume through the intersection by 25 percent and deteriorate operations from LOS B to LOS E under Cumulative Plus Project Conditions. Implementation of the following mitigation measure would reduce this impact to a ***less-than-significant*** level.

MM4.10-11 *A signal timing adjustment to redistribute green time to better serve future vehicle volumes would reduce delay at the intersection, and improve operations at this intersection. This would cause the intersection to operate at an acceptable LOS D during the PM peak hour.*

Implementation of the Station Area Plan would result in the addition of project traffic (3 to 4 percent increase) to intersection #6 E. Grand Avenue/Gateway Boulevard, which would exacerbate unacceptable LOS F in the AM and PM peak hours under Cumulative Plus Project Conditions. This mitigation measure would improve operations during the AM peak hour to LOS E, and during the PM peak hour to LOS F, but at a lower delay than without Project traffic. The addition of several lanes is not typically recommended as an urban intersection treatment; therefore, alternative mitigation measures may need to be explored, or unacceptable operations may be accepted.

Implementation of the following mitigation measure would reduce this impact to a ***less-than-significant*** level.

MM4.10-12 *Construct an additional northbound right-turn lane, southbound left-turn lane, southbound right-turn pocket, and retime and optimize the traffic signals at E. Grand Avenue/Gateway Boulevard.*

Implementation of the Station Area Plan would result in the addition of project traffic (19 percent increase) to intersection #7 Grand Avenue/Spruce Avenue and cause it to degrade from LOS C to LOS E in the PM peak hour under Cumulative Plus Project Conditions. This lane modification would not require any additional right-of-way. This lane modification would reduce delay at the intersection and

improve operations at #7 Grand Avenue/Spruce Avenue This would cause the intersection to operate at an acceptable LOS C in the PM peak hour.

Implementation of the following mitigation measure would reduce this impact to a ***less-than-significant*** level.

MM4.10-13 *Convert the westbound approach to include one left-turn lane and one through-right shared lane.*

Implementation of the Station Area Plan would result in the addition of project traffic (27 to 32 percent increase) to intersection #9 Grand Avenue/Linden Avenue and cause it to degrade from LOS B to LOS F in the AM peak hour and from LOS C to LOS F in the PM peak hour under Cumulative Plus Project Conditions. This lane modification would not require any additional right-of-way. This lane modification and signal timing adjustment would reduce delay at the intersection and improve operations at #9 Grand Avenue/Linden Avenue. This would cause the intersection to operate at an acceptable LOS D in the AM and PM peak hours.

Implementation of the following mitigation measure would reduce this impact to a ***less-than-significant*** level.

MM4.10-14 *Modify the eastbound and westbound approach to each have one left-turn pocket and one through-right shared lane, and retime and optimize the traffic signals at Grand Avenue/Linden Avenue.*

Implementation of the Station Area Plan would result in the addition of project traffic (22 to 25 percent increase) to intersection #10 Grand Avenue/Airport Boulevard, which would exacerbate unacceptable LOS F in the AM and PM peak hours under Cumulative Plus Project Conditions. Furthermore, the project would exacerbate the 95th percentile queues for several movements during the AM and PM peak hours.

Although implementation of the following mitigation measure would help to reduce queuing at the intersection, not all queue lengths are reduced to acceptable levels during the AM and PM peak hours. Therefore, this impact would be considered ***significant and unavoidable*** during the AM and PM peak hours.

This mitigation measure would improve operations during the AM and PM peak hours. The intersection would still operate at an unacceptable LOS F during the AM and PM peak hours, but at a lower delay than without project traffic. However, implementation of the identified mitigation measure does not reduce all queuing impacts.

The addition of several lanes is not typically recommended as an urban intersection treatment; therefore, alternative mitigation measures may need to be explored, or unacceptable operations may be accepted.

MM4.10-15 *Modify the eastbound approach to include one left-turn pocket, one through lane, and one right-turn pocket, and retime and optimize the traffic signals at Grand Avenue/Airport Boulevard. This lane modification and signal timing adjustment would reduce vehicle delay at the intersection, and improve operations at #10 Grand Avenue/Airport Boulevard.*

Implementation of the Station Area Plan would result in the addition of project traffic (5 to 6 percent increase) to intersection #12 Baden Avenue/Linden Avenue, which would exacerbate unacceptable

LOS F in the AM and PM peak hours under Cumulative Plus Project Conditions. This signal timing adjustment would reduce delay at the intersection, and improve operations at #12 Baden Avenue/Linden Avenue This would cause the intersection to operate at an acceptable LOS C in the AM peak hour and at LOS D during the PM peak hour.

Implementation of the following mitigation measure would reduce this impact to a ***less-than-significant*** level.

MM4.10-16 *Retime and optimize the traffic signals at Baden Avenue/Linden Avenue.*

Implementation of the Station Area Plan would result in the addition of project traffic (20 percent increase) to intersection #14 San Mateo Avenue/Airport Boulevard, which would exacerbate unacceptable LOS F in the PM peak hour under Cumulative Plus Project Conditions. Furthermore, the project would exacerbate the 95th percentile queues for several movements during the AM and PM peak hours.

Implementation of the following mitigation measure would reduce this impact to a less-than-significant level. Although implementation of the following mitigation measure would help to reduce queuing at the intersection, not all queue lengths are reduced to acceptable levels during the AM and PM peak hours. Therefore, this impact would be considered significant and unavoidable during the AM and PM peak hours. This lane modification and signal timing adjustment would reduce vehicle delay at the intersection, and improve operations at #14 San Mateo Avenue/Airport Boulevard during the PM peak hour; however, the intersection would still operate at an unacceptable LOS F, but at a lower delay than without project traffic. However, implementation of the identified mitigation measure does not reduce all queuing impacts and the impact would remain ***significant and unavoidable***. The addition of several lanes is not typically recommended as an urban intersection treatment; therefore, alternative mitigation measures may need to be explored, or unacceptable operations may be accepted.

MM4.10-17 *Construct an additional westbound left-turn lane, provide a northbound right-turn pocket, and retime and optimize the traffic signals at San Mateo Avenue/Airport Boulevard.*

Implementation of the Station Area Plan would result in the addition of project traffic (a 20 to 22 percent increase) to intersection #15 So. Airport Boulevard/Gateway Boulevard and cause it to degrade from LOS E to LOS F in the AM peak hour and from LOS D to LOS F in the PM peak hour under Cumulative Plus Project Conditions. Furthermore, the project would result in the eastbound left-turn 95th percentile queue exceeding storage capacity for the movement during the AM peak hour. This lane modification and signal timing adjustment would reduce vehicle delay at the intersection, and improve operations at #15 So. Airport Boulevard/Gateway Boulevard This mitigation measure would improve operations during the AM and PM peak hours to LOS E. Implementation of the following mitigation would reduce this intersection LOS impact to a ***less-than-significant*** level but would be considered ***significant and unavoidable*** as it relates to queuing. Implementation of this mitigation may improve queuing at the eastbound left-turn movement; however, queues would continue to exceed available storage capacity, resulting in a significant and unavoidable impact to queuing at this intersection.

MM4.10-18 *Construct an additional northbound left-turn lane, and retime and optimize the traffic signals at So. Airport Boulevard/Gateway Boulevard.*

Implementation of the Station Area Plan would result in the addition of project traffic (5 to 6 percent increase) to intersection #16 US-101 NB/So. Airport Boulevard off-ramp/So. Airport Boulevard, which would exacerbate unacceptable LOS F in the AM and PM peak hours under Cumulative Plus Project Conditions. Furthermore, the project would exacerbate the 95th percentile queues for several movements during the AM and PM peak hours.

Implementation of the following mitigation would reduce overall vehicle delay and improve intersection operations to an acceptable LOS D in the AM peak hour, and an improved LOS E in the PM peak hour. Although implementation of the following mitigation would help to reduce queuing at the intersection, not all queue lengths are reduced to acceptable levels during the AM and PM peak hours. This lane modification would not require any additional right-of-way. Therefore, this impact would be ***significant and unavoidable*** during the AM and PM peak hours.

MM4.10-19 *Modify the eastbound approach to include two left-turn lanes, one through-left shared lane, and one right-turn lane, and retime and optimize the traffic signal at US-101 NB/So. Airport Boulevard Off Ramp/So. Airport Boulevard to reallocate green time to better serve future volumes.*

Cumulative Freeway Operations The cumulative freeway mainline operations under the cumulative and plus project conditions are presented below. The freeway analysis results with the proposed project are presented in Table 4.10-17 (Cumulative Plus Project Freeway Segment LOS Results). The freeway operation LOS would vary depending on the peak hour, direction, and segment, ranging from LOS C to LOS F. Several segments on US-101 would exceed their CMP LOS threshold (LOS E) with the proposed project under cumulative plus project conditions:

- Northbound US-101 I-380 to South Airport Blvd off-ramp—LOS F (AM peak hour)
- Northbound US-101 Between S Airport Blvd ramps—LOS F (AM peak hour)
- Northbound US-101 South Airport Blvd on-ramp to E Grand Avenue/Poletti Way—LOS F (AM peak hour)
- Northbound US-101 Between Grand ramps—LOS F (AM peak hour)
- Northbound US-101 Grand/Airport on-ramp to Oyster off-ramp—LOS F (AM and PM peak hours)
- Northbound US-101 North of Oyster Point Boulevard—LOS F (AM and PM peak hours)
- Southbound US-101 Oyster Point Boulevard off-ramp—LOS F (AM peak hour)
- Southbound US-101 Between Oyster off-ramp and Airport on-ramp—LOS F (AM peak hour)
- Southbound US-101 Airport Boulevard on-ramp—LOS F (AM and PM peak hours)
- Southbound US-101 between Oyster on-ramp and Miller off-ramp—LOS F (AM and PM peak hours)
- Southbound US-101 Produce/Airport off-ramp—LOS F (AM and PM peak hours)
- Southbound US-101 between Produce ramps—LOS F (AM and PM peak hours)
- Southbound US-101 between Produce on-ramp and I-380 west—LOS F (AM and PM peak hours)

Freeway operations along US-101 are expected to worsen in the Cumulative scenario compared to the existing conditions due primarily to higher mainline volumes traveling through South San Francisco due to projected regional population and employment growth.

Impact 4.10-5 **Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on one northbound segment of US-101 and would add traffic greater than 1 percent of the freeway segment volume to a segment already operating at LOS F under No Project Conditions on five northbound segments and five southbound segments of US-101. No feasible mitigation is available to reduce this impact. Therefore, this impact would be *significant and unavoidable* under cumulative conditions.**

As noted in Table 4.10-18 (Cumulative Plus Project Freeway Segment LOS Results), the proposed project would make a cumulatively considerable contribution to eleven segments of US-101 during the AM and PM peak hours.

Widening of the US-101 mainline from four to five mixed-flow lanes from Airport Boulevard to Oyster Point Boulevard would expand roadway capacity. This improvement is not under the jurisdiction of the City, is neither planned nor funded, and is not guaranteed to be implemented by Caltrans. In addition, this freeway improvement would likely be part of a larger, regional freeway improvement project. Such a project would be inconsistent with regional policies related to encouraging infill development and the encouragement of non-auto travel modes. Since no other feasible mitigation is available to reduce freeway segment conditions to acceptable levels, this impact would be ***significant and unavoidable***.

Impact 4.10-6 **Implementation of the Station Area Plan would add traffic greater than 1 percent of the freeway ramp volume and deteriorate LOS from E to F for one southbound US-101 ramp during the PM peak hour. No feasible mitigation is available to reduce this impact. Therefore, the impact would be *significant and unavoidable* under cumulative conditions.**

Cumulative and Cumulative Plus Project freeway ramp volume-to-capacity results are shown in Table 4.10-19 (Cumulative and Cumulative Plus Project Freeway Ramp Volume-to-Capacity Results). Under Plus Project conditions, the following US-101 ramp is forecasted to be over capacity:

- Southbound US-101
  - On-ramp from Produce Avenue – PM peak period

Expanding US-101 on-ramps and off-ramp from one lane to two or from two lanes to three would expand roadway capacity, and thus provide acceptable operations. Such a project would be inconsistent with regional policies related to encouraging infill development and the encouragement of non-auto travel modes. Such a project is neither planned nor funded and is under the jurisdiction of Caltrans. No additional feasible mitigation is available to provide acceptable operations at these Caltrans facilities. Therefore, this impact is considered ***significant and unavoidable***.

Table 4.10-18 Cumulative Plus Project Freeway Segment LOS Results

Freeway Segment	*Type*	*Peak Hour*	*Cumulative*				*Cumulative Plus Project*			
			Volume	*V/C[a]*	*Density[b]*	*LOS*	*Volume*	*V/C[a]*	*Density[b]*	*LOS*
Northbound US-101										
I-380 to South Airport Blvd Off	Basic	AM	13,710	**>1.00**	**—**	**F**	14,312	**>1.00**	**—**	**F**
		PM	8,017	0.62	22.30	C	8,344	0.64	23.26	C
Between S Airport Blvd Ramps	Basic	AM	11,559	**>1.00**	**—**	**F**	11,955	**>1.00**	**—**	**F**
		PM	7,213	0.67	24.21	C	7,399	0.68	24.91	C
South Airport Blvd On Ramp to E Grand Ave/ Poletti Way	Weave	AM	11,559	**>1.00**	**—**	**F**	11,955	**>1.00**	**—**	**F**
		PM	7,213	0.87	41.27	E	7,399	0.90	45.00	E
Between Grand ramps	Basic	AM	9,773	**>1.00**	**—**	**F**	9,789	**>1.00**	**—**	**F**
		PM	7,445	0.86	33.87	D	7,522	0.87	34.43	D
Grand/Airport On to Oyster Off	Weave	AM	9,773	**>1.00**	**—**	**F**	9,789	**>1.00**	**—**	**F**
		PM	7,445	**>1.00**	**—**	**F**	7,522	**>1.00**	**—**	**F**
Between Oyster Point ramps	Basic	AM	8,655	1.00	44.85	E	8,828	**>1.00**	**—**	**F**
		PM	7,850	0.91	37.01	E	8,356	0.96	41.64	E
North of Oyster Point	Weave	AM	8,655	**>1.00**	**—**	**F**	8,828	**>1.00**	**—**	**F**
		PM	7,850	**>1.00**	**—**	**F**	8,356	**>1.00**	**—**	**F**
Southbound US-101										
Oyster Point Blvd Off Ramp	Basic	AM	13,342	**>1.00**	**—**	**F**	13,342	**>1.00**	**—**	**F**
		PM	8,408	0.97	42.17	E	8,408	0.97	42.17	E
Between Oyster Off and Airport On	Basic	AM	10,886	**>1.00**	**—**	**F**	10,886	**>1.00**	**—**	**F**
		PM	7,963	0.92	37.97	E	7,963	0.92	37.97	E
Airport Blvd On Ramp	Basic	AM	11,606	**>1.00**	**—**	**F**	10,886	**>1.00**	**—**	**F**
		PM	8,693	**>1.00**	**—**	**F**	7,963	0.92	37.97	E
Between Oyster On and Miller Off	Weave	AM	12,326	**>1.00**	**—**	**F**	11,606	**>1.00**	**—**	**F**
		PM	9,423	**>1.00**	**—**	**F**	8,693	**>1.00**	**—**	**F**
Produce/Airport Off	Basic	AM	12,523	**>1.00**	**—**	**F**	11,803	**>1.00**	**—**	**F**
		PM	10,800	**>1.00**	**—**	**F**	10,070	**>1.00**	**—**	**F**
Between Produce Ramps	Basic	AM	12,954	**>1.00**	**—**	**F**	11,372	**>1.00**	**—**	**F**
		PM	11,555	**>1.00**	**—**	**F**	9,315	**>1.00**	**—**	**F**
Between Produce on and I-380 west	Weave	AM	12,954	**>1.00**	**—**	**F**	11,372	**>1.00**	**—**	**F**
		PM	11,555	**>1.00**	**—**	**F**	9,315	**>1.00**	**—**	**F**

SOURCE: Fehr & Peers (2014).

Bold = unacceptable LOS; shaded = potentially significant impact

a. Freeway segment level of service based on volume to capacity ratio according to the Highway Capacity Manual. Highway Capacity Manual, Transportation Research Board, 2010.

b. Density for each segment is shown in passenger car equivalents per mile of roadway per lane (pcpmpl)

Table 4.10-19 Cumulative and Cumulative Plus Project Freeway Ramp Volume-to-Capacity Results

Freeway Ramp	*Peak Hour*	*Capacity (veh/hr)*	*Volume (veh/hr)*	
			Cumulative	*Cumulative Plus Project*
Northbound US-101				
On-ramp from Grand Avenue/Airport Boulevard	AM	2,000	844	1,001
	PM		1,213	1,642
On-ramp from South Airport Boulevard	AM	2,000	388	404
	PM		897	974
Off-ramp to East Grand Avenue/Poletti Way	AM	3,000	**2,174**	**2,570**
	PM		665	851
Off-ramp to South Airport Boulevard	AM	3,000	**2,151**	**2,357**
	PM		804	945
Southbound US-101				
On-ramp from Produce Avenue	AM	3,300	1,305	1,516
	PM		2,854	**3,491**
Off-ramp to Airport Boulevard/Miller Avenue	AM	1,500	1,010	1,190
	PM		748	891
Off-ramp to South Airport Boulevard/Produce Avenue	AM	1,500	431	719
	PM		755	866

SOURCE: Fehr & Peers (2014).
Bold = Volume exceeds capacity. Shaded = Potentially significant impact.

4.10.6 References

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4.11 UTILITIES/SERVICE SYSTEMS

This section of the EIR analyzes the potential environmental effects on utilities/service systems from implementation of the proposed project. For purposes of this EIR, the utilities analysis is divided into four subsections: (1) water supply, storage, and distribution; (2) wastewater collection, transmission, and treatment; (3) solid waste collection and disposal; and (4) energy (electricity and natural gas) use. Cumulative impacts are addressed at the end of each respective subsection. This analysis assumes that in general, actual development under any area plan is substantially less than the entitlement or theoretical limit of development because of building and zoning restrictions as well as several economic factors and market forces. Specific to this analysis, it is assumed that 25 percent of parcels in the study area would be constructed at build-out in 2035. No comment letters addressing utilities/service systems were received in response to the notice of preparation (NOP) circulated for the proposed project.

Water

This section describes the current status of water facilities and water supply services in the study area, including a discussion of local water conservation initiatives and the ability of the City's water supply services to meet the current needs of the City.

Data for this section were taken from the Utilities and Public Services section of the South San Francisco Downtown Station Area Specific Plan (Specific Plan or proposed project), Senate Bill (SB) 610 Water Supply Assessment prepared by Yarne & Associates for California Water Service Company (Cal Water) (June 25, 2014), attached as Appendix F, and other relevant documents related to water supply. Full reference-list entries for all cited materials are provided in Section 4.15.5 (References).

4.11.1 Environmental Setting

As set forth in CEQA Guidelines Section 15125(a) the following Environmental Setting discussion describes the physical environmental conditions in the City of South San Francisco at the time the environmental analysis commenced. It constitutes the baseline physical conditions by which the City of South San Francisco will determine whether a water facilities or supply impact is significant.

Water Delivery, Treatment, and Storage

The Regional Water System (RWS) is geographically delineated between the Hetch Hetchy Project and the Bay Area water system facilities. The Hetch Hetchy Project is generally composed of the reservoirs, hydroelectric generation and transmission facilities, and water transmission facilities from the Hetch Hetchy Valley west to the Alameda East Portal of the Coast Range Tunnel in Sunol Valley. The local Bay Area water system generally consists of the facilities west of Alameda East Portal, and includes the Alameda and Peninsula watershed reservoirs, two water treatment plants and the distribution system that delivers water to the San Francisco Public Utilities Commission's (SFPUC) Retail and Wholesale Customers.

The RWS consists of more than 280 miles of pipeline and 60 miles of tunnels, eleven reservoirs, five pump stations, and two water treatment plants, and comprises three regional water supply and conveyance systems: the Hetch Hetchy System, the Alameda System, and the Peninsula System. The City of South San Francisco receives its water through the Hetch Hetchy System. In the Hetch Hetchy System, water is diverted from Hetch Hetchy Reservoir into a series of tunnels and aqueducts from the Sierra Nevada to the San Joaquin Pipelines that cross the San Joaquin Valley to the Coast Range Tunnel, which connects to the Alameda system at the Alameda East Portal.

In May 2002, the SFPUC adopted a 2.9 billion dollar capital improvement program (CIP) to rebuild and retrofit the RWS to improve system reliability and to ensure seismic safety (BAWSCA 2014). Currently, many parts of the RWS are 75 to 100 years old and do not meet today's seismic codes but cross active earthquake faults. For this reason AB 1832, which amended the state water code to require the SFPUC to adopt and implement the CIP, singled out nine key projects among the thirty-eight projects in the CIP for quick action. These nine projects are intended to ensure that, should a large seismic event occur, the system can remain relatively intact and continue to deliver water to the 2.4 million people and businesses that depend on it. Additionally, the cost to make these improvements is shared in proportion to water delivered between San Francisco and its regional customers in Alameda, Santa Clara and San Mateo counties (BAWSCA 2014).

Local Water System

The City of South San Francisco is served by the Cal Water—Bayshore District. Cal Water obtains water from a combination of a purchasing agreement with SFPUC, which is supplied by water from the Hetch Hetchy RWS, and from Cal Water-owned groundwater wells. The Cal Water—Bayshore District South San Francisco system includes 144 miles of pipeline, twelve storage tanks, one collecting tank, and twenty booster pumps (CWSC 2014). Cal Water has an annual purchased water supply from SFPUC of 35.68 million gallons per day (mgd) and depends on the availability of local supplies in both in Bear Gulch and South San Francisco Districts. The water from groundwater wells is collected and treated at Cal Water's reservoir and treatment plant in Atherton. The water purchased is treated by SFPUC prior to delivery to the Cal Water system.

Water Quality

According to the 2010 Urban Water Management Plan (UWMP) for the South San Francisco District, the water quality for the potable water serving the City meets all federal and state regulations. Groundwater obtained from the Westside Basin would be disinfected using sodium hypochlorite (bleach) before it enters the distribution system, which is consistent with the use of bleach in the RWS and other municipalities that supply groundwater. In addition, the pH of the blended water (the combination of groundwater and SFPUC water) would be adjusted upward using sodium hydroxide for corrosion control, which is also an existing technique used in the RWS.

Water Supply

Domestic Water

The South San Francisco District (SSFD) of Cal Water is located in northern San Mateo County approximately 6 miles south of the City of San Francisco. The district serves the communities of South San Francisco, Colma, a small portion of Daly City, and an unincorporated area of San Mateo County known as Broadmoor, which lies between Colma and Daly City. Cal Water estimates the service area's 2010 population at 58,658, and the projected population in 2040 at 70,548 persons.

Cal Water receives water from the City and County of San Francisco's Regional Water System (RWS), operated by the San Francisco Public Utilities Commission (SFPUC). This regional supply is delivered through a network of pipes, tunnels, and treatment plants. The water purchased is treated by SFPUC prior to delivery to Cal Water. The SSFD takes delivery from SFPUC from eleven active and three standby metered turnouts from SFPUC transmission lines.

The amount of imported water available to the SFPUC's retail and wholesale customers is constrained by hydrology, physical facilities and legal agreements that allocate the water supply of the Tuolumne River. Due to these constraints, the SFPUC is very dependent on reservoir storage for meeting its delivery obligations.

The SFPUC serves its retail and wholesale water demands with an integrated operation of local Bay Area water production and imported water from the Hetch Hetchy Project in the Sierra Nevada Mountains. Local watershed facilities are operated to capture local runoff as well as store imported water. Local reservoirs include: Crystal Springs Reservoir, San Andreas Reservoir, Pilarcitos Reservoir, Calaveras Reservoir, and San Antonio Reservoir.

The Raker Act, which authorized the Hetch Hetchy project, prohibits the SFPUC from selling water from that project to a privately-owned utility; however, local sources generated by the SFPUC are available for purchase by privately-owned utilities. Section 6 of the Raker act states:

> That the grantee [San Francisco] is prohibited from ever selling or letting to any corporation or individual, except a municipality or a municipal water district or irrigation district, the right to sell or sublet the water or the electric energy sold or given to it or him by the said grantee: Provided, that the rights hereby granted shall not be sold, assigned, or transferred to any private person, corporation, or association, and in case of any attempt to so sell, assign, transfer or convey, this grant shall revert to the Government of the United States.

Cal Water's purchased water supply from the SFPUC is subject to the Water Supply Agreement (WSA) between the City and County of San Francisco and Wholesale Customers, which was adopted in July, 2009. The supply agreement and associated Contract are included in Appendices I and J of Cal Water's 2010 Urban Water Management Plan (UWMP) and should be referenced for further details.

As a means of addressing the aforementioned Raker Act exclusion, the supply agreement contains Article 9.02 A. which identifies Cal Water as an investor owned utility company, and as such, has no claim to co-grantee status under the Raker Act. In addition Article 9.02 B. states that:

> The total quantity of water delivered by San Francisco to California Water Service Company shall not in any calendar exceed 47,400 acre-feet, which is the estimated average annual production of Local

> System Water. If San Francisco develops additional Local System Water after the Effective Date, it may (1) increase the maximum delivery amount stated herein; and (2) increase the Supply Assurance, but not necessarily both. San Francisco has no obligation to deliver water to California Water Service Company in excess of the maximum stated herein, except as such maximum may be increased by San Francisco pursuant to this subsection. The maximum annual quantity of Local System Water set forth in this subsection is intended to be a limitation on the total quantity of water that may be allocated to California Water Service Company, and is not an Individual Supply Guarantee for purposes of Section 3.02. The maximum quantity of Local System Water set forth in this subsection is subject to reduction in response to (1) changes in long-term hydrology or (2) environmental water requirements that may be imposed by or negotiated with state and federal resource agencies in order to comply with state or federal law or to secure applicable permits for construction of Regional Water System facilities. San Francisco shall notify California Water Service Company of any anticipated reduction of the quantity of Local System Water set forth in this subsection, along with an explanation of the basis for the reduction.

Short-term changes in hydrologic conditions such as drought and supply emergencies are governed by other provisions of the supply agreement including the two tiered allocation plan recently adopted by the Bay Area Water Supply and Conservation Agency (BAWSCA) membership as required in the supply agreement (Sections 5.2.2, 5.2.3, and 5.3.6).

Water Treatment

SFPUC Purchased Water. The SSFD purchases approximately 90 percent of its treated water supplies from SFPUC as agreed upon in the current Water Sales Agreement and its Individual Supply Guarantee (ISG). The balance of its supply (approximately 1.2 mgd) is made up from local surface water from the Bear Gulch Reservoir.

The purchased water is treated at both the Sunol Valley WTP and the Harry Tracy WTP. SFPUC is currently engaged in a variety of water treatment and distribution system improvements projects that comprise its Water System Improvement Program (WSIP), which evolved out of the Water System Master Plan (2000). In October 2008, SFPUC certified the Program Environmental Impact Report (PEIR) for the WSIP. The WSIP consists of eighty-five projects, twenty-six of which are specifically for water supply reliability needed to accommodate projected growth, meet water quality standards, and add system redundancy in the event of an interruption due to seismic activity. The PEIR evaluated the impacts associated with implementation of the WSIP; individual projects would be subject to project-specific environmental review. SFPUC is in the process of completing the environmental review for expansion at the Sunol Valley WTP; once completed, the Sunol Valley WTP would have capacity to treat up to 160 mgd. The Harry Tracy WTP treats 120 mgd, but there are plans for expansion and upgrades to sustainably treat 180 mgd. When both of these WTPs are operating at capacity, SFPUC would be capable of producing up to 340 mgd. In addition, SFPUC initiated construction of the Tesla WTP in Tracy, California, was completed in 2011. The Tesla WTP will be the nation's largest ultraviolet disinfection treatment plant and will be capable of producing 315 mgd. Therefore, SFPUC can deliver up to 655 mgd throughout its service area.

Supply Assurance

In addition to the SSFD, Cal Water has two other districts in the San Francisco peninsula (Bear Gulch and Mid-Peninsula). The three districts rely on SFPUC as the main water source. Prior to 1984, Cal

Water had a contractual agreement with SFPUC to purchase up to 47,400 afy (42.32 million gallons per day [mgd]) of water per year for the three peninsula districts combined. This quantity is identified in the WSA as the estimated average annual production of Local System Water and serves as the maximum annual delivery amount to Cal Water from San Francisco.

In 1984, Cal Water, along with twenty-nine other Bay Area water suppliers, signed a Settlement Agreement and Master Water Sales Contract (Master Contract) with San Francisco, supplemented by an individual Water Supply Contract. These contracts provided for a 184 mgd (annual average basis) Supply Assurance Allocation (SAA) to SFPUC's wholesale customers collectively. This allocation was reached through negotiation in the early 1990s between the SFPUC and Bay Area Water Users Association (BAWUA), the predecessor organization to BAWSCA. In 2009 the Master Contract was extended through 2018, keeping the SAA at 184 mgd, but changing its name to the Individual Supply Guarantee (ISG).

Cal Water's ISG for the three districts was 35.39 mgd (39,642 afy). Additionally, the acquisition of the Los Trancos County Water District in July 2005 allowed the transfer of its 0.11 mgd ISG to Cal Water. In 2009, Cal Water acquired the Skyline County Water District, which also transferred its 0.181 mgd ISG to Cal Water. This increased Cal Water's total ISG for the three districts to 35.68 mgd (39,967 afy).

The WSA does not guarantee that San Francisco will meet peak daily or hourly customer demands when their annual usage exceeds the Supply Assurance. The SFPUC's wholesale customers have agreed to the allocation of the 184 mgd ISG among all agencies, with each entity's share of the SAA set forth on a schedule adopted in 1993.

The SFPUC can meet the demands of its retail and wholesale customers in years of average and above average precipitation. The WSA allows the SFPUC to reduce water deliveries during droughts, emergencies, and for scheduled maintenance activities. The SFPUC and all wholesale customers adopted an Interim Water Shortage Allocation Plan in 2000 to address the allocation of water between San Francisco, wholesale customers, and individual wholesale customers during water shortages of up to 20 percent of systemwide use. In 2010, the wholesale customers negotiated, and have recently adopted, a revised methodology for allocating supplies during shortages. (For more detail see WSA Sections 5.2.2, 5.2.3, and 5.3.6.)

SFPUC Water System Improvement Program (WSIP)

In order to enhance the ability of the SFPUC water supply system to meet identified service goals for water quality, seismic reliability, delivery reliability and water supply, the SFPUC undertook the Water System Improvement Program (WSIP), approved October 31, 2008. The WSIP will make capital improvements to strengthen the SFPUC's ability to provide high-quality water to customers in a reliable, affordable and environmentally sustainable manner. Many of the water supply and reliability projects evaluated in the WSIP were originally put forth in the SFPUC's Water Supply Master Plan (2000).

A Program Environmental Impact Report (PEIR) was prepared in accordance with CEQA for the WSIP. The PEIR, certified in 2008, analyzed the broad environmental effects of the projects in the WSIP at a program level and the water supply impacts of various alternative supplies at a project level.

Individual WSIP projects are also undergoing individual project specific environmental review as required.

In approving the WSIP, the Commission adopted a Phased WSIP Variant for water supply that was analyzed in the PEIR. This Phased WSIP Variant established a mid-term water supply planning milestone in 2018 when the Commission would reevaluate water demands through 2030. At the same meeting, the Commission also imposed the Interim Supply Limitation (ISL), which limits the volume of water that the member agencies and San Francisco can collectively purchase from RWS to 265 mgd until at least 2018. Although the Phased WSIP Variant included a mid-term water supply planning milestone, it did include full implementation of all proposed WSIP facility improvement projects to insure that the public health, seismic safety, and delivery reliability goals were achieved as soon as possible. The WSIP is scheduled to be completed in December 2015.

Water Supply Agreement: Other Terms and Conditions

The WSA, which has a 25-year term, addresses the rate-making methodology used by the City in setting wholesale water rates for its wholesale customers in addition to addressing water supply and water shortages.

In terms of water supply, the agreement provides for a 184 mgd (expressed on an annual average basis) "Supply Assurance" to the SFPUC's wholesale customers, subject to reduction, to the extent and for the period made necessary by reason of water shortage, due to drought, emergencies, or by malfunctioning or rehabilitation of the RWS. The WSA does not guarantee that San Francisco will meet peak daily or hourly customer demands when their annual usage exceeds the Supply Assurance. The SFPUC's wholesale customers have agreed to the allocation of the 184 mgd Supply Assurance among themselves, with each entity's share of the Supply Assurance set forth in WSA Attachment C. The Supply Assurance survives termination or expiration of the WSA and each agency's Individual Water Sales Contract with San Francisco.

The Water Shortage Allocation Plan between the SFPUC and its wholesale customers, adopted as part of the WSA, addresses shortages of up to 20 percent of system-wide use. The Tier 1 Shortage Plan allocates water between San Francisco Retail and the wholesale customers during system-wide shortages of 20 percent or less. The supply agreement also anticipated a Tier 2 Shortage Plan adopted by the wholesale customers which would allocate the available water from the RWS among the wholesale customers.

2018 Interim Supply Limitation (ILS)

As part of its adoption of the WSIP in October 2008, the Commission adopted a water supply element, the ISL, to limit sales from San Francisco RWS watersheds to an average annual of 265 mgd through 2018. The wholesale customers' collective allocation under the ISL is 184 mgd and San Francisco's is 81 mgd. Although the wholesale customers did not agree to the ISL, the WSA provides a framework for administering the ISL.

BAWSCA has developed a strategy to address each of its member agencies' unmet needs flowing from the ISL through its Water Conservation Implementation Plan and the Long-term Reliable Water Supply Strategy, separately addressed herein.

Interim Supply Allocations

The Interim Supply Allocation (ISA) refers to each individual wholesale customer's share of the ISL. On December 14, 2010, the Commission established each agency's ISA through 2018. In general, the Commission based the allocations on the lesser of the projected fiscal year 2017/18 purchase projections or ISGs. The ISAs are effective only until December 31, 2018, and do not affect the Supply Assurance or the ISGs. San Francisco's ISA is 81 mgd.

Cal Water's ISA of 35.68 mgd (39,967 afy) will be shared among its SSF, Mid-Peninsula, and Bear Gulch Districts.

As stated in the WSA, the wholesale customers do not concede the legality of the Commission's establishment of the ISAs and Environmental Enhancement Surcharge, discussed below, and expressly retain the right to challenge either or both, if and when imposed, in a court of competent jurisdiction.

Supply Guarantee

The SFPUC can meet the demands of its retail and wholesale customers in years of average and above-average precipitation. SFPUC can reduce water deliveries during droughts, during emergencies, and for scheduled maintenance activities. SFPUC's wholesale customers, through their collective organization, BAWSCA, during 2010 negotiated the Drought Implementation Plan (DRIP), which will replace the previously adopted Interim Water Shortage Allocation Plan. SFPUC's WSA allocates the required reduction of available water supply between San Francisco's retail and wholesale customers. The supply agreement established that during a called upon 20 percent drought reduction, collective wholesale customers face up to a 28 percent reduction in their available supply, while SFPUC retail customers face only a 2 percent reduction.

The DRIP aggregates the reduction applied to the wholesale customers and allocates it among individual wholesale customers during water shortages of up to 20 percent of systemwide. Although the DRIP was not yet been adopted by the wholesale customers when the 2010 UWMP was adopted, it was approved unanimously by a BAWSCA committee of representatives from each wholesale customer.

The DRIP uses an allocation process that takes into consideration the wholesale customer's ISG and the seasonal water use pattern of the wholesale customer's service area. Communities that use substantially more water in the summer will face a greater reduction in their allocated drought supply. Health and safety adjustments were provided to increase the drought allocation of several wholesale customers that have extremely low ISG values.

Much like the previously approved Interim Water Supply Allocation Plan, during a called upon 20 percent drought reduction because of the seasonal water use pattern of its customers and the recent high demand that has reached or exceeded its ISG, Cal Water's customers face a potential 33 percent reduction in their available supply. By implementing conservation and seeking outside water supplies that

can be transferred into Cal Water's service area, the magnitude of the potential reduction could be reduced.

The SFPUC has the authority to determine that during a moderate drought resulting in an available supply reduction of 5 percent to 10 percent, it may cut back deliveries to its wholesale customers of 17 percent of the wholesale customers collective ISG. Likewise during a severe drought (multiple dry years) resulting in an available supply reduction of 11 percent to 20 percent, the SFPUC under its Tier 1 plan may cut back deliveries by up to 28 percent of wholesale customers' collective ISG amount. However, in a joint presentation by SFPUC staff and BAWSCA staff on June 25, 2013, both agencies set forth goals and objectives to dry-year supply by limiting system wide reductions to a maximum of 20 percent of normal delivery. The presentation identified a variety supply projects and options to be developed and be operational between 2016 and 2022 to eliminate shortfalls in supply. These included groundwater storage and recovery, development of San Francisco ground water supply, San Francisco Westside recycled water project, SF eastside recycled water project, Daly City recycled water project, South San Francisco recycled water project, regional desalination project, and water transfers.

Groundwater Basin Boundaries and Hydrology

The Merced Formation of the Colma Creek Basin is a groundwater sub-basin of the Merced Valley Groundwater Basin, and it is popularly referred to as the Westside Basin. Westside Basin is the largest groundwater basin in the San Francisco Bay hydrologic region. It is separated from the Lobos Basin to the north by a northwest trending bedrock ridge through the northeastern part of Golden Gate Park. The San Bruno Mountains bound the basin on the east. The San Andreas Fault and Pacific Ocean form its western boundary and its southern limit is defined by bedrock high that separates it from the San Mateo Plain Groundwater Basin. The basin opens to the Pacific Ocean on the northwest and San Francisco Bay on the southeast.

South San Francisco District Groundwater

Groundwater is extracted using Cal Water-owned wells from the Westside Basin. Groundwater supplies ten to 15 percent of the district's water demand.

Cal Water owns the land on which its wells are located in the SSFD. Under state law, the use of percolating groundwater in California is governed by the doctrine of correlative rights and reasonable use, which gives the overlying property owner a common right to reasonable, beneficial use of the basin supply on the overlying land. The Westside Basin is an unadjudicated groundwater basin.

Cal Water monitors the groundwater level of its wells. The water level has remained relative constant since 1990 due to the area receiving average to above average rainfall and that the wells have been operating at less than 60 percent of total capacity. The water levels have been rising since 2003 since the wells have been placed off-line as part of a SFPUC program to demonstrate the feasibility of a conjunctive use program. SFPUC proposes to install wells in the Westside Basin, and then have Cal Water, Daly City and San Bruno not pump their wells during periods of above average precipitation and thereby "bank" the groundwater or increase the quantity of groundwater in storage. During dry periods when SFPUC anticipates reductions in its deliverable surface supplies, Cal Water, Daly City and San Bruno could pump their normal amounts plus additional amounts of the stored water using the SFPUC

installed wells to make up for the surface supply cutback. Agreements to implement this plan, which has been demonstrated to be technically feasible, are currently being negotiated among the parties.

In June 2003, Cal Water entered into an agreement with the SFPUC to conduct a conjunctive use test program, its practicality and potential impact on the regional groundwater basin and Lake Merced recovery. The conjunctive use program was for a 3-year duration. Groundwater levels rose in 2004 and 2005. In 2009, Cal Water's wells were placed back into operation.

The SSFD has six active wells with a total design capacity of 1,210 gallons per minute (gpm). If operated full-time, these wells could produce 1.74 mgd (1,953 afy). A maximum of 1,560 afy was pumped in 1970 and 1983. Over the past two decades, Cal Water's average groundwater production has dropped below 1,000 afy, due largely to the availability of SFPUC supplies for the conjunctive use pilot project and required shutdowns of the groundwater treatment plant for required maintenance and repairs. In the WSA, 1,535 afy is used as the annual supply from this source or 79 percent of current production capacity. This production level is the designated pumping level that will be established within the Groundwater Storage and Recovery Project (GSR Project) being developed with the SFPUC.

SFPUC Proposed Conjunctive Use Westside Basin Groundwater Management Plan

For more than ten years, SFPUC, Cal Water, San Bruno and Daly City have been working on developing a conjunctive use plan for replenishment and management of the Westside Basin groundwater. Technical and cost studies were conducted along with extensive hydrogeologic modeling to determine the feasibility of using the basin to store water during above normal hydrologic years so that during drought years, the stored water could be extracted to make up for reductions in SFPUC treated surface water supply. Basin storage would be increased due to three utilities (who normally extract groundwater) not pumping during surplus supply years as a result of receiving more SFPUC water. During drought periods, the three utilities would resume pumping and in addition SFPUC would pump the "added" stored groundwater from wells it proposes to construct and operate. SFPUC would either feed this water into its transmission mains or the distribution systems of the three utilities. Considerable effort has been expended in the past years in working on an agreement among the four parties. The intent of this conjunctive use plan is to reduce the quantity of drought supply reductions from SFPUC. Stored water in the GSR project would not completely alleviate drought supply reduction since total additional pumped supply from SFPUC installed wells will be less than anticipated surface water supply reductions.

The proposed Regional GSR Project will coordinate groundwater and surface water management in the South Westside Basin. This project would increase water supply reliability during dry years or emergency conditions. Cal Water, Daly City, and San Bruno are BAWSCA members who use groundwater from the South Westside Basin to augment their SFPUC supplies and are referred to as participating pumpers.

The SFPUC plans to install up to sixteen new wells in the Westside Basin. There will be three operational action cycles within the proposed Groundwater Storage and Recovery Program, which are associated with the available SFPUC supply. When SFPUC determines that there is surplus supply available they can call for a "Put" cycle during which they will deliver surplus water to Cal Water, San Bruno and Daly City, in lieu of groundwater pumping by these utilities, thus leaving groundwater in storage in the basin.

During normal supply years, the three utilities will operate on a "Hold" cycle, in which SFPUC will deliver normal supplies to the participants who will also pump their Designated Quantity from the groundwater basin. When imported supplies are to be reduced by SFPUC due to drought, the three utilities would move to a "Take" cycle and pump their Designated Quantities and receive groundwater produced from SFPUC wells as an offset for reduced imported supplies.

The SFPUC wells will only be operated to extract the previously stored or banked supply. The expected groundwater storage gained from this reduced pumping is approximately 61,000 acre-feet (af). With that amount of additional groundwater available in the basin, the agencies could pump at rate of 7.2 mgd for a 7.5-year dry period.

Project facilities would include wells, disinfection, treatment and distribution pipelines as needed, which will be paid for by the SFPUC. SFPUC will pay all operation costs when the take cycle is authorized. During non-drought emergencies the SFPUC wells would be available to the participating pumpers to provide additional redundant supply capacity. However, the operational cost for such an event would be paid for by the participating pumper.

An agreement among all four parties was expected to be signed in August 2014. Design and construction and substantial completion of well projects and pipe connections to existing systems is expected to be completed by fall 2017. Availability of stored wet year water in the West Basin will depend on annual precipitation levels during the next three plus years. When sufficient surplus supply is available from SFPUC, groundwater pumping by the three water utilities can be cut back or halted, so that drought supply will be available during a drought.

The GSR project does not increase supplies available to Cal Water but it may reduce the degree of drought reductions that SFPUC may be require under the WSA.

Cal water has signed a statement of support for the project in principle and will likely sign the agreement to participate in the Regional GSR Project.

Recycled Water

Recycling of wastewater is summarized by Cal Water in the 2010 SSFD UWMP. Use of recycled water for non-potable uses (e.g., landscape irrigation) can reduce demands on SFPUC and groundwater supplies. Currently, no recycled water is used in the SSFD. Following is a summary of the potential for future recycling for nonpotable uses.

Potential Water Recycling in District

South San Francisco has conducted studies to assess the feasibility of developing a recycled water program and is continuing with further investigations to determine capital and operations and maintenance costs associated with various stages of implementation of a water recycling program as well as environmental, institutional, regulatory, and financial issues that must be addressed. NSMCWTP staff has worked on upgrading its treatment facilities to meet Title 22 requirements, i.e., tertiary treatment. Some process improvements have been made. Planned uses for recycled water include irrigation of three golf courses adjacent to the treatment plant and irrigation of local median strips and athletic fields. However, theses golf courses currently use groundwater for irrigation. The golf courses and median

strips are not within Cal Water's SSFD service area. In addition, Cal Water's service areas in Broadmoor and Colma are residential communities with no current use for recycled water. It is hoped that potential customers will be served with recycled water from the North San Mateo Wastewater Treatment Plant in the future, but none of these potential customers are within Cal Water's service area. Current projected recycled water demand for Cal Water's service area, which is served by NSMWTP through 2035, is 0 acre-feet per year (afy).

Cal Water will continue to participate in planning for future recycled water project(s) with South San Francisco, San Bruno and SFPUC and consider supporting a joint feasibility study with Daly City to investigate supplying recycled water to Colma cemeteries.

The SSFWQCP will be at capacity in approximately 5 years and any available space will be used to increase capacity. Under current conditions the SSFWQCP does not have plans to provide recycled water at any time in the near future.

Desalination of Bay Surface or Brackish Water

Cal Water developed an Integrated Long Term Water Supply Plan (ILTWSP) for its three peninsula districts in 2010. The findings of the ILTWSP recommend continuing with conservation and further evaluating desalination and water transfers. A summary of the desalination option follows.

Desalination involves high pressure membrane technology to remove dissolved salts from water. Two sources of water were considered: brackish groundwater and Bay water (either through an open intake or through slant wells). Based on the projected costs, brackish water desalination (with potential yields up to 5 mgd) appears to be the most attractive option for meeting Cal Water needs. A SF Bay water option, while more expensive, may be feasible as it would provide greater capacity and an opportunity for Cal Water to supply water to other BAWSCA members.

Cal Water planned to conduct a more detailed siting and feasibility investigation if results were positive, prepare a preliminary engineering design of recommended desalination facilities. Several steps are necessary for Cal Water to refine cost estimates including: verifying feasible brackish groundwater yield capacity, determining the best well location for wells, confirming feasibility of brine discharge locations, siting treatment facilities based on land availability and costs, and determining the need for pilot testing. If a larger capacity facility is justified because of interested other parties, Cal Water will identify potential open water intake locations and determine costs.

This detailed feasibility investigation and site location study will take 4 to 5 years to complete. In order to proceed, Cal Water had to first obtain approval to conduct the study from the CPUC. In its last General Rate Case request, the CPUC did not approve the project—prior to the current 2013/14 drought.

Cal Water intends to reformulate it proposed approach to the CPUC, prepare a total estimated cost for development of desalination project and resubmit its request single project application in order to secure approval of a complete desalination project. A Step by step action plan will be developed along with cost estimates, alternative analyses and project termination criteria that will enable cost recovery at various decision points. If a desalination project proves feasible, environmental, permitting, design, construction

and commissioning will likely require 6 to 7 additional years; therefore supply from this source will not be available for the next 10 to 12 years.

Water Transfer Agreements and Exchanges

The second option indicated in the ILTWSP for the three Cal Water peninsula districts is water transfers, which Cal Water is pursuing with other agencies. Cal Water envisions that it would take 3 to 5 years to develop a water supply transfer agreement and address all transmission costs, planning, environmental and engineering requirements. This assumes Cal Water can enter into an agreement with a local water agency with transferable supplies that Cal Water acquire and transfer to its three peninsula districts.

Bay Area Water Supply and Conservation Agency (BAWSCA) Long-Term Reliable Water Supply Strategy

BAWSCA's water management objective is to ensure that a reliable, high-quality supply of water is available where and when people within the BAWSCA service area need it. A reliable supply of water is required to support the health, safety, employment, and economic opportunities of the existing and expected future residents in the BAWSCA service area and to supply water to the agencies, businesses, and organizations that serve those communities. BAWSCA is developing the Long-Term Reliable Water Supply Strategy (Strategy) to meet the projected water needs of its member agencies and their customers through 2035 and to increase their water supply reliability under normal and drought conditions.

The Strategy is proceeding in three phases. Phase I was completed in 2010 and defined the magnitude of the water supply issue and the scope of work for the Strategy. Phase II is being completed and will result in a report to be completed late 2014 or early 2015 presenting alternative approaches to increasing supply through new sources such as water reuse, desalination, water transfers and supply reliability throughout the BAWSCA service area. This will include an analysis of water supply projects and a preliminary proposed implementation plan. In 2015, BAWSCA intends to evaluate these alternatives and develop a recommended plan for implementation for Phase III. Depending on cost-effectiveness and other factors, selected projects may be implemented by a single member agency, by a collection of member agencies, or by BAWSCA. Project implementation could begin in 2016.

The development and implementation of the Strategy will be coordinated with the BAWCSA member agencies and will be managed to ensure that adequate supply is developed to meet demands. Desalination is a supply option being evaluated by BAWSCA; so Cal Water is exploring partnership opportunities to determine if a joint project is feasible and more cost effective.

The water furnished to customers in the SSFD is a combination of purchased water and groundwater from Cal Water-owned wells.

Cal Water has an annual purchased water supply from SFPUC of 35.68 mgd (39,967 afy) in normal hydrologic years, which is shared among its Bear Gulch, Mid-Peninsula, and South San Francisco Districts. The amount available to the SSFD in any given year varies, and depends on the availability of local supplies both in Bear Gulch and South San Francisco Districts. The Mid-Peninsula District does not have a local supply. SFPUC sources are expected to provide most of the supply in the SSFD in the next 20 years.

Based on its contract with SFPUC (described in the following section), Cal Water expects the 39,967 afy to be available for the term of the contract. Although increased levels of imported water may become available after completion of SFPUC's WSIP, Cal Water does not anticipate a significant increase in its Supply Assurance over time. For planning purposes the imported supply has been limited to its present quantity.

Cal Water historically pumped up to 1,500 afy from the Westside basin to supplement its supply from SFPUC. This amount was not pumped for nearly 3 years due to participation in a pilot conjunctive use program, mechanical problems with the wells and shutdown of the groundwater treatment facilities for upgrades and re-authorization for use by the California Department of Public Health (CDPH). Cal Water installed additional wells in the SSFD so that 1,500 afy can be reliably be provided by groundwater.

Cal Water, the City of San Bruno, Daly City, and SFPUC are collaborating in an evaluation of the Westside Groundwater Basin to estimate its safe yield and determine the feasibility of establishing a conjunctive use program. Preliminary results indicate that Cal Water's SSFD would have a designated quantity to pump during nonsurplus and drought periods of 1.37 mgd or 1,535 afy. When surplus surface supplies are available from SFPUC, Cal Water would receive a corresponding supply directly from the SFPUC distribution system in-lieu of pumping groundwater.

The WSA projected water supply for the SSFD, shown in Table 4.11-1 (SSFD Water Supplies [afy]), is based on existing groundwater and SFPUC supplies and does not include any additional supply that may be obtained from implementation of the GSR Project.

Table 4.11-1 SSFD Water Supplies (afy)

Water Supply Sources	*2010 Actual*	*2015*	*2020*	*2025*	*2030*	*2035*	*2040*
San Francisco Public Utilities Commission	8,013	7,762	7,130	7,393	7,769	7,959	8,264
Groundwater	452	1,535	1,535	1,535	1,535	1,535	1,535
Total	***8,465***	***9,297***	***8,665***	***8,928***	***9,204***	***9,494***	***9,799***

Normal Years

In normal hydrologic years the full ISG of 35.68 mgd (39,967 af) is available. The long-term average of local surface supply in the Bear Gulch District is 1,260 afy. This amount is considered to be the normal year supply. Cal Water, the City of San Bruno, City of Daly City, and SFPUC, through an evaluation of the Westside Groundwater Basin, have estimated the safe yield of the basin. Preliminary results indicate that Cal Water's SSFD pumping level is 1,535 afy in a normal year.

Based on the availability of normal year supplies, for 2035 or in 20 years, projected normal demand for the three districts is 43,530 af versus a projected supply of 42,762 af or a deficiency of 768 af. This deficiency is well within the uncertainty of the estimate, but in later years could increase unless Cal Water adds another supply source.

The projected demand as shown in Table 4.11-2 (Supply vs. Demand—Normal Hydrologic Year [acre-feet]).

Table 4.11-2 Cal Water Supply vs. Demand—Normal Hydrologic Year (acre-feet)

	2015	2020	2025	2030	2035	2040
Supply						
SFPUC Supply	39,967	39,967	39,967	39,967	39,967	39,967
BG – Surface	1,260	1,260	1,260	1,260	1,260	1,260
SSF – Wells	1,535	1,535	1,535	1,535	1,535	1,535
Cal Water Supply	*42,762*	*42,762*	*42,762*	*42,762*	*42,762*	*42,762*
Demand						
BG	13,839	12,622	12,975	13,348	13,743	14,160
MPS	18,911	18,613	19,143	19,703	20,293	20,915
SSF	9,297	8,665	8,928	9,204	9,494	9,799
Cal Water Demand	*42,047*	*39,900*	*41,046*	*42,255*	*45,530*	*44,874*
Difference	***715***	***2,862***	***1,716***	***507***	***-768***	***-2,112***

SOURCE: Cal Water, *SB 610 Water Supply Assessment For South San Francisco Downtown Station Area Plan* (June 25, 2014), prepared by Yarne &Associates, Inc.

Single-Dry Year

Overall average annual demand per service in acre-feet for the SSFD, as shown in Table 4.11-3 (SSFD Average Demand—Normal, Single-Dry, and Multiple-Dry Years [acre-feet]) shows a typical pattern where demand decreases during a single-dry-year and multiple-dry-year periods. Demand reduction generally happens as a result of increased conservation requests by Cal Water and a heightened awareness of drought conditions by the general public.

Table 4.11-3 SSFD Average Demand—Normal, Single-Dry, and Multiple-Dry Years (acre-feet)

Average/Normal Water Year	*Single-Dry-Water Year*	*Multiple-Dry-Water Years*			
		Year 1	*Year 2*	*Year 3*	*Year 4*
Percent of Average/Normal Year Demand	95%	92%	90%	89%	78%

SOURCE: Cal Water, *SB 610 Water Supply Assessment For South San Francisco Downtown Station Area Plan* (June 25, 2014), prepared by Yarne &Associates, Inc.

Based on historical records, the local surface supply from the Bear Gulch Reservoir provides approximately 351 afy in single-dry years. SSFD's normal groundwater supply of 1,535 afy is expected to be fully available in a single-dry year. According to the SFPUC reliability analysis provided to BAWSCA for the 2010 UWMP, there could be a 10 percent systemwide cutback during single-dry years. Although the reduction in supply to BAWSCA wholesale customers would be a 17 percent reduction in supply, a 10 percent reduction in Cal Water's SFPUC supply is assumed here for a single-dry year, since storage in SFPUC's reservoirs is likely to be reasonably full and have sufficient carryover for a subsequent year. Historically, SFPUC supplies have not been reduced by 17 percent in a single-dry year or the first year of a drought.

The single-dry year supply and demand values for all three Cal Water Peninsula Districts are shown in Table 4.11-4 (Cal Water Peninsula Districts: Supply vs. Demand—Single-Dry Year [acre-feet]). The demand values were calculated by decreasing the target demand projection in each year by the 5 percent—the percentage listed for the single-dry year as shown in Table 4.11-3, above. A 10 percent cutback in SFPUC and a loss of 900 afy from the Bear Gulch surface supply could result in a projected supply shortfall of 2,089 af in 2015 and 3,498 af in 2035 within Cal Water's three-Peninsula Districts. The WSA for the SPA assumes that this potential shortfall would be balanced by increased conservation by Cal Water customers as a result of more intensive demand reduction measures.

Table 4.11-4 Cal Water Peninsula Districts: Supply vs. Demand—Single-Dry Year (acre-feet)

	2015	*2020*	*2025*	*2030*	*2035*	*2040*
SFPUC Supply	35,970	35,970	35,970	35,970	35,970	35,970
Bear Gulch Supply	351	351	351	351	351	351
SSF Wells	1,535	1,535	1,535	1,535	1,535	1,535
Cal Water Supply Total	*37,856*	*37,856*	*37,856*	*37,856*	*37,856*	*37,856*
Cal Water Demand Total	39,945	37,905	38,994	40,142	41,354	42,630
Difference	***-2,089***	***-49***	***-1,138***	***-2,286***	***-3,498***	***-4,774***

SOURCE: Cal Water, *SB 610 Water Supply Assessment For South San Francisco Downtown Station Area Plan* (June 25, 2014), prepared by Yarne &Associates, Inc.

Multiple Dry-Years

Historic demand data from 1988 to 1990 show that customers used 12 to 18 percent less water in multiple-dry years than during a normal hydrologic year. This was largely due to customer response to strong water conservation efforts. It is assumed that 15 percent demand reduction will be achieved during the second year and 20 percent during the third year of a multiple-dry-year period.

Historical records indicate that the Bear Gulch Reservoir provides an average of 609 afy during multiple-dry years; however, here is it assumed that the supply in a second dry year in a multiple-dry-year period will be 350 afy. SSFD's groundwater supply of 1,535 afy is expected to be drought resistant available during multiple-dry years.

According to the SFPUC reliability analysis provided to BAWSCA, there could be a 10 percent systemwide cutback during the first year of a multiple-dry-year period, and a 20 percent cutback in years two and three. As mentioned, a 10 percent systemwide cutback results is a 17 percent reduction in SFPUC supplies to Cal Water. Under SFPUC's Tier 2 plan, a 20 percent cutback could result in a 34 percent reduction in SFPUC supply to Cal Water. It is assumed that the first year is the same as a single-=dry year, as shown in Table 4.11-4. In the second dry year, it is assumed SFPUC supply cutbacks to Cal Water will be 20percent. In the third year, it is assumed that SFPUC will cutback supplies to Cal Water by 30 percent.

As modeled in Table 4.11-5 (Cal Water Peninsula Districts Supply vs. Demand—Multiple-Dry-Year Period [acre-feet]), assuming a 30 percent water supply cutback to Cal Water from SFPUC, a potential

supply shortfall of 5,116 af could occur as early as 2015, which according to Table 4.11-5, also assumes this is the third year of multiple-dry-year scenario. Also, it is conservatively assumed that Bear Gulch surface supply will reduce to 250 af. As with the single-dry year, this multiple-dry-year supply shortfall would have to be met by increasing demand reduction measures within Cal Water Peninsula Districts. Under this scenario, Cal Water would implement Stage 2 or 3 of its mandatory reductions as described in its 2010 UWMP.

Table 4.11-5 Cal Water Peninsula Districts Supply vs. Demand—Multiple-Dry-Year Period (acre-feet)

		2015	*2020*	*2025*	*2030*	*2035*
Multi-dry year period: 2nd Year	SFPUC Supply	31,974	31,974	31,974	31,974	31,974
	Bear Gulch Supply	350	350	350	350	350
	SSF Wells	1,535	1,535	1,535	1,535	1,535
	Supply Total	*33,859*	*33,859*	*33,859*	*33,859*	*33,859*
	Demand Total	35,740	33,915	34,890	35,917	37,000
	Difference	***-1,881***	***-56***	***-1,031***	***-2,058***	***-3,141***
Multi-dry year period: 3rd Year	SFPUC Supply	27,978	27,978	27,978	27,978	27,978
	Bear Gulch Supply	250	250	250	250	250
	SSF Wells	1,535	1,535	1,535	1,535	1,535
	Supply Total	*28,522*	*28,522*	*28,522*	*28,522*	*28,522*
	Demand Total	33,638	31,920	32,837	33,804	34,824
	Difference	***-5,116***	***-3,398***	***-4,315***	***-5,282***	***-6,302***

SOURCE: Cal Water, *SB 610 Water Supply Assessment For South San Francisco Downtown Station Area Plan* (June 25, 2014), prepared by Yarne &Associates, Inc.

As shown in Table 4.11-5, depending on drought severity, SFPUC could reduce supply to Cal Water by 10 to 30 percent.

Should SFPUC reduce supply by 30 percent and SFPUC, BAWSCA, and Cal Water have not been able to develop additional supplies within the next 20 years as described in this project's WSA, Cal Water could have a net shortage of supply of 6,302 afy during the third year of a multiple-dry-year scenario. As stated previously, Cal Water will impose additional conservation measures to reduce demand within its service area. Based on historical experience, Cal Water's can achieve up to 10 percent demand reduction through voluntary measures during drought. During a severe drought an additional 25 percent of demand reduction can be achieved through mandatory rationing resulting in a significant demand reduction of up to 35 percent.

While the WSA analysis of SFPUC supply is based on no additional reductions in supply from SFPUC, there is some uncertainty since SFPUC notes that fishery flow releases in Alameda Creek (Calaveras Reservoir) and San Mateo Creek (Crystal Springs Reservoir) could reduce the SFPUC annual average local supply by up to 12.8 mgd or 14,350 afy. This reduction in local supply could have a more significant effect on Cal Water than other wholesale customers of the SPFUC due to the Raker Act, which restricts

Cal Water to local SFPUC supply sources rather than the larger supply source from the Tuolumne River basin. Further, there is also a potential additional local supply reduction due to SFPUC's agreements to deliver 9 mgd to the cities of San Jose and Santa Clara.

4.11.2 Regulatory Framework

Federal

Clean Water Act

The CWA is the principal statute governing water quality. The statute's goal is to end all discharges entirely and to restore, maintain, and preserve the integrity of the nation's waters, with an interim goal of providing water that is both fishable and swimmable. The CWA regulates both the direct and indirect discharge of pollutants into the nation's waters. It mandates permits for wastewater and stormwater discharges, regulates publicly owned treatment works that treat municipal and industrial wastewater, requires states to establish site-specific water quality standards for navigable bodies of water, and regulates other activities that affect water quality, such as dredging and the filling of wetlands. The CWA was enacted in 1977 as a series of amendments to the federal Water Pollution Control Act of 1948.

CWA Section 303(d) requires each state to identify waters that will not achieve water quality standards after application of effluent limits. For each water and pollutant, the state is required to propose a priority for development of load-based (as opposed to concentration-based) limits called total maximum daily loads (TMDLs). The TMDL determines how much of a given pollutant can be discharged from a particular source without causing water quality standards to be violated. Priorities for development of TMDLs are set by the state, based on the severity of the pollution and uses of the waters.

Federal Safe Drinking Water Act

Enacted in 1974 and implemented by the U.S. Environmental Protection Agency (USEPA), the federal Safe Drinking Water Act (SDWA) imposes water quality and infrastructure standards for potable water delivery systems nation-wide. The primary standards are health-based thresholds established for numerous toxic substances. Secondary standards are recommended thresholds for taste and mineral content.

State

Urban Water Management Planning Act

The California Urban Water Management Planning Act (California Water Code [CWC] Division 6, Part 2.6 Sections 10610–10656) requires water suppliers to develop water management plans every 5 years to identify short-term and long-term water resource management measures to meet growing water demands during normal, single-dry, and multiple-dry years.

Safe Drinking Water Act

California enacted its own SDWA in 1976. The Department of Health Services (DHS) has been granted primary enforcement responsibility for the SDWA. California Administrative Code Title 22 establishes

DHS authority and stipulates drinking water quality and monitoring standards. These standards are equal to or more stringent than the Federal standards.

Water Conservation Projects Act

California's requirements for water conservation are codified in the Water Conservation Projects Act of 1985 (CWC Sections 11950–11954), as reflected below:

> 11952(a). It is the intent of the Legislature in enacting this chapter to encourage local agencies and private enterprise to implement potential water conservation and reclamation projects. …

California Water Code Sections 10910 et seq.

SB 610 was adopted in 2001 and reflects the growing awareness of the need to incorporate water supply and demand analysis at the earliest possible stage in the land use planning process. SB 610 amended the statutes of the Urban Water Management Planning Act, as well as CWC Sections 10910 et seq.

Water supply planning under CWC Section 10910 requires reviewing and identifying adequate available water supplies necessary to meet the demand generated by certain qualifying projects, as well as the cumulative demand for the general region over the next 20 years, under a broad range of water conditions. For areas served by public water systems, this information is typically found in the current UWMP. CWC 10910 requires the identification of the public water supplier. Under CWC 10910, a WSA need only be prepared if a project exceeds thresholds of development identified, thereby relieving projects of less significance from the requirements of the bill. SB 610 requires water supply assessments in any environmental documentation for certain projects (as defined in CWC Section 10912(a)) subject to CEQA. A WSA was prepared by Cal Water SSFD for the proposed project.

SB 221 requires the legislative body of a city, county, or local agency to include, as a condition in any tentative map that includes a subdivision, a requirement that a sufficient water supply shall be available to serve the subdivision. A "subdivision" is defined in SB 221 as a proposed residential development of more than 500 dwelling units or one that would increase, by at least 10 percent, the number of service connections of a public water system having less than 5,000 connections. "Sufficient water supply" is defined as the total water supplies available during normal, single-dry, and multiple-dry years within a twenty-year projection that will meet the projected demand of a proposed subdivision. SB 221 ensures that collaboration on finding the needed water supplies to serve a new large subdivision occurs before construction begins.

Recycled Water Regulations

Within the state of California, recycled water is regulated by the USEPA, the State Water Resources Control Board (SWRCB), Regional Water Quality Control Boards (RWQCBs), and CDPH. SWRCB has adopted Resolution No. 77-1, Policy with Respect to Water Reclamation in California. This policy states that the SWRCB and RWQCB would encourage and consider or recommend for funding water reclamation projects that do not impair water rights or beneficial in-stream uses, such as maintaining certain riparian habitats or supporting recreational activities.

The RWQCB implements the SWRQB's Guidelines for Regulation of Water Reclamation and issues waste discharge permits that serve to regulate the quality of recycled water based on stringent water

quality requirements. CDPH develops policies protecting human health, and comments and advises on RWQCB permits.

California Water Code Title 22

The CWC requires CDPH to establish water reclamation criteria. In 1975, the DHS prepared Title 22 to fulfill this requirement. Title 22 regulates the production and use of reclaimed water in California by establishing three categories of reclaimed water: primary effluent, which typically includes grit removal and initial sedimentation or settling tanks; adequately disinfected, oxidized effluent (secondary effluent) which typically involves aeration and additional settling basins; and adequately disinfected, oxidized, coagulated, clarified, filtered effluent (tertiary effluent) which typically involves filtration and chlorination. In addition to defining reclaimed water uses, Title 22 also defines requirements for sampling and analysis of effluent and requires specific design requirements for facilities.

Regional

Water Quality Control Plan for the San Francisco Bay Region

Prepared by the RWQCB, the Water Quality Control Plan (Basin Plan) for the San Francisco Bay Region identifies surface waters in the region as consisting of inland surface water (freshwater lakes, rivers, and streams), estuaries, enclosed bays, and ocean waters. Historic and ongoing wasteload contributions to surface water bodies in the region come from upstream discharges carried into the region via Delta outflow, direct input in the forms of point and nonpoint sources, and indirect input via groundwater (SFB RWQCB 1995). The Basin Plan describes the water quality control measures that contribute to the protection of the beneficial uses of the Bay watershed. The Basin Plan identifies beneficial uses for each segment of the Bay and its tributaries, water quality objectives for the reasonable protection of the uses, and an implementation plan for achieving these objectives.

McAteer-Petris Act (Public Resources Code Sections 66600 et seq.)

The San Francisco Bay Conservation and Development Commission (BCDC) is dedicated to the protection and enhancement of San Francisco Bay and encourages the Bay's responsible use. The members of BCDC are local, elected government officials, public appointees of the governor and the legislature and representatives of state and federal agencies. BCDC has been successful in stopping the shrinkage of the Bay and dramatically increased public access to the Bay's shoreline and waters. Pursuant to its authority under the McAteer-Petris Act, BCDC regulates development in the Bay and within the first 100-feet inland of the shoreline, evaluating proposals for consistency with the provision of the Act, and BCDC's San Francisco Bay Plan. BCDC also participates in regional partnerships, including the San Francisco Bay Trail Project to advance its mission of improving public access to the San Francisco Bay and its shoreline.

Local

City of South San Francisco General Plan

The City's General Plan, which contains implementing policies regarding public services and utilities, is discussed below.

Water

General Plan Policies 5.3-I-1 and 5.3-I-2 of the Parks, Public Facilities, and Services Element call for the City to work with Cal Water and Westborough Water District to do the following:

- Ensure coordinated capital improvements
- Establish guidelines and standards for water conservation
- Actively promote the use of water-conserving devices and practices in both new construction and major alterations and additions to existing buildings, including conservation as it relates to any industrial or commercial construction

East of 101 Area Plan

Public Facilities Element

The East of 101 Area Plan's overall intent regarding water, sewer, drainage, and utility facilities for the East of 101 Area is to provide adequate municipal services to serve all development, and to limit development if it would exceed available service capacity.

Policy PF-1 The City shall allow development in the East of 101 Area only if adequate water supply to meet its needs can be provided in a timely manner.

Policy PF-2 Low flow plumbing fixtures and drought tolerant landscaping shall be installed as part of all new developments in the area.

Policy PF-11 Utility companies shall be provided early notification for any proposed project that could have an unusual requirement for water, sewer, gas, electric, or telephone services.

Consistency Analysis

Implementation of the Specific Plan could include the construction of necessary water conveyance pipeline upgrades, both on- and off-site, to serve future development. Specific future developments for the Specific Plan are not known at this time and no specific development plan has been proposed or presented. However, the water lines associated with future development permitted under the Specific Plan would be required to be sized appropriately for the anticipated design average day demand and appropriate peaking factors. Any impact to water demand and supply would be assessed and mitigated based on individual CEQA documentation. Therefore, the Specific Plan would be consistent with the goals, objectives, and policies contained in the General Plan and the East of 101 Area Plan.

City of South San Francisco Municipal Code

4.11.3 Impacts and Mitigation Measures

Analytic Method

To determine impacts on water facilities and supply resulting from future development under the Specific Plan, this section includes an evaluation of whether the projected increase in water use in the study area falls within the Cal Water projected water demands and supplies, as well as the capacity of the treatment and distribution system. It also includes an analysis of whether any infrastructure improvements would be necessary and whether there will be an adequate and reliable source of water for the proposed project.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on water facilities and supplies if it would:

- Have insufficient water supplies available to serve the project from existing entitlements and resources or are new or expanded entitlements needed.
- Require or result in the construction of new water treatment, distribution, or conveyance facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Project Impacts and Mitigation

Threshold	Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

Impact 4.11-1 **There would be sufficient water supplies available to serve Specific Plan development from existing entitlements and resources, and new or expanded entitlements would not be necessary. This would be a *less-than-significant* impact.**

The City of South San Francisco is served by the Cal Water's—SSFD. Cal Water obtains water from a purchasing agreement with SFPUC, which is supplied by local surface water sources within its RWS, and from its own groundwater sources. Water is delivered to the City after being treated at the South San Francisco/San Bruno Sewage Treatment Plant. Future area water supplies would be delivered through existing City supply facilities and new water infrastructure constructed for delivery into specific project sites, per the requirements of the City of South San Francisco.

Table 4.11-6 (Existing and Potential Water Demand in Specific Plan Study Area) illustrates the potential increase in demand with implementation of the Specific Plan. As shown in Table 4.11-6, existing demand is calculated to be 627,989 gpd (703.4 afy). Projected demand generated from implementation of the Specific Plan as calculated in the Specific Plan WSA is estimated to be 266,395 gpd (298.4 afy). Total

demand within the Specific Plan area (Existing and Projected), as shown in Table 4.11-6, is calculated to be 894,384 gpd (1,001.8 afy) This is considered a net increase in demand over existing conditions since the proposed project would construct new structures, buildings, and facilities over the existing development.

Table 4.11-6 Existing and Potential Water Demand in Specific Plan Study Area

Land Use	Factor (existing uses) (gpd/unit/ksf)	Existing Uses			Specific Plan Build-Out (demand from WSA)			Existing Plus Specific Plan		
		Area/Units		Water Demand (gpd)	Area/Units		Water Demand (gpd)	Area/Units		Water Demand (gpd)
Residential[a]	207	1,436	du	297,539	1,435	du	89,274	2,871	du	386,813
Business Commercial	60	130,000	sf	7,800	512,000	sf	18,432	642,000	sf	26,232
Downtown Commercial	195	603,000	sf	117,585	—			603,000	sf	117,585
Auto-serving Commercial	60	55,000	sf	3,300	—			55,000	sf	3,300
Industrial/	195	797,000	sf	155,415	21,000	sf	756	818,000	sf	156,171
Manufacturing		—		—	—			—		0
Hotel	60	285,000	sf	17,100	—			285,000	sf	17,100
Institutional	195	150,000	sf	29,250	—			150,000	sf	29,250
Commercial	195	—		0	269,000	sf	93,940	279,000	sf	93,940
Office/R&D	195	—		0	1,200,000	sf	63,993	1,200,000	sf	63,993
Total gpd		**—**		***627,989***	**—**		***266,395***	***0***		***894,384***
Total mgd				***0.628***			***0.27***	***0***		***0.894***
Total afy				***703.4***			***298.4***			***1,001.84***

SOURCE: Cal Water, *SB 610 Water Supply Assessment For South San Francisco Downtown Station Area Plan* (June 25, 2014), prepared by Yarne &Associates, Inc.

du = dwelling units; gpd = gallons per day; ksf = thousand square feet; msf = million square feet

a. Inside residential water usage is estimated based on the number of dwelling units times an estimated 2.96 people per dwelling unit and 70 gallons per capita per day. The people per dwelling unit is based on an estimate provided the City. The 70 gallons per capita is based on statistics compiled by the American Water Works Association from the website www.drinktap.org.

Cal Water bases its future water use projections on estimates of both the number of future water users and the amount of water each type of user will consume. The 5-year average growth in the number of accounts is the basis for the utility's projections of the number of water users through 2020. Water use projections for 2020 range from 5.9 mgd to 9.1 mgd. Cal Water, through its ISG with SFPUC, will continue to receive adequate supply to meet even the projected demand within its service areas.

As such, water demand generated with implementation of the Specific Plan combined with demand generated by the current population would be approximately 9.27 mgd, which is within the water demand projections in the WSA for this Specific Plan and presented in Table 4.11-2. As shown in Table 4.11-2, a potential shortfall occurs in 2035 and 2040; this potential deficiency is well within the uncertainty of the projection estimate, but in later years will increase unless Cal Water can balance demand through ongoing

conservation programs or supplements its supply portfolio with through additional sources. It should be noted, that nothing in Senate Bill 610 prevents a city from approving a project even in the face of information concluding that there is not sufficient water supply for build-out of the project.

As previously discussed, Cal Water's ISG with SFPUC ensures Cal Water 35.68 mgd (39,967 afy) that is shared within Cal Water's three Peninsula Districts. SSFD also pumps approximately 1,535 afy from the Westside Basin to supplement its SFPUC supplies. Groundwater is not immediately affected by low precipitation and dry years and can be reliable in all hydrologic conditions. Development under the Specific Plan would be required to comply with any measures imposed by Cal Water to achieve these targets, which would help to minimize any excess water usage within the study area.

The WSA concludes under normal year conditions that the SSFD would have sufficient capacity to meet the water demands of the proposed project without compromising existing demands. As previously stated, SFPUC can reliably deliver the purchase request submitted by the BAWSCA member agencies (assumes implementation of the SFPUC's Water System Improvement Plan or after year 2018, increased diversions from the Tuolumne River under San Francisco's existing water rights). As such, in normal years, Cal Water would have sufficient water supply to serve the proposed project and the impact is less than significant. As stated previously, the SFPUC could curtail systemwide water deliveries by 20 percent when specific critical dry-year events occur or when multiple-dry years prevail and further jeopardize the availability of water supplies. In the event that SFPUC reduces its deliveries by 20 percent, Cal Water and the SSFD would have insufficient water supplies to meet the projected water demand associated with development at the Specific Plan area, in addition to existing and planned future uses within the service area of the Bear Gulch District. In these instances, Cal Water, through its water shortage contingency plan (California Water Code Section 10632) can also impose supply curtailments and implement subsequent stages of demand reductions to balance demand against curtailed supplies.

In addition, SB x7-7 (the Water Conservation Act of 2009) calls for reducing demand by 10 percent conservation per capita in 2015 and 20 percent by 2020. Because Cal Water can regulate its deliveries accordingly in response to a regional water supply reduction and mandate demand customer reductions within its service area, a less-than-significant impact would occur as result of implementation of the proposed Specific Plan.

Therefore, based on the supply and demand data in the WSA for Specific Plan area, Cal Water would have sufficient supplies to meet the projected demand generated by the Specific Plan. Since adequate water supplies would be available, new or expanded water entitlements would not be required and the impact would be ***less than significant***. No mitigation would be required.

Threshold	Would the project require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Impact 4.11-2 Implementation of the proposed project would not require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. This would be a *less-than-significant* impact.

The City of South San Francisco is served by the Cal Water's SSFD. Cal Water obtains water from a purchasing agreement with SFPUC, which is supplied by local surface water sources within its RWS, and from its own groundwater sources. Future area water supplies would be delivered through existing City supply facilities and new water infrastructure constructed for delivery into specific project sites, per the requirements of the City of South San Francisco.

Implementation of the Specific Plan would potentially increase the demand for potable water in the study area. The Specific Plan would accommodate a net increase of 1,435 dwelling units, 0.8 million square feet (sf) of commercial uses, 21,000 sf of industrial uses, and 1.2 million sf of new office/research, as shown in Table 4.11-6.

The SFPUC has planned for improvements to the water treatment system to improve system reliability and accommodate projected growth in its regional service area. Therefore the proposed project would not prompt a need to expand treatment facilities in order to meet its demands. SFPUC's WTPs currently have a maximum combined treatment capacity of 340 mgd, if operated continuously. After 2011, with the addition of the Tesla WTP (315 mgd), SFPUC can reliably deliver 655 mgd, which is well in excess of the demands within Cal Water and Bear Gulch District's service area, now and over the next 20 years.

In order to ensure proper distribution, SFPUC also manages the regional conveyance system used to transport potable water supplies to the wholesale water agencies. In addition, SFPUC manages and maintains all the WTPs; any improvements or expansions are the responsibility of SFPUC and would not adversely affect Cal Water, the SSFD or any of the Specific Plan development. As such, no additional water treatment facilities are required to meet water demands associated with the proposed project and the project would not require the construction or expansion of water treatment facilities. Therefore, impacts of the Specific Plan implementation on water facilities would be ***less than significant***. No mitigation would be required.

4.11.4 Cumulative Impacts

Threshold	Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?
Threshold	Would the project require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

The geographic context for the consideration of cumulative impacts to water facilities and supply is the water service area of the Cal Water Peninsula Districts. The cumulative impact of growth under the

Specific Plan, as well as existing and projected future growth within the water service area would be the same as that described above with regard to project-specific impacts because the same water supply assurances would be put in place for any cumulative development within this area.

The WSA prepared for the EIR for the proposed Specific Plan project considered the growth in demand estimated by through existing or similar uses on the Peninsula. This data can be considered as representing a cumulative growth scenario that could occur as a result of redevelopment at or near the project site.

The SSFD currently uses 8.29 mgd or approximately 23.26 percent of Cal Water's 35.68 mgd allocation from SFPUC. The balance is used to meet demand in Cal Water's other Peninsula Districts. Although the proposed Specific Plan and other projects would contribute to demand within SSFD's service area, this new demand would be accommodated through Cal Water's ISG (Individual Supply Guarantee) of 35.68 mgd. This analysis recognizes that in the event that the SSFD reaches its ISG maximum, in normal years, it could use additional supplies available to the BASWCA members to meet demand, because, the aggregated demand within the BAWSCA members has not reached its maximum of 184.0 mgd, and no supply limitations under these conditions are being enforced. The demand of the Specific Plan and other projects can be accommodated under normal year conditions and, if need be Cal Water could purchase supplemental supplies from the SFPUC without penalties.

As previously discussed, SFPUC can deliver an average of 239 mgd based on a hydrologic period equivalent to that experienced from 1921 to 1999 with no deficiencies and can meet the demand of its Retail and Wholesale customers.[12] SFPUC can reliably deliver the purchase request submitted by the BAWSCA member agencies (assumes implementation of the SFPUC's Water System Improvement Plan or after year 2018, increased diversions from the Tuolumne River under San Francisco's existing water rights). As such, in normal years, the Bear Gulch District would have sufficient water supply to serve the proposed project and the impact is less than significant.

Table 4.11-7 (2010–2035 Supply and Demand Comparison for Normal and Critical-Dry and Multiple-Dry Years under with 20 Percent Systemwide Reductions to BAWSCA Members—No Net Demand Increase Scenario with No Conservation) includes the projected future supply and demand by varying hydrologic conditions over the 25-year planning horizon through 2035. As shown, only in normal or above-normal precipitation years can SFPUC meet the demand generated in Cal Water's service areas – this assumes that demand is held to 35.68 mgd even with planned growth or no net gain in water demand. The Water Supply Agreement and Water Supply Allocation Plan allow the SFPUC to reduce water deliveries to Wholesale customers during periods of declared water shortages. The SFPUC used the historical hydrologic record from 1920 to 2002 to compare water supplies and demands into the future. This methodology assumes that climatic history will repeat itself and similar hydrologic conditions will be experienced.

[12] San Francisco Public Utilities Commission, *Water Supply Master Plan* (April 2000), p. 22.

Table 4.11-7 2010–2035 Supply and Demand Comparison for Normal and Critical-Dry and Multiple-Dry Years under with 20 Percent Systemwide Reductions to BAWSCA Members—No Net Demand Increase Scenario with No Conservation

	Normal Year Purchase Request		*20% System-wide Reductions to BAWSCA Members and Cal Water*							
			A Critical Dry (Year 1)		*Multiple-Dry-Year Event*					
					Year 2		*Year 3*		*Year 4*	
	mgd	*%*	*mgd*	*20%*	*mgd*	*20%*	*mgd*	*20%*	*mgd*	*20%*
SFPUC/BAWSCA Allocation	184.0	100%	115.5	62.5%	115.5	62.5%	115.5	62.5%	115.5	62.5%
Cal Water Individual Supply Guarantee (Allocation)[a,b]	35.68	100%	24.04	66.8%	24.04	66.8%	24.04	66.8%	24.04	66.8%
Cal Water Demand[c]	35.68		35.68		35.68		35.68		35.68	
Difference	0.00	100%	-11.64	33.2%	-11.64	66.8%	-11.64	66.8%	-11.64	66.8%

a. BAWSCA Allocation based on the 2009 Settlement Agreement and Master Water Sales Contract currently being approved by all parties in interest. Pursuant to the 2009 Settlement Agreement and Master Water Sales Contract, BAWSCA and its member agencies will receive 184 mgd. After 2018 SFPUC could obtain additional supplies from the Tuolumne River watershed; however, at this time that remains an unknown. Therefore, in order to meet potential growth now and beyond 2018 to 2030, BAWSCA and its member agencies must optimize conservation measures and pursue local water supply sources, i.e. groundwater, stormwater and recycled water. The Settlement Agreement and Master Water Sales Contract determined that the BAWSCA members are responsible for obtaining 25 mgd collectively.

b. The tentative agreement among BAWSCA members is to use the results of Case 16A. It shows that in a 20% system-wide shortage, the average reduction among BAWSCA members is 26.88%. Cal Water would get a reduction of 33.2%.Source: BAWSCA Table 1 REVISED - DRIP Case 16A Results Plus Options 1, 2 (corrected), and 3 (corrected) to Address EPA Needs

c. Total for Cal Water Districts.

As shown Table 4.11-7, within the next 25 years during critical-dry and over multiple-dry years when a 20 percent systemwide reduction could be imposed, SFPUC is incapable of sufficiently meeting Cal Water's demand, including the net increase in demand generated by the proposed project. Under present regional water supply conditions, if a critical dry year is declared and SFPUC imposes a 20 percent systemwide reduction, water supplies to BAWSCA would be reduced to approximately 115.5 mgd; as such, the BAWSCA members would be required to reduce their individual demands according to the Tier Two Water Supply Allocation Plan formula.

In recent years, the SFPUC has delivered 265 mgd, and in fiscal year 2007/08, SFPUC delivered approximately 254 mgd—these are above the firm delivery capabilities of 219 mgd. In terms of water supply reliability, the SFPUC's UWMP assumes "firm" delivery "as amount the system can be expected to deliver during historically experienced drought periods."[13] In recent years (2007–2009), when many water suppliers declared drought conditions in their service areas, SFPUC did not declare a drought and did not impose a limitations or supply reductions on the RWS. As such, SFPUC was able to deliver adequate supply to meet all demand. It should be noted that during this 2007–2009 period, SFPUC did request a voluntary 10 percent reduction from the BAWSCA members.

In the event that SFPUC reduces its deliveries by 20 percent, Cal Water and the SSFD would have insufficient water supplies to meet the projected water demand associated with development at the project site in addition to existing and planned future uses within the service area of the Bear Gulch District. In fact, under a called 20 percent systemwide reduction even without implementation of new

[13] San Francisco Public Utilities Commission, *Urban Water Management Plan* (December 2005), p. 21.

development projects (i.e., moratorium on new development) throughout SFPUC's service area, the SFPUC is incapable of meeting 100 percent of the local and regional demands under these critical-dry or multiple-dry-year hydrologic conditions.

As discussed previously in the Regulatory Setting, development within the project area would be required to comply with applicable Cal Water and City of South San Francisco policies, which require the installation of low-water-use plumbing fixtures and landscaping in new development. In addition, SB x7-7 (the Water Conservation Act of 2009) calls for reducing demand by 10 percent conservation per capita in 2015 and 20 percent by 2020. As such, if customers in the SSFD achieve as much as 20 percent conservation per capita, in the event regional supplies are reduced, additional water conservation (within the Bear Gulch District) may not be necessary.

Water Supply Uncertainties

A number of uncertainties have the potential to impact long-term water supplies.

Climate Change

The future effects of climate change on long-term water supplies are commonly addressed as effects on precipitation forecasts. Change to weather patterns is difficult to predict and the California Department of Water Resources (DWR) estimates in the 2007 State Water Project Reliability Report a range of a 1 percent increase to a 10 percent decrease in precipitation. Both the amount of precipitation and the form that is takes, i.e., snow versus rain, are important. Most of the SFPUC water supplies are the result of snow pack in the mountains that melts over a long period of time and flows to reservoirs for controlled conveyance to its customers, including the Bear Gulch District. A change from snow to rain would alter the ability to capture water in the Hetch Hetchy Reservoir and would alter the seasonal levels of water flow. This has two primary effects on water planning. One is possibly a reduction in the total amount of water available because of reduced precipitation, and the second is a change in how water flow is used to balance ecological concerns and customer demands.

Localized weather patterns would possibly change the amount or timing of rain, which has an effect on surface runoff and groundwater recharge; however, it is speculative to estimate any precise effect at this time as no model can predict local weather patterns. Climate-change-related sea level rise could also have local effects on the groundwater aquifer and could change the dynamics of salt water intrusion. However, the Bear Gulch District does not currently use groundwater for water supply, nor does it have plans to in the future.

Pending System Improvements and Potential Policy Actions

Crystal Springs, Calaveras Dam, and Sunol Valley Water Treatment Plant currently have active or planned replacement/repair projects, which would secure and improve their long-term supply capabilities. Although there is no specific reason that these improvements will not be completed, it is worth noting that delays or disruptions in these projects could affect long-term water supplies.

In addition, as identified in SFPUC's Phased Variant of its Water System Improvement Plan, and assuming regional achievements in water use efficiencies are met; the SFPUC could increase its

diversions from the Tuolumne River under San Francisco's existing water rights, thereby improving supplies within the Regional Water Supply system. This also assumes that implementation of the Water System Improvement Plan would continue after 2018 and over the remainder of the planning horizon.

Conclusion

Cal Water, based on the analysis in the WSA, has concluded that none of these uncertainties would require the development of alternative sources of water supply within its service area including the Specific Plan area, and that its Individual Supply Guarantee of 35.68 mgd coupled with its groundwater extractions of 1.4 mgd (1,535 afy) are adequate to meet demands generated by development consistent with the Specific Plan. Therefore, cumulative development would have adequate water supplies with existing entitlements and would not require or result in the construction of new water facilities or expansion of existing facilities. Cumulative development would have a ***less-than-significant*** impact on water supplies and facilities.

4.11.5 References

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Wastewater

This section describes the current status of wastewater services in the City of San Francisco, including a discussion of the ability of the City's wastewater services to meet the current needs of the City.

Data for this section were taken from South San Francisco Downtown Station Area Specific Plan, and other relevant documents and internet resources related to wastewater. Full reference-list entries for all cited materials are provided in Section 4.11.10 (References).

4.11.6 Environmental Setting

Wastewater and Storm Drainage

Wastewater Collection System

The South San Francisco General Plan mentions that existing and as-planned capacity of the water and sewer systems in South San Francisco will be able to accommodate the build-out of the General Plan. The most recent major infrastructure improvements occurred between 1998 and 2004, during which time the South San Francisco/San Bruno Water Quality Control Plant (WQCP) was expanded and improvements were made to the facility, including construction of a 7-million-gallon effluent storage pond and reconstruction of two large pump stations These improvements increased the maximum allowable capacity to 13 mgd from the current 9 mgd and will accommodate future development (South San Francisco 1999).

Sewage and wastewater generated within the City is collected through the City's sewer system and is disposed of and treated at the South San Francisco/San Bruno WQCP. The sanitary sewer system has an interconnecting network of approximately 12 miles of 6-inch to 30-inch-diameter gravity sewer mains, force mains, and twelve pump stations, which function together to bring wastewater from individual homes and businesses to the WQCP. Some pump stations act as tributaries to a few stations that handle most of the wastewater from large portions of the community.

Older portions of the City's sewer system are subject to infiltration and inflow (I/I) problems. I/I problems occur when leaks and breaks in sewer pipes, or cross connection with the storm drain system, result in the entrance of rainfall and other water from the storm drain system into the sewer pipes. There are also some reliability issues at pump stations and areas where sewer lines have sunk, decreasing hydraulic capacity and increasing the potential deposit of solids.

Within the City of South San Francisco, there are approximately 3,200 firms and businesses including manufacturing, wholesaling, transportation facilities and utilities, and 60,000 residents. The City facilities consist of gravity and force main pipes of various materials including, primarily, vitrified clay (VCP), but also asbestos cement (ACP), ductile iron (DIP), polyvinyl chloride (PVC), high-density polyethylene (HDPE) and reinforced concrete (RCP). According to the Specific Plan, one of the City's twelve pump stations is within the study area. The entire study area west of U.S. Highway 101 (US-101) and a small area east of US-101 at Gateway Boulevard and South Airport Boulevard are served by a by gravity to Pump Station 9 within the study area. Pump Station 9 then conveys wastewater via a 24-inch force main south and east to the WQCP, crossing US-101 at South Airport Boulevard. Wastewater within the study

area east of US-101 and north of South Airport Boulevard is conveyed by gravity to Pump Station 4, which then pumps via a 27-inch force main south to the WQCP. The majority of the lines west of US-101 are 6-inch VCP, while larger lines, ranging from 8 inches to 30 inches, again primarily VCP, serve the more commercial and industrial area east of US-101.

A comprehensive evaluation of the sewer system for the Downtown area has not been conducted since 1994. East of US-101, an evaluation was conducted in 2002 and portions updated in 2007 and most recently in January 2012. The majority of the updates did not include areas that would serve the Specific Plan. Two consecutive segments of trunk line in Grand Avenue and Harbor Way, currently 15 inches and 27 inches, respectively, are recommended to be upgraded to 24 inches and 30 inches with the January 2012 Update. Additional capacity work may be required for the sewer system in the Downtown area or the Specific Plan study area east of US-101.

Water Quality Control Plant

The South San Francisco/San Bruno WQCP, located in South San Francisco, would serve the proposed project. The WQCP operates under NPDES No. CA0038130 and Waste Discharge Requirements R2 2003-010. The current facility has an average dry weather flow capacity to provide secondary level treatment for 13.0 mgd of domestic, commercial, and industrial wastewater from the cities of South San Francisco and San Bruno, portions of the City of Daly City, and the Town of Colma. The WQCP can handle a peak hourly wet weather flow of 62 mgd. In 2001, the average annual and peak wet weather flows at the treatment plant were 10.4 and 24.4 mgd, respectively. The cities of South San Francisco and San Bruno are each entitled up to 50 percent of the available treatment capacity.

Additionally, the WQCP dechlorinates effluent from the cities of Burlingame and Millbrae and the San Francisco International Airport, which all form the North Bayside System Unit (NBSU), prior to discharge to the San Francisco Bay. The treatment facility consists of bar screens, grit chambers, primary sedimentation, aeration tanks, final clarifiers and disinfection equipment. NBSU dechlorinates the combined effluent prior to discharging via the joint NBSU outfall off Point San Bruno (BMS Design Group 2013).

The WQCP had five discharge violations during 2003, as reported in RWQCB Order No. R2 2004-0075. During 2003, effluent concentrations of oils and grease, cyanide, and biological oxygen demand (BOD) were exceeded. These results are summarized in Table 4.11-8 (WQCP 2003–2008 Violations). From 2003 to 2008, there have been a total of four violations; three occurred in 2005 and one in 2006. Effluent concentrations of oils and grease, cyanide, BOD, settleable solids, and fecal coliform were exceeded. No violations were reported during the 2004 and 2007 annual reports.

Solids from the wastewater treatment process are referred to as sludge. Sludge consists of inert solids from the wastewater and microbial biomass created during treatment. Sludge is thickened, anaerobically digested, and then dewatered. Final disposal of sludge is by trucking to a landfill for disposal.

Table 4.11-8 WQCP 2003–2008 Violations

Date	*Pollutant*	*Effluent Limit*	*Reported Value*
2003 *			
4/1/2003	Oil and Grease daily maximum, mg/L	20	35
7/1/2003*	Cyanide daily maximum, µg/L	10	19
10/4/2003	BOD weekly average, mg/L	45	52
10/11/2003	BOD weekly average, mg/L	45	54
10/31/2003	BOD monthly average, mg/L	30	37
2005+			
1/5/2005	Test 1 Specie Eff 11 Samp 90th %, % Sur minimum	70	0
2/15/2005	Total Settleable Solids Eff Instant Max, mL/hour	0.2	3.5
3/23/2005	Fecal Coliform Eff 10 Samp, 90th %, mpn/mL	400/100	490/100
2006+			
10/30/2006	Oil and Grease monthly average, mg/L	10	11.10

SOURCES: * RWQCB No. R2-2004-0075.
+ South San Francisco Planning Division, *Gateway Business Park Master Plan Draft Environmental Impact Report* (October 2009).
mpn = most probable number

The City currently does not limit the amount of flow or the peak pollutant concentrations that industries can discharge. However, the East of 101 Area Plan requires projects in the East of 101 Area that are likely to generate large quantities of wastewater to lower their treatment needs through recycling, on-site treatment, graywater irrigation, and other programs where feasible. In addition, the East of 101 Area is subject to the East of 101 Sewer Impact Fee to update any of the sanitary sewer facilities listed in the East of Highway 101 Sewer System Master Plan Update prepared by Akel Engineering (dated January 2012).

Surface Water and Storm Drainage

The study area is located within the Downtown area of South San Francisco. The area East of 101 generally slopes downward to the east, toward San Francisco Bay. The storm drainage infrastructure within the study area is owned, operated and maintained by the City of South Francisco (the City). The City is responsible for maintaining its drainage infrastructure within public rights-of-way from drain pipes to flood channels and natural creeks. Specifically, the City is responsible for reducing flooding and responding to mandates imposed at the federal, state, and regional levels. The Clean Water Act is at the federal level, while the SWRCB and RWQCBs act via the Porter-Cologne Act and support federal and state regulations. The City's Standard Development Conditions address both storm water conveyance and maintenance of water quality. "Minor" storm drain lines are required to accommodate a 10-year design storm with initial time of concentration of 5 minutes with open channel flow conditions so that they are not surcharged. "Major" trunk lines are required to accommodate a 25-year design storm under the same design conditions. Public lines are required to be within public streets or within drainage easements a minimum of 10 feet wide for a single pipe or 15 feet wide for two pipes. They are required

to be a minimum of 12 inches in diameter and Class III or better reinforced gasketed concrete pipe, or HDPE (minimum SDR 26) pipe. Per FEMA requirements, new development must be constructed with building finished floors at least one foot above the reference Federal Emergency Management Agency (FEMA) base flood elevation.

Current FEMA maps (dated October 16, 2012) identify portions of the study area as potential Flood Hazard Zones that are subject to localized flooding. Approximately half of the study area is designated as FEMA Flood Hazard Zones A, AH, and X (2 percent). FEMA Zones A and AH areas are subject to inundation by the 1 percent annual chance flood. The 1 percent annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1 percent chance of being equaled or exceeded in any given year. In Zone A, no base flood elevations (the water surface elevation in of a 1 percent annual chance flood) have been determined. In Zone AH, flood depths of 1 to 3 feet may occur, usually in areas of ponding, and base flood elevations have been determined. Some Zone X areas have been hatched and are defined as areas of 0.2 percent annual chance of flood; areas of 1 percent annual chance flood with average depths of less than 1 foot, or with drainage areas less than 1 square mile; and areas protected by levees from 1 percent annual chance flood.

Special Flood Hazard Areas (SFHAs) have been identified by FEMA within the following the portions of the study area bounded approximately to the west and north by Linden Avenue, to the south by Armour Avenue and to the east by US-101, inclusive of Linden and Armour Avenues and limited at the western edge of US-101 (Zone A, with a small area of AH-Elevation 30). SFHAs also are identified in the areas from Armour Avenue at the north, along the eastern half of parcels on Cypress Avenue limited by the western edge of US-101, spilling over US-101 for a portion from California Avenue to Lux Avenue and extending beyond the limits of the study area to the east and south, and, from Second Lane extending beyond the study area to the south (Zone A, with a small area of hatched Zone X between Produce Avenue, US-101 and Colma Creek). Existing storm water drainage facilities in the study area consist of several networks of pipes, primarily RCP, that convey storm water to Colma Creek before ultimate discharge to San Francisco Bay. In general, the storm water conveyance follows the topography with storm water being conveyed primarily from north to south, and slightly west to east.

No other creeks or natural surface drainages are located in the study area. Instead, surface water and stormwater runoff in the study area are collected by the City's storm drainage system and discharged to San Francisco Bay to the east of the study area.

To minimize water quality degradation associated with industrial pollutant discharges, the San Mateo Countywide Stormwater Pollution Prevention Program (STOPPP), a consortium of all twenty cities located within San Mateo County, has prepared a Best Management Practices (BMPs) plan to control pollutants in their stormwater system. Compliance with the permit requirements for nonpoint source stormwater discharge under the National Pollutant Discharge Elimination System (NPDES) also requires the property owner of all construction projects over 1 acre in size to obtain a stormwater discharge permit. The WQCP operates under STOPPP's Joint Municipal NPDES Permit. Section 4.11.7 (Regulatory Framework) further describes the STOPPP and NPDES programs.

According to the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan), which applies to the study area, beneficial uses of South San Francisco Bay include wildlife habitat, navigation,

water contact and noncontact recreation, commercial and sport fishing, and industrial service supply. However, the Bay is listed on the 2002 CWA Section 303(d) list as an impaired water body. The various pollutants and stressors listed as inflicting the Lower and Central San Francisco Bay are chlordane, dichloro-diphenyl-trichloroethane (DDT), diazinon, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, mercury (sediment), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), PCBs (dioxin-like), and selenium. Sources contributing to impairment include urban runoff, other nonpoint sources, ballast water (exotic species), municipal point sources, industrial point sources, resource extraction (mercury) and agriculture.

As described above, a shallow groundwater table occurs within the majority of the East of 101 Area, including the study area. Groundwater in this area is hydraulically connected to San Francisco Bay, and thus, groundwater quality is closely tied with Bay water quality. The high groundwater table increases the risk that on-site surface contamination will leach into groundwater and spread to other properties or to the Bay. The "Groundwater and Water Quality" subsection of this Section 4.11, as well as Section 4.6 (Hazards/Hazardous Materials), further describe factors affecting groundwater in the study area and its vicinity.

4.11.7 Regulatory Framework

Federal

Federal Water Pollution Control Act (Clean Water Act)

The major piece of federal legislation dealing with wastewater is the Water Pollution Control Act, which is designed to restore and preserve the integrity of the nation's waters. The Water Pollution Control Act, popularly known as the Clean Water Act, is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Enacted originally in 1948, the Act was amended numerous times until it was reorganized and expanded in 1972. It continues to be amended almost every year. In addition to the Water Pollution Control Act, other federal environmental laws regulate the location, type, planning, and funding of wastewater treatment facilities.

National Pollutant Discharge Elimination System (NPDES)

The NPDES permit system was established in the CWA to regulate both point source discharges and nonpoint source discharges from construction, industrial, and municipal activities to surface waters of the U.S. For point source discharges, each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge. For nonpoint source discharges, the NPDES program establishes a comprehensive stormwater quality program to manage urban stormwater and minimize pollution of the environment to the maximum extent practicable. As permitted under the CWA, authority for issuing NPDES permits has been delegated by the USEPA to the San Francisco Bay RWQCB in the San Francisco Bay Area.

The SWRCB has adopted a separate NPDES General Permit for stormwater discharge associated with construction activity (NPDES Permit No. CAS000002). Under this permit, developers proposing construction activity that disturbs more than 1 acre of land must submit a Notice of Intent (NOI), develop a Stormwater Pollution Prevention Plan (SWPPP), conduct monitoring and inspections, retain

records of the monitoring, report incidences of noncompliance, and submit annual compliance reports. The SWPPP must address both grading/erosion impacts and nonpoint source pollution impacts of the development project, including post-construction impacts and sampling/monitoring requirements. Individual projects proposed under the 2006 FMPU that would disturb more than 1 acre of land would be required to obtain and comply with a NPDES General Permit for construction activity.

Stormwater NPDES permitting for certain classes of industrial activities, including manufacturing activity, are regulated under the Industrial Activities General Permit adopted by the SWRCB (NPDES Permit No. CAS612008). To comply with the conditions of this permit, facility operators are required to submit a NOI, develop a SWPPP, and conduct stormwater monitoring, in addition to submitting annual reports by July 1 of each year.

Municipal stormwater in the City is regulated by STOPPP's Joint Municipal NPDES Permit (No. CAS612008, Order No. R2-2009-0074, originally issued in 1999) for stormwater quality management. STOPPP and its NPDES Permit are described further in "San Mateo Countywide Stormwater Pollution Prevention Program," below.

State

The operation of treatment plants is subject to regulations set forth by the California DHS and the San Francisco Bay (SFB) RWQCB.

Pretreatment Program and Storm Water Pollution Prevention Program

The State mandates a Pretreatment Program and a Storm Water Pollution Prevention Program, which are administered by the Water Quality Control Plant environmental compliance staff. The two programs regulate and control the concentrations of wastewater and stormwater pollutants discharged by industrial, commercial, and residential dischargers. Pollution prevention information is distributed to residents as well as schools and businesses within the service area. These programs are enacted under Chapter 14.08 (Water Quality Control) of the SSFMC, which is described in City of South San Francisco Municipal Code.

Regional

Regional Water Quality Control Board

Under the SFB RWQCB NPDES permit system, all existing and future municipal and industrial discharges to surface waters within the City are subject to regulations. The NPDES permit requires that all development within the City is subject to the provisions of the NPDES Storm Water Permit. The NPDES storm water permit was issued by SFB RWQCB for municipal storm water and urban runoff discharges for the San Francisco Bay Region of San Mateo County.

Local

General Plan

Public Facilities and Services

Implementation of the Specific Plan would be consistent with the guiding and implementing policies outlined in the City of South San Francisco's General Plan. The relevant policies found in the General Plan are listed below:

Guiding Policies: Wastewater

Policy 5.3-G-4 Promote the orderly and efficient operation and expansion of the wastewater system to meet projected needs.

Policy 5.3-G-5 Promote the equitable sharing of the costs of associated with providing wastewater service to new development.

Policy 5.3-G-6 Maintain environmentally appropriate wastewater management practices.

Implementing Policies: Wastewater

Policy 5.3-I-4 Ensure coordinated capital improvements with respect to the extent and timing of growth. The need for capital improvements to the wastewater system will necessarily be linked to the extent and timing of growth, if sufficient capacity is to be provided. This requires the continuous monitoring of very dynamic trends in both development and system capacity.

Policy 5.3-I-5 Ensure that future residents and businesses equitably share costs associated with providing wastewater service to new development in South San Francisco.

Policy 5.3-I-6 Monitor industrial discharges to ensure that wastewater quality continues to meet various federal, state, and regional standards; treatment costs would remain affordable.

Policy 5.3-I-7 Encourage new projects in East of 101 area that are likely to generate large quantities of wastewater to lower treatment needs through recycling, pretreatment, or other means as necessary.

Discharge from the City's wastewater treatment plant is closely monitored for quantity and concentrations of pollutants. Noncompliance with various numerous federal, state, and regional regulations could result in the City's NPDES waste discharge permit to be revoked. Because increased industrial growth may make it difficult to achieve the standards for biological oxygen demand (BOD)and total suspended solids (TSS) concentrations over time, linkages between pollutant levels and land uses need to be established. Industrial discharges also place enormous treatment costs on the City. The cost of providing this service should also be closely monitored to ensure that the continuation of this service remains cost-effective.

Industrial-related conservation measures regarding monitoring of industrial discharges to ensure that wastewater quality continues to meet various federal, state, and regional standards and to encourage new projects in the East of 101 Area (such as the EIR study area) that are likely to generate large quantities of

wastewater to lower treatment needs through recycling, pretreatment, or other means as necessary are intended to help limit the demand for wastewater treatment plant capacity.

East of 101 Area Plan

Policy PF-7 Projects in the East of 101 Area that would generate large quantities of wastewater shall be required to lower their wastewater treatment needs through water recycling, on-site treatment, gray water irrigation and similar programs where feasible.

Policy PF-8 Specific development proposals in the East of 101 Area shall be evaluated individually to determine drainage and flood protection requirements.

Policy PF-9 All development in the East of 101 Area shall comply with the NPDES discharge program. Developments over 5 acres in size shall obtain a storm water discharge permit from the NPDES, which may require inclusion of on-site treatment of stormwater from parking areas.

Policy PF-10 During the rainy season, developers shall be required to place appropriate erosion control devices, such as silt fences, hay bales, etc. during construction activities to minimize the amount of silt directly entering the Bay or other wetlands.

City of South San Francisco Municipal Code

Chapter 14.04 (Stormwater Management and Discharge Controls)

Chapter 14.04 was created to ensure the future health, safety, and general welfare of the City and to protect and enhance water quality pursuant to the CWA. The controls include measures to eliminate non-stormwater discharges to the municipal separate storm sewer; control discharges to the municipal storm sewer from spills, dumping, or disposal of materials other than stormwater; protect watercourses from modifications to natural flow; and reduce pollutants in stormwater discharges to the maximum extent practicable.

Chapter 14.08 (Water Quality)

Chapter 14.08 sets forth requirements for direct and indirect contributors into the City's wastewater collection and treatment system and enables the City to comply with all applicable state and federal laws required by the CWA and the General Pretreatment Regulations. The objectives of Chapter 14.08 are the following:

- To prevent the introduction of pollutants into the municipal wastewater system which will upset or interfere with the operation of the system or contaminate the resulting sludge
- To prevent the introduction of pollutants into the municipal wastewater system which will pass through the system, inadequately treated, into receiving waters or the atmosphere or otherwise be incompatible with the system
- To improve the opportunity to recycle and reclaim wastewaters and sludge from the system
- To provide for equitable distribution of the cost of the municipal wastewater system
- To prevent the exposure of workers at the publicly owned treatment works and the collection system to chemical hazards

This chapter provides for the regulation of direct and indirect contributors to the municipal wastewater system through the issuance of permits to certain nondomestic users. Further, through enforcement of general requirements for all users, the chapter authorizes monitoring and enforcement activities, requires user reporting, assumes that existing customer's capacity will not be preempted, and provides for the setting of fees for the equitable distribution of costs.

The superintendent of the WQCP is responsible for administering, implementing, and enforcing the provisions of Chapter 14.08.

Chapter 14.12 (Sewer Rates)

Under this chapter, the City establishes a system of sewer rentals and charges for all domestic, commercial, and industrial uses of the municipal sewer system. This chapter also contains the charges for sewer service and facilities as provided by the City.

Chapter 13.16 (Underground Utility Installations)

Under this chapter, the City Council may call public hearings to determine whether existing overhead utilities should be relocated underground. It is the responsibility of the person owning, operating, leasing or renting the property with the utility in question to follow the provisions set forth as a result of the public hearing.

Chapter 15.08 (California Building Code)

Under Chapter 15.08, the City adopts and modifies the 2001 California Building Code for application to developments within the City. This chapter contains construction standards for weather protection, foundations, drainage, and grading. Grading activities require a permit from the City Engineer. To obtain the grading permit, a soils engineering report and engineering geology report must be approved by the City Engineer. Recommendations in these reports must be incorporated in the grading plans or specifications. Under Section 15.08.170, construction work is restricted during the rainy season (November 1 to May 1) so as to minimize erosion.

San Mateo Countywide Stormwater Pollution Prevention Program (STOPPP)

The STOPPP is a consortium of all twenty cities located within San Mateo County. Many of STOPPP's activities are coordinated through the City/County Association of Governments of San Mateo County. The STOPPP functions under a Joint Municipal NPDES Permit (No. CAS612008) for stormwater quality management, as authorized by the RWQCB. This partnership also relies on each of the municipalities to implement local stormwater pollution prevention and control activities for their local storm drain systems. The STOPPP includes the following:

- Provisions for a model ordinance
- Identification of BMPs, including street sweeping, storm drain stenciling, spill clean-up, and annual catch basin maintenance
- Measures for extensive public education and public awareness

- Pollutant source identification and water quality measurement, and elimination of illicit discharges
- Structural and nonstructural controls for commercial and residential areas, and controls for industrial facilities
- Controls for new development and construction sites and other elements

As noted above, the STOPPP Stormwater Management Plan (SWMP) describes measures for the prevention and control of stormwater pollution. The SMWP serves as part of the basis of STOPPP's third NPDES permit to be reissued by the RWQCB (NPDES Permit No. CAS612008), which expires in 2014. The SWMP, in conjunction with the reissued permit adopted by the RWQCB, is designed to enable STOPPP to meet requirements of the CWA. Because individual projects proposed under the 2006 FMPU would apply for coverage under the STOPPP NPDES Municipal Permit, the SWPPP prepared for each individual project must to be consistent with the SWMP.

Because much of Colma Creek flows through private property, the City has also adopted BMPs aimed at private land owners to control litter, gain compliance from industrial dischargers, reduce pollutants at commercial sites, minimize construction sediment, and clean and maintain privately-owned watercourses.

Consistency Analysis

Development under the Specific Plan would be required to meet applicable City conservation requirements, including those required through the 2013 California Building Code. Wastewater generation is correlated with water usage and continued water conservation practices would reduce the volume of wastewater generated. New developments under implementation of the proposed Specific Plan would be required to comply with all provisions of the NPDES program as well as all applicable wastewater discharge requirements issued by the SFB RWQCB. The City of South San Francisco would maintain local sewer lines and perform upgrades on an as-needed basis. As discussed in the impact analysis, it is anticipated that the increased flows from development under the Specific Plan would not result in required upgrades to the reclamation plants. However, if it is determined at a later date that new facilities would need to be constructed, a project-specific environmental evaluation would be required under CEQA to analyze any potential adverse environmental effects that might result from such a facility. Implementation of the Specific Plan would not conflict with the goals and policies of the City's Public Facilities and Services Section within the General Plan.

4.11.8 Impacts and Mitigation Measures

Analytic Method

Water use and wastewater flows are related. In general, wastewater is generated from indoor water uses, such as toilets, as well as industrial discharges, such as those resulting from commercial operations. To determine the amount of wastewater that would be generated by the implementation of the Specific Plan, wastewater generation factors were applied for the type and amount of proposed land uses (e.g., residential, commercial, and industrial). Wastewater generation factors were taken from a recent engineering study for the City of Manteca (Nolte Associates 2013). These rates provide the wastewater yields that would be expected during peak hour flows (largest volumes); as such, the calculations

overestimate the quantities beyond that of the potable inflows. This methodology allows for complete analysis of the wastewater that would need to be treated at the South San Francisco/San Bruno WQCP wastewater treatment facility. Wastewater impacts were then determined by comparing the estimated future wastewater flows to the capacity of the sewer lines and the water treatment plants to determine whether sufficient capacity exists and/or whether there is a need for additional wastewater conveyance or treatment systems. Table 4.11-9 (Wastewater Generated from Existing Uses and Specific Plan Build-Out) shows the estimated wastewater generation from projects developed under the Specific Plan.

Table 4.11-9 Wastewater Generated from Specific Plan Build-Out

Land Use	*Wastewater Generation Rate*	*Existing Uses*		*Specific Plan Build-Out*		*Existing Plus Specific Plan*	
		Size	*Waste Generated*	*Size*	*Waste Generated*	*Size*	*Waste Generated*
Residential	189 gpd/du	1,400 du	264,600 gpd	1,435 du	271,215 gpd	2,835 du	535,815 gpd
Business Commercial	25.7 gpd/ksf	129,884 sf	3,338 gpd	511,780 sf	13,153 gpd	641,664 sf	16,491 gpd
Downtown Commercial	25.7 gpd/ksf	602,643 sf	15,488 gpd	—	—	602,643 sf	15,488 gpd
Auto-serving Commercial[a]	25.7 gpd/ksf	54,664 sf	1,405 gpd	—	—	54,664 sf	1,405 gpd
Industrial/ Manufacturing	46.1 gpd/ksf	797,055 sf	36,744 gpd	21,250 sf	980 gpd	818,305 sf	37,724 gpd
Hotel	25.7 gpd/ksf	285,165 sf	7,329 gpd	—	—	285,165 sf	7,329 gpd
Institutional	25.7 gpd/ksf	150,142 sf	3,859 gpd	—	—	150,142 sf	3,859 gpd
Commercial	25.7 gpd/ksf	n/a	n/a	268,800 sf	6,908 gpd	268,800 sf	6,908 gpd
Office/R&D	25.7 gpd/ksf	n/a	n/a	1,185,049 sf	30,456 gpd	1,185,049 sf	30,456 gpd
	Total	**—**	***342,763 gpd***	**—**	***322,712 gpd***	**—**	***665,475 gpd***

SOURCE: Nolte Associates, Inc., *City of Manteca 2012 Wastewater Collection System Master Plan Update* (January2013), Appendix A (Wastewater Generation Factors Technical Memorandum), http://www.ci.manteca.ca.us/pwt/engdiv/sseng/files/02%20WCMP_Appendices%20(2012-10).pdf (accessed October 6, 2014).

a. Includes 187,599 sf of building space and 587,769 sf of exterior sales space for a conservative estimate of wastewater usage.

Thresholds of Significance

The following thresholds of significance are based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on utilities/service systems if it would:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board
- Require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects
- Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments

Project Impacts and Mitigation

Threshold	Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

Impact 4.11-3 **Implementation of the proposed project would not exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board. This would be a *less-than-significant* impact.**

The NPDES permit system requires that all existing and future municipal and industrial discharges to surface waters within the City be subject to specific discharge requirements. New development pursuant to implementation of the Specific Plan must to comply with all provisions of the NPDES program and other applicable waste discharge requirements, as enforced by the SFB RWQCB and the SWRCB. Therefore, implementation of the Specific Plan would not result in an exceedance of wastewater treatment requirements. Build-out of the Specific Plan study area would not result in the discharge of wastewater to any surface water. Instead, operational discharges would be sent to the sewer system, which would ultimately be treated at the South San Francisco/ San Bruno WQCP. As addressed in Impact 4.11-4, below, the WQCP has adequate capacity to treat wastewater generated by development under the Specific Plan. The wastewater reclamation plant is required to comply with associated Waste Discharge Requirements (WDRs) and any updates or new permits issued. WDRs set the levels of pollutants allowable in water discharged from a facility. Compliance with applicable WDRs would ensure that implementation of the Specific Plan would not exceed the applicable wastewater treatment requirements of the SFB RWQCB with respect to discharges to the sewer system. This would result in a ***less-than-significant*** impact. No mitigation measures are required.

Threshold	Would the project require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?
Threshold	Would the project result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Impact 4.11-4 **Implementation of the proposed project would require additional wastewater to be treated, but would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities. The proposed project would not result in inadequate capacity by the wastewater treatment provider to serve the project's projected demand. This is a *less-than-significant* impact.**

The South San Francisco/San Bruno WQCP has the capacity to accommodate the water demand generated by new development anticipated within the South San Francisco General Plan. The WQCP has a capacity to treat 13 mgd average daily flow and currently receives 9 mgd from the WQCP service area. With this capacity, projects developed under the Specific Plan would account for approximately a 2.5 percent increase in demand at the South San Francisco/San Bruno WQCP. Implementation of recycled water programs and installation of higher efficiency design practices will also assist in lowering cumulative water demands for the region (South San Francisco 1999).

Discussions with City engineering staff indicated that there were no particular areas of current concern within the study area. The Sewer System Management Plan (SSMP), updated November 2011, indicates that there were three recorded sewer overflow events within the study area in 2011. The SSMP is scheduled to be updated every 2 years with general system audits, inventories of overflows, review of projects completed over the past 2 years, and recommendations for the next 2 years. The SSMP indicates that the system will be re-evaluated during the planning stage of any proposed redevelopment and reassessed every 10 years through hydraulic modeling and data assessment. Preventative maintenance schedules are also provided, although no specific projects are proposed.

Densification of development within the study area and changes in land use would likely increase sewage generation. The City may require computer modeling to be completed for the Downtown area of their sewer facilities, and updated for the East of 101 Area, prior to construction of projects implemented under the Specific Plan. The sewer model update would identify localized infrastructure that needs to be modified or replaced in order to support proposed development. In addition to any new sewer infrastructure installed, increased sewer flows may require upsizing of the pump stations to mitigate an increase in wet weather flows. Additionally, in accordance with Resolution 97-2002, new development of any kind east of US-101 would be required to pay a Sewer Impact Fee to support upgrades to sewer infrastructure east of 101. The WQCP currently treats an average of 9 mgd in dry weather, with peak wet weather flows exceeding 60 mgd. It underwent facility upgrades in 2000 and 2004 and City staff indicates that it has additional capacity for approximately 3 mgd. Development under the Specific Plan would increase wastewater generation by an estimated 0.323 mgd. Capacity of the treatment plant is utilized as new developments buy into the system and is not prioritized in any way based on the nature of the development.

Based on current treatment levels and the design capacity, there would be ample capacity to treat the full increase in sewage attributable to growth anticipated under build-out of the Specific Plan. There is adequate wastewater treatment facilities capacity to serve the proposed project, and the project would not require the construction or expansion of wastewater treatment facilities. Should the existing local wastewater collection lines adjacent to the study area not be adequate to serve the development, the project developer(s) would be responsible for constructing local mains and extensions to serve their respective project area. The final sewer line configuration would be approved by the City of South San Francisco. Additionally, air quality, traffic, and noise construction impacts associated with such off-site improvements would be assessed in each project's CEQA document.

Increased wastewater generation due to implementation of the Specific Plan could be accommodated by the existing treatment infrastructure; therefore, expansion of existing facilities would not be required. Given existing and anticipated future capacity at the treatment facilities and wastewater generation expected from the Specific Plan's build-out, impacts to the wastewater treatment facilities associated with implementation of the Specific Plan would be ***less than significant***. No mitigation is required.

4.11.9 Cumulative Impacts

Threshold	Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

The geographic context for the consideration of cumulative wastewater treatment impacts is the service area for the South San Francisco/San Bruno WQCP within the General Plan build out area. As discussed in Section 4.7 (Population/Housing), full build-out of the proposed project would only slightly exceed the population estimated in the General Plan for build-out of the City. However, this estimate assumes no existing residents of the City would relocate to the Specific Plan area and that all new occupants of development under the Specific Plan would be new to the City. It is reasonable to assume that at least a percentage of new occupants would be existing residents of the City; therefore, full build-out of the proposed project would not exceed the growth projections for the City as outlined in General Plan or exceed wastewater treatment requirements of the SFB RWQB. Additionally, the existing treatment plant operates well below their design capacity, and the City would continue to implement water conservation measures that would result in a decrease in wastewater generation. Thus, it is anticipated that cumulative development would not exceed the capacity of the wastewater treatment system and all wastewater would be treated adequately. This cumulative impact is considered ***less than significant***.

Threshold	Would the project require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?
Threshold	Would the project result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The geographic context for the analysis of cumulative impacts associated with wastewater would be the service area of the South San Francisco/San Bruno WQCP within the General Plan build out area. Cumulative impacts from future growth impacting sewer line capacity are mitigated on a project-by-project basis and do not combine to create greater impacts. Should the existing local wastewater collection lines adjacent to the study area not be adequate to serve the development, the project developer(s) would be responsible for constructing local mains and extensions to serve their respective project area. The final sewer line configuration would be approved by the City of South San Francisco. Additionally, Air Quality, Traffic, and Noise construction impacts associated with such off-site improvements would be assessed in each project's CEQA document. As each project would construct the necessary sewer lines in accordance with existing requirements, there would be a less-than-significant overall cumulative impact. To the extent that future projected growth would result in the treatment capacity of the wastewater treatment plant being exceeded, each project would be required to mitigate its individual impacts to wastewater treatment facilities, and any potential increase in the demand for wastewater treatment facilities would require the payment of fees to upgrade the impacted wastewater systems. Future projects would be required to pay fees and develop construction schedules that would reduce the overall impacts to current and future residents in the area. Therefore, the impact of cumulative development on wastewater treatment would be ***less than significant***.

4.11.10 References

California Water Service Company (Cal Water). 2011. *2010 Urban Water Management Plan South San Francisco District*, June. http://www.calwater.com/your_district/uwmp/bay/South_San_Francisco/2010_Urban_Water_Management_Plan_(SSF).pdf (accessed January 14, 2013).

Nolte Associates, Inc. 2013. *City of Manteca 2012 Wastewater Collection System Master Plan Update*. Appendix A (Wastewater Generation Factors Technical Memorandum), January. http://www.ci.manteca.ca.us/pwt/engdiv/sseng/files/02%20WCMP_Appendices%20(2012-10).pdf (accessed October 6, 2014).

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?NID=360.

———. 2011. *Sewer System Management Plan*. http://www.ssf.net/DocumentCenter/Home/View/2383 (accessed October 9, 2013).

———. 2013. *South San Francisco Municipal Code*. http://qcode.us/codes/southsanfrancisco/ (accessed October 9, 2013).

Solid Waste

This section describes the current status of solid waste services in the City of South San Francisco including a discussion of the ability of the City's solid waste services to meet the current needs of the City. Solid waste is defined as refuse requiring collection, recycling, or disposal into a landfill.

Data for this section were taken from the City of South San Francisco General Plan, City of South San Francisco Public Works Department and the Department of Resources Recycling and Recovery (CalRecycle). Full reference-list entries for all cited materials are provided in Section 4.11.15 (References).

4.11.11 Environmental Setting

The South San Francisco Scavenger Company (Scavengers) is contracted by the City of South San Francisco as the sole hauler of solid waste and operator of recycling services for the City. The Scavenger Company transports all solid waste from the study area to the Blue Line Material Recovery Facility/Transfer Site (MRF/TS). The MRF/TS has a permitted capacity of 1,200 tons per day, but currently receives an average of 600 to 700 tons per day. Once the useable materials have been separated at the MRF/TS, the remaining trash is then transported to the Ox Mountain Sanitary Landfill in Half Moon Bay. The Ox Mountain Sanitary Landfill is the only remaining landfill in the County that will accept Scavenger Company waste. Browning-Ferris Industries (BFI) owns the Ox Mountain Sanitary Landfill and is permitted by the California Integrated Waste Management Board (CIWMB) to receive 3,598 tons per day, or 1.3 million tons per year. Additionally, The Ox Mountain Sanitary Landfill has a total capacity of 37.9 million cubic yards (CalRecycle 2013b). As of 2006, the landfill's remaining capacity is 44.6 million cubic yards, which translates to a 12-year life through 2018 (CIWMB 2004). BFI has obtained a permit for the expansion of the Ox Mountain Sanitary Landfill and, once the permit expires in 2016, either the Los Trancos Canyon will be expanded further or nearby Apanolio Canyon will be opened and filled (South San Francisco 1999).

The new Scavenger MRF/TS, which was approved in April 1999, is permitted to receive a daily maximum of 1,250 tons per day of wastes and recyclable materials. This facility allows the Scavenger Company increased capability to recover valuable materials from wastes, reducing the amount of waste being sent to the landfill. South San Francisco recycles both household and industrial solid waste and sewage sludge. The Blue Line Transfer Station has a recycling center for newspaper, cardboard, glass, mattresses, and waste oil. The City of South San Francisco coordinates recycling of newspaper, aluminum, glass, and waste oil. There are also certified recycling centers at South San Francisco's two Safeways, Bell Market, and Reynolds Aluminum.

Sewage sludge produced at the South San Francisco/San Bruno Sewage Treatment Plant is composted by combining the dry sludge with sawdust and rice hulls, producing a commercial soil conditioner. With an expected build-out population of 67,400 residents in South San Francisco, the City will generate approximately 38,000 tons of solid waste each year, based on the assumed generation rates used by the County (CalRecycle 2013a).

Household Hazardous Waste

Hazardous waste is generated in homes and businesses alike, and includes products ranging from used motor oil to infectious compounds to dioxins. Management of hazardous waste in San Mateo County occurs under the 1991 Hazardous Waste Plan.

Although most hazardous waste is generated by larger commercial and industrial enterprises, wastes generated by households and small businesses are of particular concern, since these wastes are more likely to be handled improperly and disposed of in a landfill or sewer. The County operates a household hazardous waste education program and established a household hazardous waste transfer station for county residents in 1989 (South San Francisco 1999).

4.11.12 Regulatory Framework

Federal

There are federal regulations related to the location and operational standards of solid waste disposal sites. However, there are no applicable federal laws, regulations, or policies that pertain to solid waste as it relates to the Specific Plan.

State

California Department of Resources Recycling and Recovery (CalRecycle)

At the state level, the management of solid waste is governed by regulations established by CalRecycle, which delegates local permitting, enforcement, and inspection responsibilities to local enforcement agencies. Historically, these duties were handled by the California Integrated Waste Management Board (CIWMB), but the CIWMB was recently reorganized and became a fully integrated part of CalRecycle.

Assembly Bill 939

The State Legislature, through Assembly Bill 939, The California Integrated Waste Management Act of 1989, mandated that all cities and counties prepare, adopt, and submit a comprehensive solid waste management plan to the county. The plan must address and detail each individual community's efforts and intended policies in the areas of waste characterization, source reduction, recycling, composting, solid waste facilities, education/public information, funding, special wastes, and hazardous wastes. The law also mandates that communities meet certain specific identified targets for percentages of waste reduction and recycling over specific identified targets for percentages of waste reduction and recycling over specified time periods (25 percent by 1995 and 50 percent by the year 2000).

Senate Bill 63

On July 28, 2009, SB 63 was approved, abolishing the California Integrated Waste Management Board (CIWMB) and transferring its duties and responsibilities to a new department called the Department of Resources Recycling and Recovery, or CalRecycle. This legislation was passed in order to combine the state's solid waste and recycling programs. The combination of the Waste Management Division and the Division of Recycling to form CalRecycle went into effect on January 1, 2010.

Local

General Plan Health and Safety Element

General Plan Health and Safety Element Policy 8.3-I-1 calls for the City to continue working toward reducing solid waste, increasing recycling, and complying with the San Mateo County Integrated Waste Management Plan. The City has a responsibility to meet regional source reduction and recycling initiatives in order to achieve state-mandated waste reduction targets and to extend the useful life of existing landfill facilities. Under this policy, builders are encouraged to incorporate interior and exterior storage areas for recyclables into new or remodeled buildings (both residential and commercial) to make recycling activities more convenient for those who use the buildings. Also, the City is encouraged to explore the feasibility of installing recycling receptacles in parks and public areas, such as the public open space areas in the study area. Commercial and business parks are encouraged to install recycling receptacles on their premises. The City is encouraged to explore incentives for businesses to establish recycling programs.

South San Francisco Municipal Code (SSFMC)

Chapter 8.16 (Solid Waste—Scavenger Services)

SSFMC Chapter 8.16 contains health and sanitation rules and regulations applicable to all lands and premises within the City. The purpose of Chapter 8.16 is to prevent the accumulation of quantities of solid waste within the boundaries of the City, except for approved dump sites, in order to protect and preserve the public health and welfare of City and neighboring communities. The Scavenger Company is identified in this chapter as the entity with whom the City has contracted to collect, receive, carry and/or transport solid waste in accordance with the provisions of this chapter.

Chapter 8.28 (Recyclable Materials)

The purpose of Chapter 8.28 is to increase participation rates, improve recyclable material recovery rates, reduce landfill dependency, and ultimately maintain a cost-effective overall solid waste and recycling program for the citizens, businesses, and institutions of the City. While the current SSFMC does not appoint an authorized recycling agent, the Scavenger Company is responsible for providing recycling services in the City. Also, the SSFMC does not establish recycling goals for the City.

San Mateo County Hazardous Waste Generator Program

The County Health Department, Environmental Health Division, has maintained a Hazardous Waste Generator Program since 1984 aimed at protecting public health and the environment. The California Department of Toxic Substances Control (DTSC) authorized the Division at that time to inspect and regulate nonpermitted hazardous waste generators in the County based on the Hazardous Waste Control Law found in the California Health and Safety Code Division 20, Chapter 6.5 and regulations found in California Code of Regulations (CCR) Title 22, Division 4.5.

The above referenced regulations require businesses generating any amount of hazardous waste as defined by regulation to properly store, manage and dispose of such waste. Division staff members conduct annual inspections at over 1,900 businesses in order to assess compliance with state law and regulations. Division staff members also conduct surveillance and enforcement activities in conjunction with the County District Attorney's Office for businesses or individuals that significantly violate the above referenced law and regulations. Furthermore, staff members respond within 24 hours to complaints filed with the Division regarding potential violation of the aforementioned law and regulations.

Consistency Analysis

Future development under the Specific Plan project would be served by CalRecycle, the Scavenger Company, and San Mateo County, which have been contracted by the City to maintain solid waste disposal needs. No actions brought forth by the proposed project would be in conflict with the goals outlined in the Public Services and Utilities Section of the City's General Plan.

4.11.13 Impacts and Mitigation Measures

Analytic Method

To determine the amount of solid waste that would be generated by the implementation of the Specific Plan, solid waste generation factors were applied for the type and amount of proposed land uses (e.g., residential, commercial, and industrial) For the most conservative analysis, the solid waste generation rates provided by CalRecycle are applied to the square footage for the existing and proposed project as presented in Table 4.11-10 (Solid Waste Generated from Existing Uses and Specific Plan Build-Out). The County of San Mateo uses the CalRecycle solid waste generation rates, which include the following:

- Residential: 12.23 pounds per dwelling unit per day
- Offices: 1 pound per 100 sf per day
- Commercial/Retail: 3.12 pounds per 100 sf per day

- Industrial: 1.42 pounds per 100 sf per day
- Schools: 1 pound per student per day
- Hotel/Motel: 4 pounds per room per day
- Public/Institutional: 0.007 pounds per sf per day

Table 4.11-10 Solid Waste Generated from Specific Plan Build-Out

Land Use	*Solid Waste Generation Rates*	*Existing Uses*		*Specific Plan Build-Out*		*Existing Plus Specific Plan*	
		Size	*Waste Generated (lb/day)*	*Size*	*Waste Generated (lb/day)*	*Size*	*Waste Generated (lbs/day)*
Residential	12.23 lbs/du/day	1,400 du	17,562	1,435 du	34,684	2,835 du	35,112
Business Commercial	0.0312 lbs/sf/day	129,884 sf	4,052	511,780 sf	15,968	641,664 sf	20,020
Downtown Commercial	0.0312 lbs/sf/day	602,643 sf	18,802	—	—	602,643 sf	18,802
Commercial	0.0312 lbs/sf/day	N/A	N/A	268,800 sf	8,387	268,800 sf	8,387
Auto-serving Commercial	0.0312 lbs/sf/day	54,664 sf	1,706	—	—	54,664 sf	1,706
Institutional	0.007 lbs/sf/day	150,142 sf	1,051	—	—	150,142 sf	1,051
Industrial/ Manufacturing	0.0142 lbs/sf/day	797,055 sf	11,318	21,250 sf	302	818,305 sf	11,620
Office	0.01 lbs/sf/day	N/A	N/A	—	—	1,185,049 sf	11,850
Institutional	0.007 lbs/sf/day	150,142 sf	1,051	—	—	150,142 sf	1,051
Hotel	0.0312 lbs/sf/day	285,165 sf	8,897	—	—	285,165 sf	8,897
Total		—	***64,439 lbs/day 11,760 tons/year***	—	***118,068 lbs/day 21,547 tons/year***	—	***182,507 lbs/day 33,307 tons/year***

SOURCE: CalRecycle, Estimated Solid Waste Generation and Disposal Rates. Generation Rates (2013), http://www.calrecycle.ca.gov/wastechar/wastegenrates/ (accessed October 9, 2013).

To determine solid waste impacts associated with implementation of the proposed project, estimated future solid waste generation amounts are compared to the total anticipated remaining capacity at landfills that serve the City to determine whether adequate capacity exists.

Thresholds of Significance

The following thresholds of significance are based on 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on utilities/service systems if it would not:

- Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs
- Comply with federal, state, and local statutes and regulations related to solid waste

Effects Not Found to Be Significant

Threshold	Would the project comply with federal, state, and local statutes and regulations related to solid waste?

The Initial Study determined that there would be ***no impact*** with regard to compliance with all regulations pertaining to solid waste. Refer to Chapter 5 for a discussion of this topic.

Project Impacts and Mitigation

Threshold	Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

Impact 4.11-5 **The proposed project would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs. This would be a *less-than-significant* impact.**

The Scavenger Company is contracted by the City of South San Francisco as the sole hauler of solid waste and operator of recycling services for the City. The Scavenger Company transports all solid waste from the study area to the Blue Line MRF/TS. The MRF/TS has a permitted capacity of 1,200 tons per day, but currently receives an average of 600 to 700 tons per day. Once the useable materials have been separated at the MRF/TS, the remaining trash is then transported to the Ox Mountain Sanitary Landfill. The Ox Mountain Sanitary Landfill can accept up to 3,598 tons per day (CIWMB 2006a). As of 2000, the landfill has exceeded its permitted capacity of 37.9 million cubic yards by 6.7 million cubic yards (17.8 percent). However, the closure date is planned for 2018. While the Ox Mountain Landfill is currently anticipated to have capacity through 2018, BFI is permitted until 2016 to either expand the Los Trancos Canyon landfill or to open and fill nearby Apanolio Canyon, which would ensure adequate capacity to support the buildout of the Specific Plan.

As identified in Table 4.11-10, the proposed Specific Plan would produce approximately 118,496 lb/day or approximately 21,625 tons/year, of solid waste. This would represent an approximately 5 percent and 1.63 percent of the permitted maximum amount accepted at the Blue Line MRF/TS and Ox Mountain Sanitary Landfill, respectively. The remaining capacity of the MRF/TS would be able to accommodate the additional solid waste. Thus, the increase in waste generated under the Specific Plan would be sufficiently served by the MRF/TS and the Ox Mountain Landfill and the impact would be ***less than significant***.

4.11.14 Cumulative Impacts

Threshold	Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

The cumulative context for the consideration of cumulative impacts related to solid waste disposal is the service area for the Ox Mountain Sanitary Landfill and the Blue Line MRF/TS. The landfill can accept up to 3,598 tons per day. With the implementation of the AB 939 provisions, which mandate the reduction of solid waste disposal in landfills, the amount of solid waste disposed of in landfills is required

to be 50 percent lower than actual waste production (at a minimum). As discussed in the section above, the Ox Mountain Sanitary Landfill is capable of accommodating waste generated with implementation of the Specific Plan. All developments (existing and planned) generate solid waste that eventually leads to closure of landfills once they have reached their maximum capacity. However, because the County has a system in place to monitor and respond to solid waste capacity issues, it is assumed that cumulative growth would not result in a significant impact. Therefore, neither the Specific Plan nor other cumulative projects proposed within the landfill service area would create demands for solid waste services that exceed the capabilities of the County's waste management system. Therefore, cumulative impacts associated with solid waste in the study area would be considered ***less than significant***.

4.11.15 References

California Integrated Waste Management Board (CIWMB). 2004. Facility/Site Summary Details for Ox Mountain Sanitary Landfill. http://www.ciwmb.ca.gov (accessed September 9, 2014).

CalRecycle. 2013a. Estimated Solid Waste Generation and Disposal Rates. Generation Rates. http://www.calrecycle.ca.gov/wastechar/wastegenrates/ (accessed October 9, 2013).

———. 2013b. Solid Waste Information System (SWIS), Facility/Site Listing. http://www.calrecycle.ca.gov/SWFacilities/Directory/SearchList/List?COUNTY=San+Mateo (accessed October 9).

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?NID=360.

Energy

This section describes the current status of energy (electricity and natural gas) services in the City of South San Francisco analyzes the potential physical environmental effects related to energy demand impacts created by construction of new or additional facilities associated with implementation of the Specific Plan.

Data for this section were taken from City of South San Francisco General Plan and Pacific Gas and Electric Company (PG&E). Full reference-list entries for all cited materials are provided in Section 4.11.20 (References).

4.11.16 Environmental Setting

Electricity and Natural Gas

Energy consumption, including electricity, by new buildings in California, is regulated by the state Building Energy Efficiency Standards, embodied in CCR Title 24. The efficiency standards apply to new construction of both residential and nonresidential buildings, and regulate energy consumed for heating, cooling, ventilation, water heating, and lighting. The building efficiency standards are enforced through the local building permit process. Local government agencies may adopt and enforce energy standards for new buildings, provided that these standards meet or exceed those provided in Title 24 guidelines.

PG&E provides natural gas and electric service to the study area. PG&E and other utilities in the state are regulated by the California Public Utilities Commission (CPUC) (PG&E 2013).

Joint trench utilities (power, phone, cable and natural gas) are already in place in the study area roads. These utilities are required to provide service to new customers upon request. Relocation of roadways would necessitate relocation of joint trench utilities, and construction on currently undeveloped parcels would likely require new services be connected. The National Pipeline Mapping System identifies "Gas Transmission Pipelines," "Hazardous Liquid Pipelines" and "Major Overhead Utilities" that cross through the study area. No changes are currently proposed to these utilities.

4.11.17 Regulatory Framework

Federal

The Federal Energy Regulatory Commission (FERC) duties include the regulation of the transmission and sale of electricity in interstate commerce, licensing of hydroelectric projects, and oversight of related environmental matters.

State

California Code of Regulations (CCR) Title 20 and Title 24

CCR Title 20 (Public Utilities and Energy) contains the regulations related to power plant siting certification. CCR Title 24 (California Building Standards) contains the energy-efficiency standards related to residential and nonresidential buildings. Title 24 standards are based, in part, on a state mandate to reduce California's energy demand.

New buildings in California are required to conform to energy conservation standards specified in CCR Title 24. The standards establish "energy budgets" for different types of residential and nonresidential buildings, with which all new buildings must comply. The energy budget has a space-conditioning component and a water-heating component, both expressed in terms of energy (British thermal units, BTU) consumed per year. The regulations allow for trade-offs within and between the components to meet the overall budget. Energy consumption of new buildings in California is regulated by the State Building Energy Efficiency Standards, embodied in CCR Title 24. The efficiency standards apply to new construction of both residential and nonresidential buildings, and regulate energy consumed for heating, cooling, ventilation, water heating, and lighting. The building efficiency standards are enforced through the local building or individual agency permit and approval processes. The City requires all new buildings to meet Title 24 standards.

Green Building Design

According to the California Green Building Standards Code (CCR Title 24, Part 11, 2011), a Green Building is defined as "a holistic approach to design, construction, and demolition that minimizes the building's impact on the environment, the occupants and the community." The Specific Plan would follow the provisions and measures that are outlined below:

Section 301: General

301.1 *Scope.* Buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code, but are not required unless adopted by a city, county, or city and county as specified in Section 101.7.

Section 302: Mixed Occupancy Buildings

302.1 *Mixed occupancy buildings.* In mixed occupancy buildings, each portion of a building shall comply with the specific green building measures applicable to each specific occupancy.

Section 303: Phased Projects

303.1 *Phased projects.* For shell buildings and others constructed for future tenant improvements, only those code measures relevant to the building components and systems considered to be new construction (or newly constructed) shall apply.

303.1.1 *Tenant improvements.* The provisions of this code shall apply only to the initial tenant or occupant improvements to a project.

Section 304: Voluntary Tiers

304.1 *Purpose.* Voluntary tiers are intended to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment and promote a more sustainable design.

304.1.1 *Tiers.* The provisions of Appendices A4 and A5 outline means of achieving enhanced construction levels by incorporating additional measures. Buildings complying with tiers specified for each occupancy contain additional prerequisite and elective green building measures necessary to meet the threshold of each tier.

[BSC] Where there are practical difficulties involved in complying with the threshold levels of a tier, the enforcing agency may grant modifications for individual cases. The enforcing agency shall first find that a special individual reason makes the strict letter of the tier impractical and that modification is in conformance with the intent and purpose of the measure. The details of any action granting modification shall be recorded and entered in the files of the enforcing agency.

Section 305: CALGreen Tier 1 and CALGreen Tier 2

305.1 CALGreen Tier 1 and CALGreen Tier 2 buildings contain voluntary green building measures necessary to meet the threshold of each level.

305.1.1 CALGreen Tier 1. To achieve CALGreen Tier 1, buildings must comply with the latest edition of "Savings By Design, Healthcare Modeling Procedures" found online at http://www/energysoft.com/ep/2007SBDHProcedures.pdf.

305.1.2 CALGreen Tier 2. To achieve CALGreen Tier 2, buildings must exceed the latest edition of "Savings By Design, Healthcare Modeling Procedures" by a minimum of 15 percent.

Section 306: Voluntary Measures

306.1 Purpose. Voluntary measures are intended to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment, promote a more sustainable design and high-performance educational facilities.

306.1.1 The provisions of Appendix A5 outline means of achieving enhanced construction levels by incorporating additional measures.

Local

General Plan Public Facilities Element

The City's General Plan Public Facilities Element includes the following goals and policies related to energy management:

Goal 8 Adequate electrical, natural gas, and telecommunication systems to meet the demand of new and existing development.

Policy 8.1 Encourage development that minimizes net energy use and consumption of natural resources.

Action 8.1.1 Support the use of solar energy to supplement conventional heating systems.

Policy 8.3 Locate utilities to minimize aesthetic impacts on the surrounding area.

Action 8.3.1 Require undergrounding of new distribution lines.

Action 8.3.2 Pursue the undergrounding of existing overhead distribution lines.

Consistency Analysis

Future development under the proposed plan could include the expansion of energy infrastructure throughout the study area. As discussed below, an adequate supply of electricity is anticipated to be available to serve the proposed project. Further, all future developments under the Specific Plan would comply with the provisions of CCR Title 24. Also, because PG&E has a long term procurement plan, it is anticipated that the electricity demand generated by future development projects could be supplied without the need for additional construction or expansion of energy facilities beyond that which was previously planned. Therefore, the Specific Plan would not conflict with the applicable goals, objectives, and policies of the City's General Plan Public Facilities Element.

4.11.18 Impacts and Mitigation Measures

Analytic Method

To determine whether implementation of the Specific Plan would result in impacts on electricity and natural gas supplies, the projected increase in energy demand for each utility was analyzed and calculated using a per-square-foot or per-unit consumption rate. Table 4.11-11 (Electricity Demand from Existing Uses and Specific Plan Build-Out) and Table 4.11-12 (Natural Gas Demand from Existing Uses and Specific Plan Build-Out), below, provide electricity and natural gas demand associated with the full build-out of the study area. Because demand rates are based on type and amount of land use, this analysis focuses upon residential (high density), retail, office and commercial uses included in the Specific Plan.

Thresholds of Significance

The following threshold of significance is based on the 2014 CEQA Guidelines Appendix G. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on utilities/service systems if it would:

- Require or result in the construction of new energy production or transmission facilities, or expansion of existing facilities, the construction of which could cause a significant environmental impact

Project Impacts and Mitigation

Threshold	Would the project require or result in the construction of new energy production or transmission facilities, or expansion of existing facilities, the construction of which could cause a significant environmental impact?

Impact 4.11-6 **Implementation of the proposed project would not require or result in the construction of new energy production or transmission facilities, or expansion of existing facilities, the construction of which could cause a significant environmental impact. This would be a *less-than-significant* impact.**

Electricity

Implementation of the Specific Plan would increase the use of electricity within the study area, as electricity would be used to support future development in the study area. To determine the amount of electricity demanded by the proposed project, electricity demand factors provided by BAAQMD are applied to net growth under build-out of the Specific Plan, as presented in Table 4.11-11 (Electricity Demand from Existing Uses and Specific Plan Build-Out).

Table 4.11-11 Electricity Demand from Existing Uses and Specific Plan Build-Out

Land Use	Energy Consumption Rates	Existing Uses		Specific Plan Build-Out		Existing Plus Specific Plan	
		Size	Electricity Demand (kWh/yr)	Size	Electricity Demand (kWh/yr)	Size	Electricity Demand (kWh/yr)
Residential	4,866 kwh/du/year[a]	1,400 du	6,812,400	1,435 du	6,982,710	2,835 du	13,795,110
Commercial	13.2 kwh/sf/year	N/A	N/A	—	—	268,800 sf	3,548,160
Institutional	5.5 kWh/sf/year	150,142 sf	825,781	N/A	—	150,142 sf	825,781
Office/R&D	15.1 kWh/sf/year	N/A	N/A	1,185,049 sf	17,893,500	1,185,049 sf	17,893,500
Industrial	7.7 kWh/sf/year	797,055 sf	6,137,324	21,250 sf	163,625	818,305 sf	6,300,949
Total		**—**	***13,775,505***	**—**	***25,039,835***	—	***38,815,340***

SOURCE: BAAQMD, *Greenhouse Gas Model User's Manual* (April 2010).
a. Calculated as average of single-family and multi-family uses for Climate Zone 5

The total annual electricity consumption in Climate Zone 5 of the BAAQMD is 13,775,505 kilowatt-hour (kWh) per year. The total annual electricity consumption, including existing consumption and increased consumption that would result from projects developed under the Specific Plan is estimated to be approximately 38,815,340 kWh/year. The state is currently experiencing constraints related to energy delivery. These constraints are generally limited to peak demand days during the summer months, such that for the majority of the days during the year adequate energy supplies are reliably provided to consumers. Implementation of the Specific Plan would increase use of electricity within the study area; in particular, the demand for electricity to operate residential and commercial uses. On peak days, the incremental demand from the Specific Plan would contribute to electricity supply and delivery constraints. The Specific Plan would be required to comply with the energy conservation measures contained in Title 24, which would reduce the amount of energy needed for the operation of any buildings constructed as a part of the Specific Plan. An adequate supply of electricity is anticipated to be available to serve the proposed project. According to PG&E, the existing infrastructure currently serving the project area is sufficient to serve the proposed project (Masuoka 2013). Based on PG&E's confirmation that existing energy supplies and infrastructure would be adequate to serve the Specific Plan, impacts to electricity would be ***less than significant***.

Natural Gas

To determine the amount of natural gas demanded by the proposed project, natural gas demand factors provided by BAAQMD are applied to net growth under build-out of the Specific Plan, as presented in Table 4.11-12 (Natural Gas Demand from Existing Uses and Specific Plan Build-Out).

Table 4.11-12 Natural Gas Demand from Existing Uses and Specific Plan Build-Out

Land Use	*Natural Gas Demand Rates*	*Existing Uses*		*Specific Plan Build-Out*		*Existing Plus Specific Plan*	
		Size	*Natural Gas Demand (kBtu/year)*	*Size*	*Natural Gas Demand (kBtu/year)*	*Size*	*Natural Gas Demand (kBtu/year)*
Residential	36.1 kBtu/du/year[a]	1,400 du	50,540	1,435	51,695	2,835 du	102,344
Commercial	31.7 kBtu/sf/year	N/A	N/A	268,800 sf	8,520,960	268,800 sf	8,520,960
Institutional	19.6 kBtu/sf/year	150,142 sf	2,942,783	N/A	—	150,142 sf	2,942,783
Office/R&D	24.3 kBtu/sf/year	N/A	N/A	1,185,049 sf	28,795,500	1,185,049 sf	28,795,500
Industrial	4.3 kBtu/sf/year	797,055 sf	3,427,337	21,250	91,375	818,305 sf	3,518,712
Total		**—**	***6,420,660***	**—**	***37,459,530***	**—**	***43,880,190***

SOURCE: BAAQMD, *Greenhouse Gas Model User's Manual* (April 2010).
a. Calculated as average of single-family and multi-family uses for Climate Zone 5.

The total annual natural gas consumption by existing uses is estimate to be approximately 6,420,660 kBtu. The total annual natural gas consumption by projects developed under the Specific Plan is estimated to be approximately 37,459,530 kBtu. PG&E was contacted to determine the impact of this increase in natural gas demand. PG&E requires a natural gas survey in order to assess impacts on demand, and only allows evaluation of project-specific impacts at the time of project implementation due to variances in natural gas supplies over time. However, as PG&E declares itself a "reactive" utility that will provide natural gas as customers request its services, PG&E has indicated that an adequate supply of natural gas is currently available to serve the proposed project and that the natural gas level of service provided to the surrounding area would not be impaired by the proposed project. If new or extended natural gas lines are required to serve future development, such infrastructure would be located underground and would be constructed in accordance with the policies of PG&E and extension rules on file with the CPUC at the time contractual agreements are made. Because the natural gas demand projected for the proposed project would not exceed available or planned supply, new infrastructure would not be required to serve the study area. Therefore, this impact would be ***less than significant***, and no mitigation is required.

4.11.19 Cumulative Impacts

Threshold	Would the project require or result in the construction of new energy production or transmission facilities, or expansion of existing facilities, the construction of which could cause a significant environmental impact?

The geographic context for the determination of cumulative impacts related to energy production and transmission facilities is PG&E's service area. PG&E indicates that existing facilities serving the Specific Plan have adequate capacity to deliver increased electricity demand based on build-out of the proposed plan (Masuoka 2013). Additionally, PG&E completed a Long Term Procurement Plan in 2006, which addresses all short-term and long-term electricity procurement needs for the utility. It is anticipated that the electricity demand generated by future development could be supplied without the need for additional construction or expansion of energy facilities beyond that which was previously planned.

Because PG&E is able to meet future projected demands, and an action plan has been identified to address energy issues on a broader scale, cumulative impacts would be ***less than significant***.

Development in the geographic area surrounding the Specific Plan study area would result in continued use of natural gas. The area surrounding the study area is currently served by existing infrastructure that projects developed under the Specific Plan would also use. Since PG&E declares itself a "reactive" utility that will provide natural gas as customers request its services, PG&E has indicated that an adequate supply of natural gas is currently available to serve the Specific Plan and that the level of service provided to the surrounding area would not be impaired by future development. The cumulative impact related to the supply of natural gas and to the need for additional or expanded facilities is ***less than significant***.

4.11.20 References

Bay Area Air Quality Management District (BAAQMD). 2010. *Greenhouse Gas Model User's Manual*, April.

California Gas and Electric Utilities. 2010. *2010 California Gas Report*.

Masuoka, Bob. 2013. Personal Communication with Principal Land & Environmental Consultant, Pacific Gas & Electric, October.

Pacific Gas & Electric (PG&E). 2013. Company Profile. http://www.pge.com/en/about/company/profile/index.page?.

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?NID=360.

CHAPTER 5 Other CEQA Considerations

This chapter presents the evaluation of additional environmental impacts required by California Environmental Quality Act (CEQA) that are not covered within the other chapters of this EIR. In particular, CEQA Guidelines Section 15126 requires that all aspects of a project must be considered when evaluating its impact on the environment, including planning, acquisition, development, and operation. Accordingly, in addition to the environmental analysis provided in Chapter 4 (Environmental Analysis) of this EIR, the EIR must identify growth-inducing impacts of the proposed project and significant irreversible environmental changes that would result from implementation of the proposed project, including any secondary or indirect impacts that could result from implementation of mitigation measures.

5.1 EFFECTS SCOPED OUT IN THE INITIAL STUDY

The initial study prepared in September 2013 (see Appendix A) identified the following resources where the proposed project would have no impact or less-than-significant impact for all thresholds, with the exception of Utilities/Service Systems, where only one threshold related to compliance with solid waste regulations was determined to have no impact and this threshold is not analyzed in the EIR.

5.1.1 Agriculture/Forestry Resources

The study area is located in an urbanized area of San Mateo County and is currently developed with commercial, industrial, and residential uses. The Farmland Mapping and Monitoring Program of the California Resources Agency has not designated the study area as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. No agricultural uses or related operations are present study area in the SPA or project vicinity, and no portion of the study area is currently used for agricultural purposes. The area is not zoned for agricultural uses. No forest lands are present in the study area or in the project vicinity. Therefore, there would be ***no impact*** on agriculture and forestry resources as a result of implementation of the proposed project.

5.1.2 Biological Resources

The study area is currently developed with residential, commercial, and office uses. There are no large open spaces in the project area. Open space consists of developed parkland, mostly graded vacant lots, and a portion of the PG&E transmission corridor.

The City's General Plan identifies the areas of the City that support biological resources, which generally consist of San Bruno Mountain, Sign Hill, and wetland areas along Colma Creek (South San Francisco 1999, Open Space and Conservation Element). The City requires assessment and protection of biological resources for development in these areas. The study area is not located in an area that supports biological resources. Only a small portion on the southern boundary of the study area is adjacent to the Colma Creek Canal. The area is located south of Airport Boulevard, east of the railroad track, and east of San

Mateo Avenue. Projects that would result in impacts to the canal are required to prepare biological assessments and comply with General Plan Policies 7.1-I-2 through 7.1-I-5.

Riparian habitat in South San Francisco is limited to along Colma Creek and along the Bay fringe. However, the Specific Plan does not propose any land use directly adjacent to the canal and the area directly adjacent to the canal is currently in use for utility infrastructure and right-of-way. In the unexpected event that a project were proposed adjacent to the canal under the Specific Plan, development would be required to comply with applicable General Plan policies, including preparation of a biological resources assessment and implementation of mitigation measures to protect or replace wetland habitat that may support sensitive species. Therefore, future development under the Specific Plan would not result in any substantial adverse impacts to sensitive plant or animal species.

Construction and development associated with implementation of the proposed project would not occur within an area containing habitat that supports biological resources. Therefore, the proposed project would have no impact on wildlife movement corridors. Landscaping vegetation within the study area could provide potential nesting habitat for migrating birds. Future construction under the Specific Plan would not occur all at once and would be spread out throughout the City. Therefore, it is expected that relatively minor amounts of landscaping would be removed at any one time. As such, access to and use of native wildlife nursery sites will not be substantially interrupted by the proposed project. Additionally, if vegetation removal were to occur during the February 1 through August 31 bird nesting period, construction would be required to comply with applicable regulations in the California Fish and Game Code (Section 3503, 3513, or 3800), which would protect nesting birds from construction disturbances.

Landscaped areas in the study area may contain trees defined as protected by the South San Francisco Tree Preservation Ordinance, Title 13, Chapter 13.30. Development activities could involve removal or pruning of protected trees. However, such activities would be required to comply with the Tree Preservation Ordinance as part of the project approval process, including obtaining a permit for any tree removals or alterations, and avoiding tree roots during trenching for utilities.

There is no adopted Habitat Conservation Plan, Natural Communities Conservation Plan, or other approved local, regional, or state habitat conservation plan that is applicable to the study area.

Therefore, there would be a ***less-than-significant*** impact on biological resources as a result of implementation of the proposed project.

5.1.3 Geology/Soils

The study area is not located within an Earthquake Fault Zone as defined by the Alquist-Priolo Earthquake Fault Zoning Act of 1994 and no known active or potentially active faults traverse the study area. Because ground rupture generally only occurs at the location of a fault, and no active faults are known to traverse the study area, the study area would not be subject to a substantial risk of surface fault ruptures. The City and the larger San Francisco Bay Area are in a seismically active region. A rupture of the Peninsula Segment of the San Andreas Fault could result in intensities registering 7.1 on the modified Mercalli intensity scale in the South San Francisco area. Most of the city would experience an intensity level of VII (Nonstructural Damage) or VIII (Moderate) from a rupture of the Peninsula Segment of the San Andreas Fault during an earthquake with a 7.1 magnitude. According to the South San Francisco

General Plan, portions of the study area are located in areas potentially subject to extremely high or very high levels of ground shaking (see General Plan Health and Safety Element Figure 8-2 [General Plan Policies for Seismically Sensitive Lands]). The structural design of the proposed buildings must adhere to state and City building code standards, such as the California Building Code (CBC), which define minimum acceptable levels of risk and safety. Additionally, in accordance with the General Plan Policy 8.1-I-1, special occupancy land uses (hospitals, schools, and other structures that are important to protecting health and safety in the community) would not be located in the areas designated as seismically sensitive in General Plan Figure 8-2. Compliance with existing state and City regulations would reduce impacts to a less-than-significant level.

Because the study area is located in a seismically active region, the potential for seismic-related ground failure exists, including liquefaction. Most of the study area is located in an area with very low susceptibility for liquefaction, except a portion of the study area east of US-101 with a moderate to very high risk for liquefaction (USGS n.d.). However, proposed development must adhere to the CBC and the Seismic Hazards Mapping Act, which include requirements for geotechnical investigations in areas with high risks for liquefaction, including mitigation to minimize risks. SFFMC Section 15.08.140 (Grading Permit Requirements) also requires a soils engineering report and engineering geology report that would identify potential geotechnical hazards and make recommendations to minimize hazards. Compliance with applicable regulations would reduce impacts to a less-than-significant level.

The parts of the San Francisco Bay region having the greatest susceptibility to landslides are hilly areas underlain by weak bedrock units with slopes greater than 15 percent. In South San Francisco this hazard is primarily located on the southern flank of San Bruno Mountain in the Terrabay development and near Skyline Boulevard. Because the study area is located in an area with slopes less than 15 percent, natural slope instability is not a concern. Excavation wall stability would be regulated by CBC Chapter 33.

Earth-disturbing activities associated with construction would be temporary and erosion effects would depend largely on the areas excavated, the quantity of excavation, and the length of time soils are subject to conditions that would be affected by erosion processes. In addition, all construction activities would comply with CBC Chapter 18, which regulates excavation activities and the construction of foundations and retaining walls, and CBC Chapter 33, which regulates grading activities, including drainage and erosion control. Additionally, development would continue to be required to comply with the NPDES general permit for construction activities, pursuant to which, as part of an erosion control plan, construction site erosion and sedimentation control best management practices (BMPs) would be implemented and would include such measures as silt fences, watering for dust control, straw bale check dams, hydroseeding, and other measures. Further, development under the Specific Plan would be required to comply with all applicable provisions of the San Mateo Countywide Stormwater Pollution Prevention Program (STOPP), and would require runoff management programs that would include BMPs to control erosion and sedimentation. Following construction, future development would consist almost entirely of impervious surfaces and would not be subject to substantial erosion or topsoil loss.

The soil in South San Francisco is generally characterized as having a low expansion potential, with the exception of areas at the base of the San Bruno Mountains or adjacent to San Francisco bay (South San Francisco 2011). Development in the study area would not be located in an area at high risk for expansive soils. Additionally, future development must comply with the CBC and SSFMC

Section 15.08.140 (Grading Permit Requirements), which require a soils engineering report and engineering geology report that would identify potential geotechnical hazards and make recommendations to minimize hazards.

The proposed project would not produce wastewater that requires support of septic tanks or alternative wastewater disposal systems. The City of South San Francisco would continue to provide wastewater service to the study area.

Therefore, there would be a ***less-than-significant*** impact on geology and soils as a result of implementation of the proposed project.

5.1.4 Hazards/Hazardous Materials

Construction of development pursuant to the Specific Plan would involve the use of common but potentially hazardous materials, including vehicle fuels, paints, cleaning materials, and caustic construction compounds. While these substances could pose a potential health risk to construction workers and to the general public during transport, handling of these common, potentially hazardous materials would occur in accordance with California Occupational Safety and Health Administration (Cal OSHA) guidelines and would be disposed of in accordance with California Department of Toxic Substances Control (DTSC) and county regulations. Demolition of older structures, such as in the Grand Avenue Core, that potentially contain asbestos or lead-based paint would be required to comply with all Cal OSHA regulations, including an asbestos inspection in compliance with Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP) requirements and Title 8 CCR Section 1532.1, which requires testing, monitoring, containment, and disposal of lead-based materials. Adherence to federal, state, and local regulations regarding the use and disposal of hazardous materials and wastes would reduce potential impacts on human health and safety from handling and transport of hazardous construction materials to less than significant. Adherence to applicable regulations would also prevent reasonably foreseeable use and accident conditions.

Implementation of development under the Specific Plan could result in construction of additional laboratories and other research facilities, particularly east of US-101 that would use, store, or require the transportation and disposal of hazardous materials, as well as a limited increase in the average population that could be exposed to hazardous materials risks. New residential and commercial development would also result in limited use of common hazardous materials such as cleaning products. However, safety procedures for the use, storage, transportation, and disposal of hazardous materials are mandated by federal, state, and local laws and regulations (including the federal Resource Conservation and Recovery Act [RCRA] and the California Hazardous Waste Control Law), and principles prescribed by the US Department of Homeland Security and Cal OSHA would reduce the risks to employees, visitors or the nearby public resulting from the routine use, transport, or disposal of hazardous materials to less-than-significant levels. Similar to construction, adherence to applicable regulations would also prevent reasonably foreseeable use and accident conditions.

Several schools are located within 0.25 mile of the study area, including South San Francisco High School and Parkway Heights Middle School. However, the proposed project would not introduce new land uses that emit or handle hazardous materials that do not already exist in the project area. Research and

development and industrial uses would continue to be located east of US-101 in the study area, although development density may increase under the proposed project. Schools in the proximity of the study area are located west of US-101. Additionally, adherence to existing federal, state, and local regulations regarding the use and disposal of hazardous materials and wastes would reduce potential impacts on human health and safety from handling and transport of hazardous construction materials to less than significant.

According to the State Water Resources Control Board GeoTracker database (accessed June 13, 2013), there are several open and closed hazardous materials cases in the study area. Cases are concentrated south of Grand Avenue and along the US-101 corridor. The majority of cases involve leaking underground storage tanks (LUST). Other cases involve solvents and dry cleaning chemicals. As discussed in the City's General Plan, the location of existing hazardous materials cases near future proposed development would be identified during the development approval process (South San Francisco 1999, Health and Safety Element). Redevelopment or development would be required to comply with all applicable regulations for remediation of hazards, such as compliance with appropriate guidelines of the regional Underground Storage Tank Program. Compliance with existing regulations would reduce impacts related to listed hazardous materials sites to a less-than-significant impact.

The study area is located approximately 0.75 mile north of the San Francisco International Airport (SFO). The study area is located outside of all airport Safety Compatibility Zones; however, the study area is located within Airport Influence Area B of the airport and is subject to FAA notification requirements (see Exhibit IV-10 [FAA Notification Form 7460—Filing Requirements, of the Comprehensive Airport Land Use Plan for the Environs of San Francisco International Airport]) (C/CAG 2012). The maximum building height allowed in the study area (120 feet) would be below 163.2 feet, which is the lowest obstruction standard in the study area (see Exhibit IV-14, 14 CFR Part 77 Airport Imaginary Surfaces – North Side, of the Comprehensive Airport Land Use Plan for the Environs of San Francisco International Airport). Additionally, all future development under the plan would be subject to review for compatibility with the Comprehensive Airport Land Use Plan for SFIA. Consistent with CFR Part 77, developers proposing structures taller than the notification elevations identified in Exhibit IV-10 of the Comprehensive Airport Land Use Plan would be required to file a notification with the FAA at least 30 days before the proposed start of construction. Most of the study area is located in area that requires notification for buildings taller than 100 feet. Coordination with the FAA would ensure that a significant safety hazard would not occur. There are no private airstrips within 2 miles of the study area.

Construction activities associated with development under the Specific Plan could potentially affect emergency response or evacuation plans due to temporary construction barricades or other obstructions that could impede emergency access on site. However, SFFMC Section 11.16.170 prohibits road closures or obstructions without approval by the chief of police. Coordination with the chief of police would ensure that adequate emergency access is maintained during construction.

The study area is currently urbanized. Intensified redevelopment would not introduce new land uses to the study area that would physically interfere with emergency response. The Specific Plan does not propose changes to the existing circulation system that would make existing roadways unavailable for

emergency response or evacuation. Plans for future development would be reviewed by the City's Fire Prevention Division to ensure proper emergency access to the development site.

The study area is highly developed, and no wildlands are intermixed within this urbanized area. The study area is bordered on all sides by developed land. The closest wildlands area, San Bruno Mountain County Park, is located approximately 0.5 mile away.

Therefore, there would be ***no impact*** with regard to hazards and hazardous materials as a result of implementation of the proposed project.

5.1.5 Hydrology/Water Quality

To comply with the Clean Water Act (CWA), San Mateo County and the twenty cities and towns in the County, including the City of South San Francisco, formed the San Mateo Countywide STOPPP. STOPPP holds a joint municipal NPDES permit from the San Francisco Bay RWQCB. The permit includes a comprehensive plan to reduce the discharge of pollutants to creeks, San Francisco Bay, and the ocean to the maximum extent possible. The San Mateo Countywide STOPPP has a Site Design Standards Checklist to evaluate proposed projects against guidelines intended to reduce stormwater pollution. Construction activities would continue to be required to comply with the NPDES general permit for construction activities, pursuant to which BMPs would be implemented to control stormwater during construction, including silt fences, watering for dust control, straw bale check dams, hydroseeding, and other measures. Compliance with existing regulations would ensure that development under the Specific Plan would not violate any water quality standards or waste discharge requirements.

Colma Creek is the City's main natural drainage system. A small area along the southern boundary of the project area is adjacent to Colma Creek; however, Colma Creek does not intersect the study area and future development of the Specific Plan would not alter the course of Colma Creek or any other waterway. Surface and stormwater runoff from the study area is collected by the City's storm drainage system. The existing storm drainage system in the project area is designed to accommodate flows from urbanized development and takes into account the high ratio of impervious surfaces in the area. The proposed project would remove existing buildings on the site and redevelop the area with similar uses. The ratio of impervious surface area would be similar to existing conditions, thereby not increasing runoff or stormwater flows over existing conditions. During construction, erosion and run-off would be controlled through required compliance with the NPDES general permit for construction activities, including preparation of a Storm Water Pollution Prevention Plan.

Redevelopment under the Specific Plan would require new drainage structures and localized on-site storm drain systems. Because no additional stormwater runoff would be created, no additional stormwater would need to be accommodated in existing stormwater drainage facilities, and no expansion of stormwater drainage facilities would be warranted.

The exact designs of the buildings that could be developed under the Specific Plan are currently unknown; as a result potential sources of pollutants cannot be quantified. The San Mateo Countywide STOPPP has a Site Design Standards Checklist to evaluate proposed projects against guidelines intended to reduce stormwater pollution. Future development would be required to comply with all applicable regulations pertaining to water quality.

Portions of the study area east of US-101, north of Amour Avenue, and south of 2nd Lane are within the 100-year flood hazard area (California DWR 2013). No residences are proposed east of US-101; therefore, no impact would occur in this area. However, high-density residential land use would be accommodated within the 100-year flood hazard area north of Amour Avenue and south of 2nd Lane. However, consistent with General Plan Policy 8.2-I-2, the City would ensure as part of the development review process that proposed development in the 100-year flood hazard area would provide adequate flood protection. Further, because the study area is already developed, redevelopment of the study area within the 100-year flood hazard area would not result in the introduction of new structures in undeveloped floodplain areas that would substantially impede or redirect flood flows.

The study area is not located in a potential dam failure inundation area (ABAG 2003). A 1.5-million-gallon storage reservoir located on the top of San Bruno Hill poses the greatest risk of seiche hazards in the study area. However, because the reservoir holds a relatively small volume of water, water released during seiching would be largely absorbed in the vegetated hillsides. Because the hillsides are not very steep, the flow of water would not be rapid. Also, water would drain away from the hill instead of ponding and resulting in high water levels. Thus, seiche inundation impacts are considered to be less than significant in the study area. The study area is not located in an area at risk for tsunami inundation; therefore, a significant impact related to tsunamis would not occur (California EMA et al. 2009). The potential for inundation by mudflow is considered low because the study area does not contain steep slopes. Hillsides surrounding the study area are covered by development and/or landscaping. Rainfall onto these areas would encounter vegetation or impervious surfaces, and would not pose a risk of causing saturated soil to loosen and flow downhill. Thus, there would be no mudflow inundation impact on the study area.

Therefore, there would be a ***less-than-significant*** impact on hydrology and water quality as a result of implementation of the proposed project.

5.1.6 Mineral Resources

The study area is not known to have any mineral resources that may be of value to this region or the state, including as delineated on a local general plan, specific plan, or other land use plan (San Mateo n.d.). ***No impact*** on mineral resources would occur, and further analysis is not required.

5.1.7 Utilities/Service Systems

Solid waste disposal and recycling in the City of South San Francisco is regulated by the City's SSFMC, particularly Chapters 8.16 and 8.28. As neither of these chapters establishes quantitative disposal or recycling rates, development in the study area would not be subject to diversion requirements. However, under the SSFMC, future development would be required to have its solid waste, including construction and demolition debris, and recyclable materials collected by the Scavenger Company. Additional health and sanitation requirements set forth in the SSFMC would be met by the Scavenger Company.

The proposed project would comply with federal, state, and local statutes and regulations related to solid waste and there would be ***no impact***.

5.2 GROWTH-INDUCING IMPACTS

As required by the CEQA Guidelines, an EIR must include a discussion of the ways in which the proposed project could directly or indirectly foster economic development, population growth, or the construction of additional housing, and how that growth would, in turn, affect the surrounding environment (CEQA Guidelines Section 15126.2(d)). Growth can be induced in a number of ways, including the construction or new homes and business, elimination of obstacles to growth, or through the stimulation of economic activity within the region. In general, a project may foster physical, economic, or population growth in a geographic area if it meets any one of the criteria identified below:

- The project removes an impediment to growth (e.g., the establishment of an essential public service, or the provision of new access to an area)
- The project results in the urbanization of land in a remote location (leapfrog development)
- The project establishes a precedent-setting action (e.g., a change in zoning or general plan amendment approval)
- Economic expansion or growth occurs in an area in response to the project (e.g., changes in revenue base, employment expansion, etc.)

If a project meets any one of these criteria, it may be considered growth-inducing. Generally, growth-inducing projects are either located in isolated, undeveloped, or underdeveloped areas, necessitating the extension of major infrastructure such as sewer and water facilities or roadways, or encourage premature or unplanned growth.

To comply with CEQA, an EIR must discuss the ways in which the proposed project could promote economic or population growth in the vicinity of the project and how that growth will, in turn, affect the surrounding environment (CEQA Guidelines Section 15126.2(d)). Under CEQA, this growth is not to be considered necessarily detrimental, beneficial, or of significant consequence. Induced growth is considered a significant impact only if it affects (directly or indirectly) the ability of agencies to provide needed public services, or if it can be demonstrated that the potential growth, in some other way, significantly affects the environment.

5.2.1 Economic and Population Growth

Population Generation and Housing

As proposed, implementation of the Specific Plan is intended to accommodate existing and future population growth forecasted for the City by introducing new residential housing within the study area. As proposed, implementation of the Specific Plan could result in the addition of up to 1,435 housing units between 2014 and 2035 in the study area. Additionally, up to 1.2 million square feet of new office/research and development (R&D) uses could be added in the study area, to be developed predominantly on the eastern side of the US-101, which could represent as many as 2,400 or more new jobs added to the City. The Specific Plan study area is currently developed, and no major extension of infrastructure is proposed as part of the proposed project.

According to the City's General Plan Land Use Element, South San Francisco will accommodate a population of approximately 67,832 at build-out in 2035, as the horizon of the General Plan is 20 years (South San Francisco 1999, Land Use Element). The 2010 Census estimated a population of 63,632 residents in the City, which is 6,178 residents fewer than the General Plan build-out estimate. According to the Specific Plan, the study area had a population of approximately 11,000 in 2010, but ABAG anticipates a larger rate of household and housing unit growth in the study area compared to San Mateo County and the rest of the City by 2040 (BAE Urban Economics 2012). ABAG projections estimate a substantial amount of growth by 2040 with an estimated three times as many households and 2.5 times as many jobs within the study area than in 2010 (BAE Urban Economics 2012). Additionally, according to ABAG's projections the study area's share of the City's employment will increase from 6 percent in 2010 to 12 percent by 2040 (BAE Urban Economics 2012).

Implementation of the Specific Plan could result in an additional 1,435 housing units within the study area from 2010 to 2035. As such, the proposed project is growth-inducing. A goal of the Specific Plan is to "intensify certain allowed uses selectively in the Downtown to increase the resident population and thus support a variety of commercial and service uses" (BAE Urban Economics 2012). The Specific Plan would provide significant additional housing over the life span of the plan and beyond with the highest densities located in the immediate proximity of to the extended Caltrain station. Thus, this would substantially increase the housing stock of the study area and would directly increase the City's population, particularly in the Downtown area. Utilizing an average person-per-household factor of 2.96, the Specific Plan could result in a population increase of 4,248 residents, which would result in a population of 67,880. The Specific Plan would not exceed the population estimated for build-out of the City as a result of higher-density residential areas within the study area and increased employment opportunities, which would attract new residents to the area. However, that assumes no existing residents of the City would relocate to the Specific Plan area and that all new occupants of development under the Specific Plan would be new to the City. It also does not take into account the lower person-per-household factor for senior housing, which would be included in the Specific Plan. It is reasonable to assume that at least a percentage of new occupants would be existing residents of the City. In addition, the difference of 48 residents, assuming full occupancy, represents only 0.07 percent of the overall population of the City at build-out of the General Plan, which would not be considered significant. Therefore, the direct increase in population as a result of the Specific Plan would be a less-than-significant impact.

Compared to development under the General Plan, the Specific Plan would yield a greater amount of new residential and employment uses within the study area. However, General Plan amendments and zoning amendments would be adopted concurrent with the preparation of the Specific Plan. With the General Plan and Zoning amendments, implementation of the Specific Plan would be consistent with the General Plan, where additional population growth due to the higher-density areas within the study area would be accounted for in future population growth projections for the City. Additionally, higher employment rates would also be accounted for in the General Plan. Therefore, the Specific Plan would be consistent with all governing documents and policies regulating the City and would not exceed the build-out estimated population of the amended General Plan.

Short-Term Employment Generation

Development pursuant to the Specific Plan would generate some short-term, construction-related employment opportunities during construction activities. Given the ample supply of construction workers in the regional work force of the Bay Area, which is the area from which the workers would be drawn, and the recent economic downturn resulting in additional workforce, the proposed project would not be considered growth-inducing from a short-term employment perspective.

Long-Term Employment Generation

As noted, above, the proposed project could result in provision of approximately 2,400 jobs. As noted, above, higher employment rates would also be accounted for in the General Plan. As the City has an average vacancy rate of 4 percent, and the proposed project would include development of housing units, the City would have ample housing stock to accommodate any new residents generated by employment opportunities associated with the proposed project. Further, development on the study area has been anticipated and encouraged by the General Plan to support TOD and provide jobs, and would not cause an exceedance of current growth projections anticipated in the General Plan. Additionally, this economic activity can also be considered a benefit to the community by providing jobs within close proximity to public transportation and housing.

Removal of Obstacles to Population Growth

The proposed Specific Plan would provide for infill development that makes maximum use of existing infrastructure. The study area is located in the center of a dense urban area, and implementation of the Specific Plan would not include extension of the existing infrastructure, only site-specific infrastructure upgrades as needed. Therefore, the proposed Specific Plan would not result in indirect growth due to extension of infrastructure

5.3 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

CEQA Guidelines Section 15126.2(c) requires a discussion of any significant irreversible environmental changes that would be caused by the proposed project. Specifically, Section 15126.2(c) states:

> Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts, and particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

The construction and implementation of the proposed project would entail the commitment of energy and human resources. Manpower will also be committed for the construction of the proposed project.

Ongoing operation of the proposed project would entail a further commitment of energy resources in the form of petroleum products (diesel fuel and gasoline), natural gas, and electricity. Long-term impacts would also result from an increase in vehicular traffic, and the associated air pollutant and noise emissions. This commitment of energy resources would be a long-term obligation in light of the fact that,

practically speaking, it is impossible to return the land to its original condition once it has been developed. However, the project would include commercial, light industrial, and residential uses, none of which would require an unusual amount of energy resources. In summary, implementation of the proposed project would involve the following irreversible environmental changes to existing on-site natural resources:

- Commitment of energy and water resources as a result of the construction, operation and maintenance of the proposed development

5.4 SIGNIFICANT UNAVOIDABLE ENVIRONMENTAL IMPACTS

CEQA Guidelines Section 15126.2(b) requires that an EIR describe any significant impacts that cannot be avoided, even with implementation of feasible mitigation measures. The following significant, unavoidable adverse impacts would result from project implementation:

- **Air Quality**
  - > Implementation of the proposed project would violate an air quality standard or contribute substantially to an existing or projected air quality violation.
- **Cultural Resources**
  - > Implementation of the proposed project could cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5.
- **Noise**
  - > Implementation of the proposed project would result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- **Traffic/Transportation**
  - > Implementation of the Specific Plan would conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system.
  - > Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on two northbound segments and one southbound segment of US-101 and would add traffic greater than 1 percent to a freeway segment already operating at LOS F under No Project Conditions for one northbound segment and two southbound segments, resulting in a significant project contribution under Existing Plus Project Conditions.
  - > Implementation of the Specific Plan would conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system under cumulative plus project conditions.
  - > Implementation of the Specific Plan would conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system under Cumulative Plus Project conditions for two intersections.
  - > Implementation of the Station Area Plan would add traffic greater than 1 percent to the freeway segment volume and deteriorate LOS from E to F on one northbound segment of US-101 and would add traffic greater than 1 percent of the freeway segment volume to a

segment already operating at LOS F under No Project Conditions on five northbound segments and five southbound segments of US-101 under cumulative conditions.

> Implementation of the Station Area Plan would add traffic greater than 1 percent of the freeway ramp volume and deteriorate LOS from E to F for one southbound US-101 ramp during the PM peak hour under cumulative conditions.

All feasible mitigation measures have been included that would reduce most, but not all, of the project's impacts. Significant impacts would remain as listed, above.

5.5 REFERENCES

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CHAPTER 6 Alternatives to the Proposed Project

CEQA Guidelines Section 15126.6(a) requires that an EIR describe a range of reasonable alternatives to the project or to the location of the project that could feasibly attain the basic objectives of the project while reducing significant project impacts. An EIR is not required to consider every conceivable alternative to a project; rather, it must consider a range of potentially feasible alternatives that will foster informed decision-making and public participation. In addition, an EIR should evaluate the comparative merits of the alternatives. Therefore, this chapter sets forth potential alternatives to the proposed plan and evaluates them, as required by CEQA.

Key provisions of the CEQA Guidelines relating to the alternatives analysis (Sections 15126.6 et seq.) are summarized below:

- The discussion of alternatives shall focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.
- The "no project" alternative shall be evaluated along with its impact. The "no project" analysis shall discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project is not approved.
- The range of alternatives required in an EIR is governed by a "rule of reason"; therefore, the EIR must evaluate only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project.
- For alternative locations, only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR.
- An EIR need not consider an alternative whose effects cannot be reasonably ascertained and whose implementation is remote and speculative.

6.1 RATIONALE FOR SELECTING POTENTIALLY FEASIBLE ALTERNATIVES

The alternatives may include a different type of project, modification of the proposed plan, or suitable alternative project sites. However, the range of alternatives discussed in an EIR is governed by a "rule of reason" which CEQA Guidelines Section 15126.6(f) defines as:

> … set[ting] forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision-making.

Among the factors that may be taken into account when addressing the feasibility of alternatives (as described in CEQA Guidelines Section 15126.6(f)(1)) are environmental impacts, site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the project proponent could reasonably acquire, control, or otherwise have access to an alternative site. An EIR need not consider an alternative whose effects could not be reasonably identified, and whose implementation is remote or speculative.

For purposes of this analysis, the project alternatives are evaluated to determine the extent to which they attain the basic project objectives, while significantly lessening any significant effects of the project. As discussed in the Specific Plan, the Specific Plan defines a vision and establishes standards and strategies for the revitalization of Downtown South San Francisco community using the principles of TOD. The Specific Plan presents a vision for the future transformation of the City over a 20-year period. The Specific Plan will guide the City in its planning efforts to create a vibrant, transit-supportive, diverse Downtown, particularly the area surrounding the City's Caltrain commuter rail station. More specifically, the objectives, as stated in the Specific Plan, include the following:

- Revitalize Downtown South San Francisco to be a vibrant and successful community resource and a source of local pride.
- Promote new residential, mixed-use and employment uses so as to add a critical mass of business patrons and residents to the Downtown, while maintaining a scale and character that are complementary.
- Focus new improvements on Grand Avenue to return the historic corridor as the focus of the community and encourage retention of existing and local businesses to protect historic building fabric
- Improve pedestrian and bicycle connections to Caltrain as well as the Downtown with the east employment area

Community goals and priorities identified during the community outreach process for the plan identified the following goals:

- Protect and celebrate the historic nature of Downtown
- Improve access to the Caltrain station
- Support local businesses—keep Downtown unique
- Improve east/west connectivity and access to Downtown
- Remove truck traffic from Downtown
- Reduce traffic congestion on Grand Avenue and Airport Boulevard
- Increase the use of alternative travel modes

These community goals and priorities were incorporated into the City's goals and objectives for the Specific Plan.

6.2 ALTERNATIVES REJECTED AS INFEASIBLE

In accordance with CEQA Guidelines Section 15126.6(c), an EIR should identify alternatives that were considered for analysis but rejected as infeasible and briefly explain the reasons for their rejection. According to the CEQA Guidelines, the following factors may be used to eliminate alternatives from detailed consideration: the alternative's failure to meet most of the basic project objectives, the alternative's infeasibility, or the alternative's inability to avoid significant environmental impacts. During the scoping process, other alternatives were also considered, but were rejected as infeasible, as described below.

6.2.1 Alternative Site

An alternative site for the proposed Specific Plan was rejected because the Specific Plan is tailored specifically to maximize transit-oriented development around the Caltrain station. There is no alternative site in South San Francisco that would achieve this fundamental project objective.

6.3 ALTERNATIVES CONSIDERED IN THIS DRAFT EIR

The South San Francisco City Council will make the final determination of the feasibility of the alternatives and the extent to which the alternatives meet the project objectives.

It should be noted that the No Project alternative that will be considered is the No Project/Reasonably Foreseeable Development Alternative; that is, continuation of the existing land use plans that currently control development in the study area. A No Project/No Build alternative was rejected because it could not occur given that land use decisions in the study area are currently governed by the City's General Plan and zoning. The alternatives include the following:

- **Alternative 1: No Project/Reasonably Foreseeable Development (Continuation of City General Plan and Zoning)**—This legally mandated alternative, which is not subject to the requirement to meet most of the project objectives of the proposed plan or to substantially lessen any of the significant effects of the project, reflects conditions likely to occur in the future without the adoption of the proposed plan. Rather, future land uses in the study area would be guided by continued implementation of the City's existing General Plan and zoning, as applicable.
- **Alternative 2: Mixed-Use Village Plan**—This alternative balances locational opportunities for new housing with additional sites for employment uses in the study area, with residential uses predominating in the Downtown, and a mix of residential and employment in the eastern neighborhood.

The following subsection describes the above alternatives, comparatively analyzes the potential environmental effects of the alternatives, and evaluates the extent that the alternatives meet the Specific Plan objectives. The focus of the analysis is the difference between the environmental effects of the alternative compared to those of the Specific Plan, with an emphasis on how the alternative affects the identified significant impacts of the Specific Plan, and the identification of any new effects created by the alternatives. For each issue area, the analysis indicates which mitigation measures would be required for the alternatives and which significant and unavoidable impacts would be avoided or substantially reduced. Where appropriate, the analysis indicates whether any mitigation measures would no longer be

required, or whether additional mitigation measures would be required for the alternatives. Unless otherwise indicated, the level of significance and relative magnitude of environmental impacts, and any required mitigation measures, would be the same for the alternatives as for the Specific Plan.

6.4 ANALYSIS OF ALTERNATIVES TO THE PROPOSED PROJECT

6.4.1 Alternative 1: No Project/Reasonably Foreseeable Development (Continuation of General Plan and Zoning)

Description

Implementation of the No Project/Reasonably Foreseeable Development Alternative would represent the continuation of the existing City General Plan and zoning designations to guide future growth and development within the study area.

Table 6-1 (Comparison of Specific Plan and Alternative 1 Land Uses) illustrates the maximum build-out under both plans for comparison.

Table 6-1 Comparison of Specific Plan and Alternative 1 Land Uses

Land Use Designation	*Specific Plan*	*Alternative 1*
Residential units	1,435	965
Business Commercial	511,780 sf	586,358 sf
Commercial	268,800 sf	467,162 sf
R&D	1,185,049 sf	N/A
Office	N/A	N/A
Industrial	21,250 sf	21,250 sf

Continuation of development per the General Plan would result in fewer dwelling units, greater business commercial/commercial, and less R&D use, with the same amount of industrial space allowed.

Because existing zoning does not focus on transit-oriented development, continuation of the General Plan in the study area would result in less cohesive, transit-oriented development, less residential use, as well as potentially greater levels of development of business commercial and commercial uses. No new R&D uses would be allowed. Because this alternative would not provide as much housing as the Specific Plan, it would not help the City meet its RHNA allocation to the same extent as the proposed Specific Plan, and because the City is completely built out, opportunities for residential development elsewhere in the City are few. Because the overall level of development under the General Plan would be less than under the Specific Plan for both residential and non-residential uses (approximately 2 million square feet [sf] for the Specific Plan compared to 1.1 million sf under the current General Plan), many of the impacts of the Specific Plan would be reduced, but likely not to a less-than-significant level. Air quality emissions during construction, while reduced compared to the Specific Plan, would be anticipated to still exceed BAAQMD thresholds, since the Bay Area is in nonattainment for criteria pollutants. The risk of adverse effects on historic and cultural resources would remain significant and unavoidable as well, because

although the amount of redevelopment under this alternative would likely be lower, any development in the study area could adversely affect historic and cultural resources. Similarly, the increase in ambient noise levels would likely remain significant given the existing high levels of ambient noise even without any additional development. Traffic impacts could be greater than under the Specific Plan, despite the lower level of development, because the different mix of uses would result in different trip generation rates that could result in a larger increase in area traffic because existing regulations do not encourage transit-oriented development. This would result in an increased impact on air quality and greenhouse gas emissions, as well as traffic noise, compared to the Specific Plan. Therefore, overall, continuation of the existing General Plan land use and zoning designations would generally reduce the impacts of the Specific Plan, but not to a less-than-significant level.

With regard to other resources where the Specific Plan would result in no impact or less-than-significant impacts, with or without mitigation, General Plan policies that address these resources would continue to be applied. However, the design standards in the Specific Plan are more detailed and tailored to the planned TOD, which would result in more pedestrian-friendly, integrated mixed-use neighborhoods. Thus, continuation of the existing plan would likely result in greater impacts to aesthetics and visual quality, as this Alternative would not provide the benefit of an integrated approach to future development in the study area that takes advantage of its proximity to the Caltrain station. It should be noted that this alternative would include extension of the Caltrain station platform to the south and construction of a major undercrossing to provide access from Grand Avenue to the west to the station and East Grand in this neighborhood. Alternative 1 would result in greater greenhouse gas emissions, as it would not reduce vehicle trips to the same extent as the proposed Specific Plan (because of the plan's TOD focus), despite General Plan policies with regard to improving air quality and reducing energy consumption. While mitigation measures in the General Plan EIR would likely help reduce some of these impacts, and would continue to be applied, these mitigations would not be anticipated to reduce the impacts to less than significant.

Attainment of Project Objectives

Alternative 1 would not meet most of the project objectives, as it would not provide the complementary mix of uses as under the proposed plan. It would not: provide for the community's transition from its predominately low-intensity and fragmented development pattern into an attractive and desirable transit and pedestrian-oriented urban community containing distinct and quality mixed-use neighborhoods and districts with housing, office, retail, restaurants, personal services, hotels, community facilities, and parks; develop a mix and choices of use to enable residents and workers to meet their basic needs within Downtown South San Francisco; develop land uses and densities that maximize ridership and support public investment in transit facilities, while reducing regional traffic congestion, pollution, and greenhouse gas emissions; develop housing in the Downtown area for a variety of persons and households who choose to live in an active, urban environment; match new housing opportunities with jobs in the Downtown area, enabling residents to live close to where they work; allow for flexibility in the mix of land uses that responds to market conditions as they evolve over the next 20 years and beyond; provide opportunities for the development of uses that complement one another, such as the support of local businesses to keep Downtown unique; improve east/west connectivity and access to Downtown; remove truck traffic from Downtown, reduce traffic congestion on Grand Avenue and Airport

Boulevard, increase the use of alternative travel modes establish zoning and design guidelines for ground floor uses and facades, streets, sidewalks, landscaping, lighting, and signage that facilitate pedestrian use; and the creation of safe and attractive pedestrian and bike routes to the Caltrain station. It would meet some of the project objectives related to improving the aesthetics and architectural appearance of the community area, providing a symbolic and functional entry to the community, increasing revenues and jobs, and improving roadway infrastructure.

The proposed Specific Plan contains numerous and specific goals intended to improve both the appearance and functionality of the Downtown area, and, importantly, provide for transit-oriented development in a pattern that promotes walkability and bicycle use, as well as direct access to the Caltrain station. Additionally, the Specific Plan includes a transit overlay zone to allow for transit-oriented uses, and also includes new residential development, which use is necessary to realize the full benefit of transit-oriented development. Alternative 1 would not achieve these goals, and would not achieve the various community goals identified in the proposed plan.

6.4.2 Alternative 2: Mixed-Use Village Plan

Similar to the proposed plan, Alternative 2 proposes to maintain modest building heights directly on Grand, while allowing taller buildings on the rear portions of Grand-facing blocks, as well as sites across the adjoining alleys: Tamarack Lane and Third Lane. Buildings directly fronting Grand would be limited in height to 45 feet, with heights transitioning up moving away from the street. Adjoining the core to the north and south, the Downtown Commercial Core would allow medium density residential uses at heights up to 60 feet. Allowed densities of development would be consistent with the current General Plan, ranging as high as 40 dwelling units per acre. Grand Avenue and its adjoining Downtown core thus would become the pedestrian-oriented, higher intensity focus of the West of 101 area.

Beyond this core area, in the Downtown North and South neighborhoods, heights up to 50 feet and residential densities up to 40 dwelling units per acre would be allowed. A transition zone would be located along the edge of the Sign Hill Neighborhood, with densities up to 25 dwelling units per acre, as currently allowed. Along Airport Boulevard and north of Armour Avenue, a medium density mixed-use designation would encourage higher density residential (up to 40 dwelling units per acre) as well as business commercial at up to 0.5 FAR.

The Business Commercial designation currently applied to the zone framed by US-101, the rail tracks, and Airport Boulevard would remain. These sites are difficult to access, serve a useful purpose now, and would not be suitable for residential development, given the area's proximity to such a high volume of vehicular and rail traffic. This alternative would offer a mix of office, residential and retail uses in the East Neighborhood of the study area and would maintain the zoning of the Downtown Core per General Plan designations, which would result in very little change from current conditions.

It should be noted that this alternative would include extension of the Caltrain station platform to the south and construction of a major undercrossing to provide access from Grand Avenue to the west to the station and East Grand in this neighborhood. Alternative 2 envisions the Eastern Neighborhood as a mixed-use neighborhood, with high density residential and employment uses, whereas the specific plan would allow only employment uses in this area. The Transit Core High Density Residential land use

designation would be applied here, with allowable residential densities up to 120 dwelling units/acre. Office uses would be allowed at densities up to 3.5 FAR. This mixed-use neighborhood would thus include a robust mix of jobs and housing, creating a transition from the solely employment uses to the east and the Downtown core commercial and residential uses west of US-101.

This alternative would include extension of the Caltrain station platform to the south and construction of a major undercrossing to provide access from Grand Avenue to the west to the station and East Grand in this neighborhood. This would allow easy access for area residents and employees to the amenities and services on Grand Avenue.

As shown below in Table 6-2 (Comparison of Specific Plan and Alternative 2 Land Uses), the proposed alternative would not include R&D.

Table 6-2 Comparison of Specific Plan and Alternative 2 Land Uses

Land Use Designation	*Specific Plan*	*Alternative 2*
Residential units	1,435	1,382
Business Commercial	511,780 sf	537,828 sf
Commercial	268,800 sf	444,725 sf
R&D	1,185,049 sf	N/A
Office	N/A	505,242 sf
Industrial	21,250 sf	21,250 sf

Alternative 2 would result in slightly fewer residential units, greater business commercial/commercial and office development, and no R&D uses. Compared to the Specific Plan's 2 million sf of non-residential uses, Alternative 2 would result in 1.5 million sf of non-residential uses. All of the mitigation measures and design standards in the Specific Plan would be implemented with this alternative.

Because this alternative would provide slightly less housing than the Specific Plan, it would not help the City meet its RHNA allocation to the same extent as the proposed Specific Plan, and because the City is completely built out, opportunities for residential development elsewhere in the City are few. Because the overall level of development under Alternative 2 would be less than under the Specific Plan for non-residential uses (approximately 2 million sf for the Specific Plan compared to 1.5 million sf under Alternative 2), many of the impacts of the Specific Plan would be reduced, but likely not to a less-than-significant level. Air quality emissions during construction, while reduced compared to the Specific Plan, would be anticipated to still exceed BAAQMD thresholds, since the Bay Area is in nonattainment for criteria pollutants. While residential uses would be less than under the Specific Plan, because of the distribution of uses, this alternative would expose a greater number of sensitive receptors in the East of 101 area to TACs and higher noise levels due to proximity to US-101 than under the Specific Plan. The risk of adverse effects on historic and cultural resources would remain significant and unavoidable as well, because any development in the study area could adversely affect historic and cultural resources, and this impact would be substantially similar to that of the Specific Plan. Similarly, the increase in ambient noise levels would likely remain significant given the existing high levels of ambient noise even without additional development. Traffic generated under this alternative would be slightly less than under

the Specific Plan (51,980 daily trips versus 53,860 trips), which would reduce air quality and greenhouse gas emissions from motor vehicles. Alternative 2 would reduce the impacts of the Specific Plan but not to a less-than-significant level; air quality and noise impacts would be potentially greater for residential uses adjacent to the US-101.

With regard to other resources where the Specific Plan would result in no impact or less-than-significant impacts, with or without mitigation, General Plan policies that address these resources would continue to be applied. The design standards articulated in the Specific Plan would be implemented under Alternative 2. Compared to the Specific Plan, Alternative 2 would not promote the more pedestrian-friendly, integrated mixed-use neighborhoods to the same extent as the Specific Plan, since the Downtown Core would remain as currently zoned, rather than becoming a more dense residential neighborhood. Thus, implementation of Alternative 2 plan would likely result in greater impacts to aesthetics and visual quality, as this Alternative would not provide the benefit of an integrated approach to future development in the study area that takes advantage of its proximity to the Caltrain station.

Attainment of Project Objectives

The proposed alternative would provide little to no change in the Downtown Core and would not help to support transit and local businesses. Therefore, this alternative would not achieve most of the project objectives.

6.5 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Table 6-3 (Summary of Impacts of Alternatives) provides a side-by-side comparison of the Specific Plan with the analyzed alternatives. Based on the information provided, the Specific Plan is environmentally superior, as it would result in fewer significant and unavoidable impacts, on balance, than either of the alternatives. The proposed Specific Plan is designed to optimize the benefits of TOD along existing corridors and to maximize revitalization of the study area. Alternative 1 would not achieve any, and Alternative 2 would only achieve some, of the Specific Plan objectives.

Table 6-3 Summary of Impacts of Alternatives

Impact Area	*Specific Plan Impacts*	*Alternative 1: No Project/Continuation of Existing General Plan*	*Alternative 2: Mixed-Use Village Plan*
Aesthetics	LTS	LTS >	LTS >
Air Quality	SU	SU>	SU>
Cultural Resources	SU	SU≈	SU≈
Greenhouse Gas Emissions	LTS	PS>	PS>
Land Use/Planning	LTS	LTS>	LTS≈
Noise	SU	SU>	SU>
Transportation/Traffic	SU	SU>	SU<
Utilities/Service Systems	LTS	LTS<	LTS<
Achieve Project Objectives?	—	None	Some
Reduce SU Impacts of Project to LTS?	—	No	No

LTS = less than significant; SU = significant and unavoidable; PS = potentially significant
≈ substantially similar; < less than; > greater than

6.6 REFERENCES

South San Francisco, City of. 1999. *City of South San Francisco General Plan*. Prepared by Dyett & Bhatia, October. http://www.ssf.net/index.aspx?NID=360 (accessed November 19, 2013).

South San Francisco, City of. 2013, June 19. *City of South San Francisco Planning Commission Joint Study Session*.

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CHAPTER 7 Report Preparers

7.1 TABLE OF REPORT PREPARERS

This EIR was prepared by Atkins, under contract to the City of South San Francisco. Assisting Atkins in this task was Fehr & Peers, subconsultant for traffic analysis; and the City of South San Francisco staff members. The following agencies and persons were directly involved in the preparation of this EIR.

It is recognized that no one individual can be an expert in all of the environmental analysis presented in this EIR. Consequently, an interdisciplinary team, consisting of technicians and experts in various issue areas, was required to prepare and complete this EIR. Table 7-1 (Report Preparers) provides a list of EIR preparers.

Table 7-1 Report Preparers

Name	*Role*
LEAD AGENCY	
City of South San Francisco	
Susy Kalkin	Chief Planner, South San Francisco Department of Economic and Community Development
Catherine Barber	Senior Planner, South San Francisco Department of Economic and Community Development
CONSULTANT TEAM	
Atkins	
Kim Avila, AICP	Project Director
Alison Rondone	Project Manager
Dave Beauchamp	Section Writer, Utilities/Services System (Water Supply)
Sharon Toland	Section Writer, Noise
Kimberly Comacho	Section Writer, Introduction, Project Description
Tomoki Demers	Section Writer, Utilities/Services System, Recreation, Alternatives to the Proposed Project, Report Preparers
Heather Dubois	Section Writer, Greenhouse Gas Emission
Jennifer J. Lee	Section Writer, Public Services
Mar-Lynn Long	Section Writer, Aesthetics, Cultural Resources, Land Use/Planning, Population/Housing
Sharon Toland	Section Writer, Air Quality
Pete Vitar	Noise Technical Support
James Songco	Graphics
Joel Miller	Administrative Coordination, Document Production
Subconsultant: Fehr & Peers	
Megan Weir	Traffic Analyses

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Appendix A Notice of Preparation and NOP Comment Letters

Notice of Preparation

To: Agencies, Organizations, and Interested Parties

From: City of South San Francisco, Economic and Community Development Department

Subject: Notice of Preparation (NOP) of an Environmental Impact Report (EIR) in Compliance with Title 14, Sections 15082(a), 15103, and 15375 of the California Administrative Code. The City of South San Francisco (City) is the Lead Agency under the California Environmental Quality Act (CEQA) for the proposed project identified below. The City has prepared an Initial Study and will prepare an EIR for the proposed project identified below:

Project Title: The South San Francisco Downtown Station Area Specific Plan

Agencies: The City requests your agency's views on the scope and content of the environmental information relevant to your agency's statutory responsibilities in connection with the proposed project, in accordance with California Code of Regulations, Title 14, Section 15082(b). Your agency will need to use the EIR when considering any permit or other approval that your agency must issue for the project.

Organizations and Interested Parties: The City requests your comments regarding the environmental issues associated with construction and operation of the proposed project.

Project Location: The South San Francisco Downtown Station Area Specific Plan (Station Area Plan) study area is located in the geographic center of the City. The study area boundary includes the South San Francisco Caltrain station and the majority of commercial and civic development in the City's Downtown Neighborhood (Figure 1). A portion of the study area extends east of US 101, encompassing much of the East Side Neighborhood, but excludes the majority of the existing office development east of US 101 and the Gateway Neighborhood. The study area is generally bound by Hillside Boulevard and Linden Avenue to the north; Gateway Boulevard and Dubuque Avenue to the east; Railroad Avenue and Canal Street to the south; and Spruce Avenue and Maple Avenue to the west.

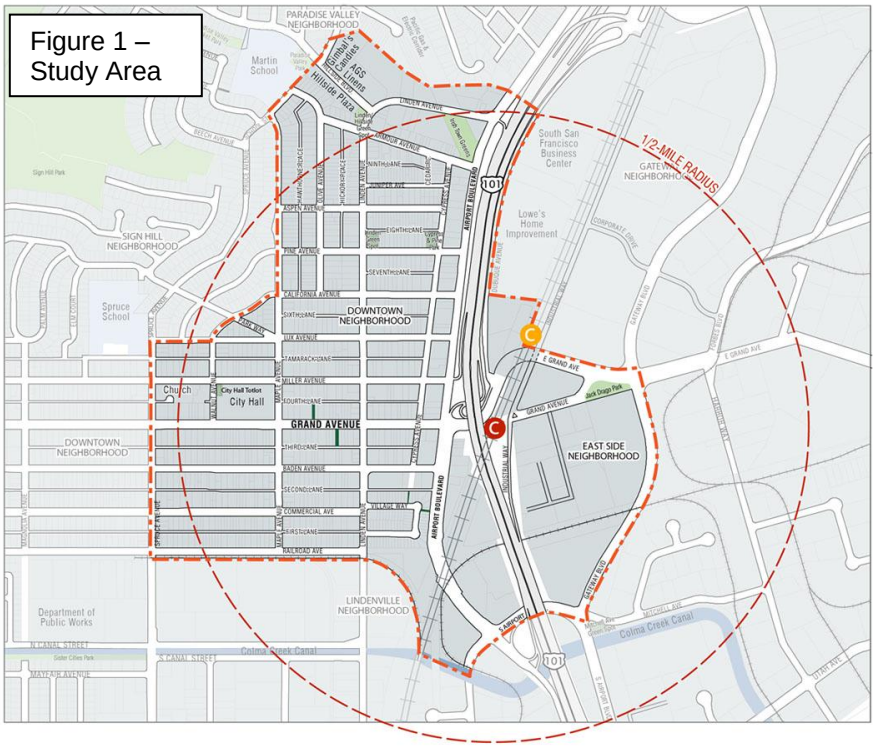

Figure 1 – Study Area

Project Description: The project includes development and adoption of a Specific Plan, and associated General Plan amendments. The Station Area Plan will guide the City in its planning efforts to create a vibrant, transit-supportive, diverse downtown as well as the area surrounding the City's Caltrain commuter rail station. The Station Area Plan will craft a vision for the Downtown core, and identify an implementation process to achieve City and community goals. The goals of the Station Area Plan include: protecting the historic nature of Downtown, improving access to the Caltrain station, supporting local businesses, improving east/west connectivity to Downtown, reducing traffic congestion on Grand Avenue and Airport Boulevard, and increasing the use of alternative transportation. The Station Area Plan would support transit-oriented development (TOD); create an open space framework; create pedestrian linkages, alleys, and a pedestrian priority zone; create a new bicycle network; employ new parking strategies; and implement affordable housing and anti-displacement strategies. In addition, a new circulation framework would be implemented to balance travel modes to improve access between Downtown and the East Side neighborhood, improve street connectivity, reduce impacts from regional traffic, and provide transit enhancements from Downtown to BART and the South San Francisco ferry terminal.

The Station Area Plan would feature an historic core, focused neighborhood and retail centers, an increase in residences within one quarter mile of the proposed future Caltrain station (maximum 120 dwelling units per acre), and high intensity office and Research and Development (R&D) uses in the East Side Neighborhood with a maximum allowable density of 3.5 floor area ratio. Increased dwelling units are anticipated to be constructed under the Station Area Plan, as well as a new area of office/R&D uses on the east side of the plan area.

Potential Environmental Effects: An Initial Study has been prepared, and the City has determined that an EIR will be necessary to fully define certain impacts and their potential level of significance. Initial review indicates that there are potentially significant impacts to Aesthetics, Air Quality, Cultural Resources, Greenhouse Gas Emissions, Land Use and Planning, Noise, Population and Housing, Public Services, Recreation, Transportation and Traffic, and Utilities and Service Systems. The City has determined that impacts to Agricultural Resources, Biological Resources, Geology and Soils, Hazards and Hazardous Materials, Hydrology and Water Quality, and Mineral Resources would be less than significant. The purpose of an EIR is to inform decision-makers and the general public of the environmental effects of a proposed project. The EIR process is intended to provide environmental information sufficient to evaluate the proposed project and its potential to cause significant effects on the environment; examine methods of reducing adverse environmental impacts; and identify alternatives to the proposed project.

Scoping Meeting: The Lead Agency will conduct a scoping meeting on October 16, 2013, from 1:00 PM to 2:00 PM, in the Annex Conference Room, 315 Maple Avenue, South San Francisco, California, at which the public will have an opportunity to comment. The Lead Agency provides notice of the scoping meeting to all of the following: San Mateo County and cities adjacent to the project area; any responsible agency; any public agency that has jurisdiction by law with respect to the proposed project; and any organization or individual who has filed a written request for the notice.

DOCUMENT AVAILABILITY: The Initial Study is available for review at the following locations:

City of South San Francisco
Planning Division
315 Maple Avenue
South San Francisco, CA 94083

South San Francisco Main Library
840 West Orange Avenue
South San Francisco, CA 94080

The Initial Study is also available online at the City of South San Francisco website for the Station Area Plan (http://www.ssfdowntownplan.org/).

Agency/Public Comments: The City will accept written comments on this NOP between October 1, 2013 and October 30, 2013. Please indicate a contact person for your agency or organization and send your responses and comments to:

City of South San Francisco
Economic and Community Development Department
315 Maple Avenue
South San Francisco, CA 94083
Attention: Mr. Gerry Beaudin, Principal Planner

Your comments may also be sent by FAX to 650.829.6639 or by email to gerry.beaudin@ssf.net (include South San Francisco Downtown Station Area Plan in the subject heading).

EIR Process: Following the close of the NOP comment period, a Draft EIR will be prepared that will consider all NOP comments. In accordance with CEQA Guidelines Section 15105(a), the Draft EIR will be released for public review and comment for the required 45-day review period. Following the close of the 45-day public review period, the City will prepare a Final EIR that will include responses to all substantive comments received on the Draft EIR. The Draft EIR and Final EIR will be considered by the Planning Commission and City Council in making the decision to certify the EIR and to approve or deny the Station Area Plan.

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October 30, 2013

Mr. Gerry Beaudin
Principal Planner
Economic and Community Development Dept.
325 Maple Avenue
South San Francisco, CA 94080

Mr. Terry White
Director of Public Works
City of South San Francisco
P.O. Box 711
South San Francisco, CA 94083

Re: South San Francisco Downtown Station Area Specific Plan Notice of Preparation (NOP)

Dear Mr. Beaudin and Mr. White:

This letter is in response to the South San Francisco Downtown Station Area Specific Plan NOP. The Peninsula Joint Powers Board (JPB) encourages transit-oriented development and investments at stations along the Caltrain corridor that support ridership and enhance mobility by alternative modes of transportation. We support South San Francisco's planning efforts to improve its downtown area.

As the City moves forward with the Downtown Station Area Specific Plan, we will continue to coordinate with the City on station related projects including:

- A JPB planning and design study to determine how to remove the "Hold Out Rule" at the station;
- JPB support for the City's Safe Routes to Transit grant application to explore the feasibility of advancing a new pedestrian tunnel at the station;
- JPB support of the City's desire to seek San Mateo County Transportation Authority (SMCTA) funding to study a potential grade separation project at Linden Ave.

In addition to these South San Francisco specific projects, it is the JPB's priority to implement its modernization program affecting the Caltrain corridor from the 4th and King Station to the Tamien Station. The key targets dates are revenue service of the advanced signal system (CBOSS PTC) by 2015 and electrified Caltrain service by 2019. In addition to these early investments, the JPB will also continue to work with the California High Speed Rail Authority to further define and plan for future infrastructure needed to support the Caltrain / HSR Blended System.

As we advance our modernization program as well as support the City's efforts in improving its downtown area, we will work with the City to make sure that all of these efforts are appropriately coordinated with the Downtown Station Area Specific Plan.

We look forward to continuing to work with you on these important efforts. Please know that Sebastian Petty, Senior Planner with the Caltrain Modernization Program will be your key contact. If you have any questions or need to contact us, Sebastian can be reached at 650-622-7831, pettys@samtrans.com.

Sincerely,

Marian Lee
Executive Officer, Caltrain Modernization Program

Copy: Chuck Harvey
Liria Larano
Hilda Lafebre
Sebastian Petty

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
111 GRAND AVENUE
P.O. BOX 23660, MS-10
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Mr. Gerry Beaudin
Planning Division
City of South San Francisco
P.O. Box 711
South San Francisco, CA 94083

Dear Mr. Beaudin:

South San Francisco Downtown Station Area Plan – Notice of Preparation

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above project. The following comments are based on the Notice of Preparation. As the lead agency, the City of South San Francisco (City) is responsible for all project mitigation, including any needed improvements to state highways. The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures. This information should also be presented in the Mitigation Monitoring and Reporting Plan of the environmental document. Required roadway improvements should be completed prior to issuance of the Certificate of Occupancy. Since an encroachment permit is required for work in the state right of way (ROW), and Caltrans will not issue a permit until our concerns are adequately addressed, we strongly recommend that the City work with Caltrans to ensure that our concerns are resolved during the environmental process, and in any case prior to submittal of an encroachment permit application. Further comments will be provided during the encroachment permit process; see the end of this letter for more information regarding encroachment permits.

Cultural Resources

Caltrans requires that a project environmental document include documentation of a current archaeological record search from the Northwest Information Center of the California Historical Resources Information System if construction activities are proposed within state right of way. Current record searches must be no more than five years old. Caltrans requires the records search, and if warranted, a cultural resource study by a qualified, professional archaeologist, and evidence of Native American consultation to ensure compliance with California Environmental Quality Act, Section 5024.5 and 5097 of the California Public Resources Code, and Volume 2 of Caltrans' Standard Environmental Reference (http://ser.dot.ca.gov). These requirements, including applicable mitigation, must be fulfilled before an encroachment permit can be issued for project-related work in state ROW; these requirements also apply to National Environmental Policy Act documents when there is a federal action on a project. Work subject to these

requirements includes, but is not limited to: lane widening, channelization, auxiliary lanes, and/or modification of existing features such as slopes, drainage features, curbs, sidewalks and driveways within or adjacent to state ROW.

Traffic Impact Study

One of Caltrans' ongoing responsibilities is to collaborate with local agencies to avoid, eliminate, or reduce to insignificant levels potential adverse impacts to the state highway system from local development projects. We recommend using the Caltrans *Guide for the Preparation of Traffic Impact Studies* (TIS Guide) for determining which scenarios and methodologies to use in the analysis. We encourage the City to coordinate preparation of the Traffic Impact Study (TIS) with our office, and we would appreciate the opportunity to review the scope of work. Please include the information detailed below in the TIS to ensure that project-related impacts to State roadway facilities are thoroughly assessed. The TIS Guide is available at the following website: http://www.dot.ca.gov/hq/tpp/offices/ocp/igr_ceqa_files/tisguide.pdf.

The TIS should include:

1. Vicinity map, regional location map, and a site plan clearly showing project access in relation to nearby state roadways. Ingress and egress for all project components should be clearly identified. The state ROW should be clearly identified.

2. The maps should also include project driveways, local roads and intersections, parking, and transit facilities.

3. Project-related trip generation, distribution, and assignment. The assumptions and methodologies used to develop this information should be detailed in the study, and should be supported with appropriate documentation.

4. Average Daily Traffic, AM and PM peak hour volumes and levels of service (LOS) on all significantly affected roadways, including crossroads and controlled intersections for existing, existing plus project, cumulative and cumulative plus project scenarios. Calculation of cumulative traffic volumes should consider all traffic-generating developments, both existing and future, that would affect study area roadways and intersections. The analysis should clearly identify the project's contribution to area traffic and degradation to existing and cumulative LOS. Lastly, the Caltrans LOS threshold, which is the transition between LOS C and D, and is explained in detail in the TIS Guide, should be applied to all state facilities. Please note, Caltrans considers LOS by itself as an inadequate measure of effectiveness (MOE) for describing traffic operational conditions since it may actually mask a deficient condition on one or more approaches. As for intersection analysis the accepted MOEs used by Caltrans include flow (output), average control delay, queue (length or number of vehicles), and Volume/Capacity (V/C) ratio. For freeway and ramp operations, flow (output), speed, and travel time/delay are the accepted MOEs in addition to LOS.

5. Schematic illustration of traffic conditions including the project site and study area roadways, trip distribution percentages and volumes as well as intersection geometrics, i.e., lane configurations, for the scenarios described above.

6. We encourage you to develop Travel Demand Management (TDM) policies to encourage usage of nearby public transit lines and reduce vehicle trips on the State Highway System. These policies could include lower parking ratios, car-sharing programs, bicycle parking and showers for employees, and providing transit passes to residents and employees, among others. For information about parking ratios, see the Metropolitan Transportation Commission (MTC) report *Reforming Parking Policies to Support Smart Growth* or visit the MTC parking webpage: http://www.mtc.ca.gov/planning/smart_growth/parking/.

7. Secondary impacts on pedestrians and bicyclists resulting from any traffic impact mitigation measures should be analyzed. The analysis should describe any pedestrian and bicycle mitigation measures and safety countermeasures that would in turn be needed as a means of maintaining and improving access to transit facilities and reducing vehicle trips and traffic impacts on state highways.

Encroachment Permit

Please be advised that any work or traffic control that encroaches onto the state ROW requires an encroachment permit that is issued by Caltrans. To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating the state ROW must be submitted to: Office of Permits, California Department of Transportation, District 4, P.O. Box 23660, Oakland, CA 94623-0660. Traffic-related mitigation measures should be incorporated into the construction plans during the encroachment permit process. See the following website link for more information: http://www.dot.ca.gov/hq/traffops/developserv/permits/.

Please feel free to call or email Sandra Finegan at (510) 622-1644 or sandra_finegan@dot.ca.gov with any questions regarding this letter.

Sincerely,

for

ERIK ALM, AICP
District Branch Chief
Local Development – Intergovernmental Review

c: State Clearinghouse

STATE OF CALIFORNIA EDMUND G. BROWN JR., *Governor*

PUBLIC UTILITIES COMMISSION
320 WEST 4TH STREET, SUITE 500
LOS ANGELES, CA 90013
(213) 576-7083

October 24, 2013

Gerry Beaudin
City of South San Francisco
315 Maple Avenue
South San Francisco, CA 94083

Dear Mr. Beaudin:

Re: SCH 2013102001 South San Francisco Downtown Station Area Plan - NOP

The California Public Utilities Commission (Commission) has jurisdiction over the safety of highway-rail crossings (crossings) in California. The California Public Utilities Code requires Commission approval for the construction or alteration of crossings and grants the Commission exclusive power on the design, alteration, and closure of crossings in California. The Commission Rail Crossings Engineering Section (RCES) is in receipt of the *Notice of Preparation (NOP)* for the proposed City of South San Francisco (City) Downtown Station Area Plan project.

The project area includes active railroad tracks. RCES recommends that the City add language to the General Plan so that any future development adjacent to or near the railroad/light rail right-of-way (ROW) is planned with the safety of the rail corridor in mind. New developments may increase traffic volumes not only on streets and at intersections, but also at at-grade crossings. This includes considering pedestrian circulation patterns or destinations with respect to railroad ROW and compliance with the Americans with Disabilities Act. Mitigation measures to consider include, but are not limited to, the planning for grade separations for major thoroughfares, improvements to existing at-grade crossings due to increase in traffic volumes and continuous vandal resistant fencing or other appropriate barriers to limit the access of trespassers onto the railroad ROW.

If you have any questions in this matter, please contact me at (213) 576-7076, ykc@cpuc.ca.gov.

Sincerely,

Ken Chiang, P.E.
Utilities Engineer
Rail Crossings Engineering Section
Safety and Enforcement Division

C: State Clearinghouse

San Mateo County
Health System

October 29, 2013

Mr. Gerry Beaudin, Principal Planner
City of South San Francisco
Economic and Community Development Department
315 Maple Avenue
South San Francisco, CA 94083

Dear Mr. Beaudin,

We appreciate the opportunity to comment on the City of South San Francisco's Initial Study and Notice of Preparation for an Environmental Impact Report (EIR) for the South San Francisco Downtown Station Area Plan. The Health System's mission is to improve the quality and longevity of our residents' lives. To further our mission we support efforts that contribute to the overall health and vibrancy of San Mateo County communities. A priority is making our cities more walkable, bikeable, and transit-friendly. I commend the City for pursuing equitable transit-oriented development, prioritizing bicycle and pedestrian connectivity, increasing residential and commercial densities, and zoning for increased mixed use development in this Station Area Plan.

The physical health benefits of dense communities accessible by walking, biking and transit are clear. In addition to increased opportunities for physical activity, these communities offer more inviting streetscapes, calmer car traffic, and higher quality of life to the people who live, work and play there. The proposed Plan promotes these changes in South San Francisco. In the creation of your EIR I urge you to consider the following additional rationales as you define health impacts and assess their significance.

Population/Housing

The changes proposed in the Plan pose **potentially significant impacts** through displacement of existing housing and people (Section XIV (b) and (c)). In the forthcoming EIR, the City must address these as potentially significant impacts rather than less-than-significant impacts, as they are currently categorized in the Initial Study. While housing units demolished due to upzoning may indeed be replaced within the Station Area, South San Francisco must commit to replacing units at the same level of affordability as the displaced units, and to working with renters and owners to avoid displacing low-income residents.

According to the City's *Affordable Housing and Anti-Displacement Strategy* document, the Plan area houses a high percentage of renters (79.4% compared with 39.8% citywide), with up to 60% of low-income renters spending more than 30% of their income on housing costs. This population is at risk of displacement through the destruction of housing and the potential for rising rents in the Study Area. As we make changes to improve the quality of life of residents, it is imperative that we ensure equitable access to these improvements. Staff should continue to seek strategies for the preservation and production of affordable housing in the Station Area and address displacement, even temporary or transitional, as a potentially significant impact of the Plan.

Public Health, Policy and Planning
225 37th Avenue, San Mateo, CA 94403
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Health System Chief • Jean S. Fraser
Board of Supervisors • Dave Pine • Carole Groom • Don Horsley • Warren Slocum • Adrienne Tissier

Air Quality

As noted in the Initial Study, the Station Area Plan will accommodate a net increase of approximately 1,400 dwelling units; 0.8 million square feet of commercial, 21,000 square feet of industrial, and a possible 1.2 million square feet of new office/research and development uses. The Health System wholeheartedly endorses this increased density and simultaneously notes the need to address outdoor air quality concerns for larger daytime and nighttime populations.

Extensive traffic calming can protect people who live, work and play in the Downtown Station Area from sources of outdoor air pollution by alleviating the effects of stop-and-go traffic and encouraging travel by other modes. According to the City's *Pedestrian Friendly and Accessible Design Standards* document, traffic calming measures including bulb-outs and intersection improvements are currently prioritized along Grand Avenue. However, the Health System encourages prioritization of traffic calming throughout the Plan area to create a consistent, calmed traffic environment, encourage a walkable downtown and mitigate the potential pollution were car traffic to increase.

The land uses immediately to the west of US 101 north of the proposed Caltrain station are proposed to change from primarily business commercial use to mixed use and high density residential. While capacity for increased residential density will provide the backbone for a vibrant, walkable Station Area, intensified residential proximity to US 101 should be accompanied by regulatory development agreements ensuring that housing developments incorporate effective filtration, indoor air quality systems, and other best practice mitigations. We encourage the City to explore solutions to mitigate the potential ill effects of locating housing in proximity to US 101 in the forthcoming EIR.

Priority should be given to reducing reliance on cars by residents and employees in the Downtown Station Area. High densities and mixed use zoning are effective tools to encourage walkability, connect residents to transit, link jobs to housing, and reduce reliance on individual cars. We encourage you to continue to pursue the strategies outlined in the memo *Parking Recommendations for the South San Francisco Station Area Plan* including enabling sharing parking resources, reducing required parking for new developments, encouraging unbundled parking for new residential developments, and encouraging car sharing programs. These strategies are critical to reducing reliance on cars and supporting multimodal transportation for every day travel.

We enthusiastically commend the City of South San Francisco on its efforts to increase density, promote walkability and bikeability, and enable connections with transit. Our staff and community partners look forward to supporting South San Francisco's efforts in finalizing and implementing this Plan.

Again, thank you for the opportunity to comment on the South San Francisco Downtown Station Area Plan Initial Study for EIR scoping. Should you have any questions, please contact Cathleen Baker at cabaker@smcgov.org or 650.573-2737.

Sincerely,

SaraT L. Mayer
Director, Public Health, Policy and Planning
San Mateo County Health System

October 30, 2013

City of South San Francisco
Economic and Community Development Department
315 Maple Avenue
South San Francisco, CA 94083
Attention: Mr. Gerry Beaudin, Principal Planner
Email: Gerry.beaudin@ssf.net

Subject: South San Francisco Downtown Station Area Plan

Dear Mr. Beaudin:

We, the **South San Francisco Community Benefits Coalition**, are submitting the following comments and questions to be considered in the development of the scope of the Environmental Impact for the City of South San Francisco's Downtown Station Area Plan (SAP).

A. Project Description

1. **We encourage the City to consider studying reasonable alternatives that are truly responsive to the housing needs in the downtown based on current conditions and future projections.** The Initial Study specifies that the SAP would accommodate a net increase of approximately 1,400 dwelling units. Feedback at the Community Workshop held the evening of September 17, 2013 suggested that the public in attendance strongly support of increased downtown densification [beyond 1,400] so long as the heights on Grand Avenue were stepped down from parallel corridors. In previous conversations you've mentioned that the height limits and zoning allow for up to 4,000 new residential units and initially estimated about 1,500 units to be included in the plan. Data prepared by Bay Area Economics highlighted that current demographic data of downtown area households represent the dire need for affordable housing production and preservation in the plan area and citywide. [1] It is incumbent upon the City for its environmental analysis to respond adequately to this need. Alternatives assessed should consider analyze up to the maximum allowable units.

2. **How does the City intend to "provide transit enhancements from Downtown to BART and the South San Francisco ferry terminal" (Initial Study: 7)?** Is this in the form of shuttling system? Can alternatives assessed incorporate a Transportation Management Association and proactive transportation demand management measures as is increasingly common in other Peninsula communities with transit access?

[1] Bay Area Economics, November 19, 2012. South San Francisco Downtown Station Area Plan Affordable Housing and Anti-Displacement Strategy. p.19. Link: *"These data demonstrate that approximately 550 Plan Area households are overcrowded and over 1,300 Plan Area households have housing costs that exceed 30 percent of household income."*

B. Job Indicators and Economic Opportunity

1. The EIR is an opportunity to highlight the positive economic impacts of developing the Downtown Area of South San Francisco. We would like you to consider adding job indicators (e.g. number of jobs created per dollar invested) and clear labor standards as mitigations to the negative impacts of the development of the SAP. Some mitigation measures could be to use Area Standard Wages and require local apprentices who are enrolled in a State of California Approved Apprenticeship Programs to be part of the construction team.

    a. **Alternatives Analysis:** The EIR should include alternatives that evaluate the impact of the plan on local businesses. It should examine the potential displacement of small businesses that are the lifeblood of the local community. Potential mitigation measures for this adverse effect should be strategies for small business retention and the banning of big box stores in the plan area.

C. Population and Housing

1. **We encourage the City to consider mitigations for displaced residents.** The City's Evaluation of Environmental Impacts checklist acknowledges a "less-than-significant impact" on the plan's potential to:

    a. "Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere"; and to
    b. "Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere."

    However, without decisive anti-displacement policies or assurance of affordability in new residential units of the downtown, current residents in the downtown plan area are almost guaranteed potential displacement--priced out of the area due to rises in real estate value and speculation in the downtown. The current factors listed above (a and b) focus on the displacement of units rather than people. While new units may be constructed to replace any demolished housing or displaced residents, such new construction does not necessarily benefit the actual residents that may experience the displacement. The plan and study thereof should consider the reality of this phenomenon and offer mitigations accordingly.

2. **Affordability levels**
    a. The EIR should examine alternatives that evaluate different levels of affordable housing (15%, 20%, 25%).

3. **Since the station area is designated by the Metropolitan Transportation Commission as a Community of Concern, the EIR should consider how the following displacement and affordability indicators fall on low-income households when compared to all other downtown households.**
    a. Housing affordability: Percentage of income spent on housing plus transportation.
    b. Potential risk of displacement: Percentage of rent-burdened households.

D. Recreation

1. **The EIR for the SAP should study alternatives that offer a range of neighborhood and regional parks or other recreational facilities, including alternatives that increase the amount of green space and recreational facilities in the draft plan.** There is currently zero acres of true open/green space in the downtown plan area. While there are plans to reconfigure the landscaping around City Hall and to create pedestrian plazas at a few sites in the SAP, there remains a dearth of recreational facilities in the downtown. Given at least a doubling of residential units in the plan, the EIR should take seriously such lack. The plan should correspondingly pursue a range of policies to mitigate for the expected need including innovative strategies as mandating the construction of rooftop gardens/open space; conversion of surface parking lots to parks; and transfer development rights that allow for higher density if the developer builds a park/green space. Anecdotal evidence from residents suggests there to already be a need for playgrounds and designated public spaces with full amenities (e.g. public restrooms).

E. Transportation/Traffic

1. **The EIR should make specific strides to focus less on traffic congestion and its proxy level of service (LOS) as the focus of CEQA transportation analysis given the passage of State Senate Bill 743.** While the new methodology for this category of analysis will be developed by the Office of Planning and Research over the next year, the Downtown SAP is intended to guide development over the next 20 years. As such the plan and environmental analysis thereof must be primarily evaluative to its promotion of "the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses."[2]
2. **Metrics: Reduction of VMT, GHG, modal split, increase transit ridership**

F. Human Impact

1. **The EIR should examine the real human impact of displacement mentioned previously (Comment B.1).** Across the Bay Area, the phenomenon of economic displacement, where low-income residents are displaced from their neighborhoods by escalating rents and property values is a known and real impact of development. Those that are transit dependent often choose to live in the downtown for its proximity and access to transit stations--and yet are the most vulnerable to displacement from transit-oriented displacement.

G. Public Scoping Process

1. **Alternatives Analysis:** We ask that the alternatives studied be specifically responsive to the comments we've raised regarding housing, transportation, and labor standards. We encourage that the EIR analysis includes the affordability and displacement, and job indicators listed above, and prioritizes assessment of non-motorized connectivity to transit.

Thank you for taking the time to review these comments and respond to our questions. We look forward to your response to our questions and eagerly await the release of the draft plan and EIR.

---

[2] California Senate Bill No. 743, Chapter 386. Link: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743

Sincerely,

Mark Leach, President
International Brotherhood of Electrical Workers Local 617

Adina Levin
Friends of Caltrain

Michele Beasley, Regional Director, South Bay
Greenbelt Alliance

Joshua Hugg, Program Manager
Housing Leadership Council of San Mateo County

Bill Nack, Business Manager
San Mateo County Building Trades Council

Belen Seara, Director of Community Relations
San Mateo County Union Community Alliance

Corinne Winter, President and Executive Director
Silicon Valley Bicycle Coalition

Victor Torreano, Business Representative
Sheet Metal Workers' Local Union No. 104

Danny Campbell, Business Development Representative
Sheet Metal Workers' Local Union No. 104

Clarrissa Cabansagan, Community Planner
TransForm

Richard Hedges and Ellouise Patten
United Food and Commercial Workers Local 5

Appendix B Air Quality Data

SFF Station Area Construction

San Mateo County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	27.21	1000sqft	0.62	27,213.00	0
Government (Civic Center)	1.88	1000sqft	0.04	1,877.00	0
Office Park	13.44	1000sqft	0.31	13,440.00	0
Research & Development	59.25	1000sqft	1.36	59,252.00	0
Industrial Park	11.03	1000sqft	0.25	11,026.00	0
Hotel	2.46	Room	0.08	3,571.92	0
Apartments Mid Rise	90.00	Dwelling Unit	2.37	90,000.00	257
Automobile Care Center	0.68	1000sqft	0.02	683.00	0
Strip Mall	7.53	1000sqft	0.17	7,533.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Phases assumed to occur within 1 year period

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Assume typical trenching equipment

Demolition -

Grading -

Construction Off-road Equipment Mitigation - Based on BAAQMD CEQA Guidelines - Basic construction BMPs

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterExposedAreaPM10PercentReduction	55	53
tblConstDustMitigation	WaterExposedAreaPM25PercentReduction	55	53
tblConstructionPhase	NumDays	20.00	35.00
tblConstructionPhase	NumDays	230.00	80.00
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	20.00	50.00
tblConstructionPhase	NumDays	20.00	35.00
tblGrading	MaterialExported	0.00	80,666.00
tblLandUse	LandUseSquareFeet	27,210.00	27,213.00
tblLandUse	LandUseSquareFeet	1,880.00	1,877.00
tblLandUse	LandUseSquareFeet	59,250.00	59,252.00
tblLandUse	LandUseSquareFeet	11,030.00	11,026.00
tblLandUse	LandUseSquareFeet	680.00	683.00
tblLandUse	LandUseSquareFeet	7,530.00	7,533.00
tblProjectCharacteristics	OperationalYear	2014	2022

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	73.8203	107.8080	95.1717	0.1784	10.3654	3.3153	13.6807	4.3865	3.0497	7.4362	0.0000	18,175.1666	18,175.1666	1.1299	0.0000	18,198.8934
2016	73.7738	2.4749	3.0374	5.3300e-003	0.1980	0.1981	0.3962	0.0525	0.1980	0.2505	0.0000	481.4381	481.4381	0.0435	0.0000	482.3516
Total	**147.5941**	**110.2830**	**98.2090**	**0.1837**	**10.5634**	**3.5134**	**14.0768**	**4.4391**	**3.2477**	**7.6868**	**0.0000**	**18,656.6048**	**18,656.6048**	**1.1734**	**0.0000**	**18,681.2450**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	73.8203	107.8080	95.1717	0.1784	6.7960	3.3153	10.1112	2.5871	3.0497	5.6368	0.0000	18,175.1666	18,175.1666	1.1299	0.0000	18,198.8934
2016	73.7738	2.4749	3.0374	5.3300e-003	0.1980	0.1981	0.3962	0.0525	0.1980	0.2505	0.0000	481.4381	481.4381	0.0435	0.0000	482.3516
Total	**147.5941**	**110.2830**	**98.2090**	**0.1837**	**6.9940**	**3.5134**	**10.5074**	**2.6397**	**3.2477**	**5.8874**	**0.0000**	**18,656.6048**	**18,656.6048**	**1.1734**	**0.0000**	**18,681.2450**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**33.79**	**0.00**	**25.36**	**40.54**	**0.00**	**23.41**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	2/25/2015	5	40	
2	Grading	Grading	2/26/2015	5/6/2015	5	50	
3	Trenching	Trenching	5/7/2015	6/10/2015	5	25	
4	Building Construction	Building Construction	6/11/2015	9/30/2015	5	80	
5	Paving	Paving	10/1/2015	11/18/2015	5	35	
6	Coating	Architectural Coating	11/19/2015	1/6/2016	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 25

Acres of Paving: 0

Residential Indoor: 182,250; Residential Outdoor: 60,750; Non-Residential Indoor: 186,894; Non-Residential Outdoor: 62,298 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Trenching	Excavators	1	8.00	162	0.38
Trenching	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Trenching	Trenchers	1	8.00	80	0.50
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38
Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	196.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	10,083.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	4	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	106.00	30.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Coating	1	21.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.0630	0.0000	1.0630	0.1609	0.0000	0.1609			0.0000			0.0000
Off-Road	4.5083	48.3629	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858		4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**48.3629**	**36.0738**	**0.0399**	**1.0630**	**2.4508**	**3.5138**	**0.1609**	**2.2858**	**2.4467**		**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

3.2 Demolition - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1302	1.6355	1.6422	3.5700e-003	0.0848	0.0240	0.1087	0.0232	0.0220	0.0452		362.0084	362.0084	2.9900e-003		362.0711
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.1915**	**1.7169**	**2.5547**	**5.2500e-003**	**0.2262**	**0.0251**	**0.2513**	**0.0607**	**0.0231**	**0.0838**		**509.6675**	**509.6675**	**0.0110**		**509.8991**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.4996	0.0000	0.4996	0.0756	0.0000	0.0756			0.0000			0.0000
Off-Road	4.5083	48.3629	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858	0.0000	4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**48.3629**	**36.0738**	**0.0399**	**0.4996**	**2.4508**	**2.9504**	**0.0756**	**2.2858**	**2.3614**	**0.0000**	**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

3.2 Demolition - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1302	1.6355	1.6422	3.5700e-003	0.0848	0.0240	0.1087	0.0232	0.0220	0.0452		362.0084	362.0084	2.9900e-003		362.0711
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.1915**	**1.7169**	**2.5547**	**5.2500e-003**	**0.2262**	**0.0251**	**0.2513**	**0.0607**	**0.0231**	**0.0838**		**509.6675**	**509.6675**	**0.0110**		**509.8991**

3.3 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.7348	0.0000	6.7348	3.3951	0.0000	3.3951			0.0000			0.0000
Off-Road	3.8327	40.4161	26.6731	0.0298		2.3284	2.3284		2.1421	2.1421		3,129.0158	3,129.0158	0.9341		3,148.6328
Total	**3.8327**	**40.4161**	**26.6731**	**0.0298**	**6.7348**	**2.3284**	**9.0631**	**3.3951**	**2.1421**	**5.5372**		**3,129.0158**	**3,129.0158**	**0.9341**		**3,148.6328**

3.3 Grading - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	5.3562	67.3105	67.5861	0.1469	3.4891	0.9858	4.4749	0.9539	0.9065	1.8605		14,898.4917	14,898.4917	0.1229		14,901.0716
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**5.4175**	**67.3919**	**68.4985**	**0.1486**	**3.6306**	**0.9869**	**4.6175**	**0.9914**	**0.9076**	**1.8990**		**15,046.1509**	**15,046.1509**	**0.1309**		**15,048.8996**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.1654	0.0000	3.1654	1.5957	0.0000	1.5957			0.0000			0.0000
Off-Road	3.8327	40.4161	26.6731	0.0298		2.3284	2.3284		2.1421	2.1421	0.0000	3,129.0158	3,129.0158	0.9341		3,148.6328
Total	**3.8327**	**40.4161**	**26.6731**	**0.0298**	**3.1654**	**2.3284**	**5.4937**	**1.5957**	**2.1421**	**3.7378**	**0.0000**	**3,129.0158**	**3,129.0158**	**0.9341**		**3,148.6328**

3.3 Grading - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	5.3562	67.3105	67.5861	0.1469	3.4891	0.9858	4.4749	0.9539	0.9065	1.8605		14,898.4917	14,898.4917	0.1229		14,901.0716
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**5.4175**	**67.3919**	**68.4985**	**0.1486**	**3.6306**	**0.9869**	**4.6175**	**0.9914**	**0.9076**	**1.8990**		**15,046.1509**	**15,046.1509**	**0.1309**		**15,048.8996**

3.4 Trenching - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7137	16.7935	11.1225	0.0150		1.1736	1.1736		1.0797	1.0797		1,574.1312	1,574.1312	0.4699		1,584.0000
Total	**1.7137**	**16.7935**	**11.1225**	**0.0150**		**1.1736**	**1.1736**		**1.0797**	**1.0797**		**1,574.1312**	**1,574.1312**	**0.4699**		**1,584.0000**

3.4 Trenching - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0409	0.0543	0.6083	1.1200e-003	0.0943	7.7000e-004	0.0951	0.0250	7.1000e-004	0.0257		98.4394	98.4394	5.3600e-003		98.5520
Total	**0.0409**	**0.0543**	**0.6083**	**1.1200e-003**	**0.0943**	**7.7000e-004**	**0.0951**	**0.0250**	**7.1000e-004**	**0.0257**		**98.4394**	**98.4394**	**5.3600e-003**		**98.5520**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7137	16.7935	11.1225	0.0150		1.1736	1.1736		1.0797	1.0797	0.0000	1,574.1312	1,574.1312	0.4699		1,584.0000
Total	**1.7137**	**16.7935**	**11.1225**	**0.0150**		**1.1736**	**1.1736**		**1.0797**	**1.0797**	**0.0000**	**1,574.1312**	**1,574.1312**	**0.4699**		**1,584.0000**

3.4 Trenching - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0409	0.0543	0.6083	1.1200e-003	0.0943	7.7000e-004	0.0951	0.0250	7.1000e-004	0.0257		98.4394	98.4394	5.3600e-003		98.5520
Total	**0.0409**	**0.0543**	**0.6083**	**1.1200e-003**	**0.0943**	**7.7000e-004**	**0.0951**	**0.0250**	**7.1000e-004**	**0.0257**		**98.4394**	**98.4394**	**5.3600e-003**		**98.5520**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

3.5 Building Construction - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3880	3.3590	4.4898	7.0200e-003	0.1985	0.0538	0.2523	0.0566	0.0495	0.1061		709.1992	709.1992	6.2300e-003		709.3301
Worker	0.4335	0.5753	6.4480	0.0119	0.9996	8.1900e-003	1.0078	0.2651	7.4800e-003	0.2726		1,043.4580	1,043.4580	0.0568		1,044.6513
Total	**0.8215**	**3.9343**	**10.9378**	**0.0189**	**1.1981**	**0.0620**	**1.2601**	**0.3217**	**0.0569**	**0.3787**		**1,752.6573**	**1,752.6573**	**0.0631**		**1,753.9814**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904	0.0000	2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**	**0.0000**	**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

3.5 Building Construction - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3880	3.3590	4.4898	7.0200e-003	0.1985	0.0538	0.2523	0.0566	0.0495	0.1061		709.1992	709.1992	6.2300e-003		709.3301
Worker	0.4335	0.5753	6.4480	0.0119	0.9996	8.1900e-003	1.0078	0.2651	7.4800e-003	0.2726		1,043.4580	1,043.4580	0.0568		1,044.6513
Total	**0.8215**	**3.9343**	**10.9378**	**0.0189**	**1.1981**	**0.0620**	**1.2601**	**0.3217**	**0.0569**	**0.3787**		**1,752.6573**	**1,752.6573**	**0.0631**		**1,753.9814**

3.6 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3172	25.1758	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016		2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.3172**	**25.1758**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**		**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

3.6 Paving - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.0613**	**0.0814**	**0.9125**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0600e-003**	**0.0386**		**147.6592**	**147.6592**	**8.0400e-003**		**147.8280**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3172	25.1758	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016	0.0000	2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.3172**	**25.1758**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**	**0.0000**	**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

3.6 Paving - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.0613**	**0.0814**	**0.9125**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0600e-003**	**0.0386**		**147.6592**	**147.6592**	**8.0400e-003**		**147.8280**

3.7 Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	73.3278					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4066	2.5703	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209		281.4481	281.4481	0.0367		282.2177
Total	**73.7344**	**2.5703**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**		**281.4481**	**281.4481**	**0.0367**		**282.2177**

3.7 Coating - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0859	0.1140	1.2774	2.3600e-003	0.1980	1.6200e-003	0.1997	0.0525	1.4800e-003	0.0540		206.7228	206.7228	0.0113		206.9592
Total	**0.0859**	**0.1140**	**1.2774**	**2.3600e-003**	**0.1980**	**1.6200e-003**	**0.1997**	**0.0525**	**1.4800e-003**	**0.0540**		**206.7228**	**206.7228**	**0.0113**		**206.9592**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	73.3278					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4066	2.5703	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209	0.0000	281.4481	281.4481	0.0367		282.2177
Total	**73.7344**	**2.5703**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**	**0.0000**	**281.4481**	**281.4481**	**0.0367**		**282.2177**

3.7 Coating - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0859	0.1140	1.2774	2.3600e-003	0.1980	1.6200e-003	0.1997	0.0525	1.4800e-003	0.0540		206.7228	206.7228	0.0113		206.9592
Total	**0.0859**	**0.1140**	**1.2774**	**2.3600e-003**	**0.1980**	**1.6200e-003**	**0.1997**	**0.0525**	**1.4800e-003**	**0.0540**		**206.7228**	**206.7228**	**0.0113**		**206.9592**

3.7 Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	73.3278					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966		281.4481	281.4481	0.0332		282.1449
Total	**73.6963**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**		**281.4481**	**281.4481**	**0.0332**		**282.1449**

3.7 Coating - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0775	0.1027	1.1535	2.3600e-003	0.1980	1.5300e-003	0.1996	0.0525	1.4000e-003	0.0539		199.9901	199.9901	0.0103		200.2068
Total	**0.0775**	**0.1027**	**1.1535**	**2.3600e-003**	**0.1980**	**1.5300e-003**	**0.1996**	**0.0525**	**1.4000e-003**	**0.0539**		**199.9901**	**199.9901**	**0.0103**		**200.2068**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	73.3278					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966	0.0000	281.4481	281.4481	0.0332		282.1449
Total	**73.6963**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**	**0.0000**	**281.4481**	**281.4481**	**0.0332**		**282.1449**

3.7 Coating - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0775	0.1027	1.1535	2.3600e-003	0.1980	1.5300e-003	0.1996	0.0525	1.4000e-003	0.0539		199.9901	199.9901	0.0103		200.2068
Total	**0.0775**	**0.1027**	**1.1535**	**2.3600e-003**	**0.1980**	**1.5300e-003**	**0.1996**	**0.0525**	**1.4000e-003**	**0.0539**		**199.9901**	**199.9901**	**0.0103**		**200.2068**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Unmitigated	5.6965	12.4892	52.5644	0.1549	9.9009	0.2328	10.1337	2.6526	0.2147	2.8673		11,891.2606	11,891.2606	0.3629		11,898.8817
Mitigated	5.6965	12.4892	52.5644	0.1549	9.9009	0.2328	10.1337	2.6526	0.2147	2.8673		11,891.2606	11,891.2606	0.3629		11,898.8817

SFF Station Area Construction

San Mateo County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	27.21	1000sqft	0.62	27,213.00	0
Government (Civic Center)	1.88	1000sqft	0.04	1,877.00	0
Office Park	13.44	1000sqft	0.31	13,440.00	0
Research & Development	59.25	1000sqft	1.36	59,252.00	0
Industrial Park	11.03	1000sqft	0.25	11,026.00	0
Hotel	2.46	Room	0.08	3,571.92	0
Apartments Mid Rise	90.00	Dwelling Unit	2.37	90,000.00	257
Automobile Care Center	0.68	1000sqft	0.02	683.00	0
Strip Mall	7.53	1000sqft	0.17	7,533.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Phases assumed to occur within 1 year period

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Assume typical trenching equipment

Demolition -

Grading -

Construction Off-road Equipment Mitigation - Based on BAAQMD CEQA Guidelines - Basic construction BMPs

Architectural Coating - based on BAAQMD regulation 8, rule 3

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	50.00
tblConstDustMitigation	WaterExposedAreaPM10PercentReduction	61	75
tblConstDustMitigation	WaterExposedAreaPM25PercentReduction	61	75
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstEquipMitigation	OxidationCatalyst	0.00	20.00
tblConstructionPhase	NumDays	20.00	35.00
tblConstructionPhase	NumDays	230.00	80.00
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	20.00	50.00
tblConstructionPhase	NumDays	20.00	35.00
tblGrading	MaterialExported	0.00	80,666.00
tblLandUse	LandUseSquareFeet	27,210.00	27,213.00
tblLandUse	LandUseSquareFeet	1,880.00	1,877.00

tblLandUse	LandUseSquareFeet	59,250.00	59,252.00
tblLandUse	LandUseSquareFeet	11,030.00	11,026.00
tblLandUse	LandUseSquareFeet	680.00	683.00
tblLandUse	LandUseSquareFeet	7,530.00	7,533.00
tblProjectCharacteristics	OperationalYear	2014	2022
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	2.73	1.21
tblVehicleEF	HHD	69.53	65.27
tblVehicleEF	HHD	1,506.39	1,558.19
tblVehicleEF	HHD	4.3630e-003	0.05
tblVehicleEF	HHD	2.93	2.81
tblVehicleEF	HHD	4.38	4.10
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.03	0.04
tblVehicleEF	HHD	0.07	0.07
tblVehicleEF	HHD	9.4800e-004	1.0710e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.4290e-003	8.7690e-003
tblVehicleEF	HHD	0.06	0.07
tblVehicleEF	HHD	8.7900e-004	9.9400e-004
tblVehicleEF	HHD	1.3490e-003	1.3640e-003
tblVehicleEF	HHD	0.10	0.08
tblVehicleEF	HHD	1.0410e-003	9.5200e-004
tblVehicleEF	HHD	0.27	0.25
tblVehicleEF	HHD	0.65	0.49
tblVehicleEF	HHD	1.95	1.91
tblVehicleEF	HHD	0.02	0.02
tblVehicleEF	HHD	1.7000e-003	1.6310e-003

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	41.2302	107.8080	95.1717	0.1784	10.3654	3.3153	13.6807	4.3865	3.0497	7.4362	0.0000	18,175.1666	18,175.1666	1.1299	0.0000	18,198.8934
2016	41.1836	2.4749	3.0374	5.3300e-003	0.1980	0.1981	0.3962	0.0525	0.1980	0.2505	0.0000	481.4381	481.4381	0.0435	0.0000	482.3516
Total	**82.4138**	**110.2830**	**98.2090**	**0.1837**	**10.5634**	**3.5134**	**14.0768**	**4.4391**	**3.2477**	**7.6868**	**0.0000**	**18,656.6048**	**18,656.6048**	**1.1734**	**0.0000**	**18,681.2450**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	41.2302	99.7248	95.1717	0.1784	5.3143	3.3153	8.6296	1.8402	3.0497	4.8899	0.0000	18,175.1666	18,175.1666	1.1299	0.0000	18,198.8934
2016	41.1836	2.0005	3.0374	5.3300e-003	0.1980	0.1981	0.3962	0.0525	0.1980	0.2505	0.0000	481.4381	481.4381	0.0435	0.0000	482.3516
Total	**82.4138**	**101.7253**	**98.2090**	**0.1837**	**5.5123**	**3.5134**	**9.0257**	**1.8927**	**3.2477**	**5.1404**	**0.0000**	**18,656.6048**	**18,656.6048**	**1.1734**	**0.0000**	**18,681.2450**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**7.76**	**0.00**	**0.00**	**47.82**	**0.00**	**35.88**	**57.36**	**0.00**	**33.13**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	2/25/2015	5	40	
2	Grading	Grading	2/26/2015	5/6/2015	5	50	
3	Trenching	Trenching	5/7/2015	6/10/2015	5	25	
4	Building Construction	Building Construction	6/11/2015	9/30/2015	5	80	
5	Paving	Paving	10/1/2015	11/18/2015	5	35	
6	Coating	Architectural Coating	11/19/2015	1/6/2016	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 25

Acres of Paving: 0

Residential Indoor: 182,250; Residential Outdoor: 60,750; Non-Residential Indoor: 186,894; Non-Residential Outdoor: 62,298 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Trenching	Excavators	1	8.00	162	0.38
Trenching	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Trenching	Trenchers	1	8.00	80	0.50
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38
Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	196.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	10,083.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	4	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	106.00	30.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Coating	1	21.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Oxidation Catalyst for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.0630	0.0000	1.0630	0.1609	0.0000	0.1609			0.0000			0.0000
Off-Road	4.5083	48.3629	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858		4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**48.3629**	**36.0738**	**0.0399**	**1.0630**	**2.4508**	**3.5138**	**0.1609**	**2.2858**	**2.4467**		**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

3.2 Demolition - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1302	1.6355	1.6422	3.5700e-003	0.0848	0.0240	0.1087	0.0232	0.0220	0.0452		362.0084	362.0084	2.9900e-003		362.0711
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.1915**	**1.7169**	**2.5547**	**5.2500e-003**	**0.2262**	**0.0251**	**0.2513**	**0.0607**	**0.0231**	**0.0838**		**509.6675**	**509.6675**	**0.0110**		**509.8991**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2657	0.0000	0.2657	0.0402	0.0000	0.0402			0.0000			0.0000
Off-Road	4.5083	38.6903	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858	0.0000	4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**38.6903**	**36.0738**	**0.0399**	**0.2657**	**2.4508**	**2.7166**	**0.0402**	**2.2858**	**2.3260**	**0.0000**	**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

3.2 Demolition - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1302	1.6355	1.6422	3.5700e-003	0.0848	0.0240	0.1087	0.0232	0.0220	0.0452		362.0084	362.0084	2.9900e-003		362.0711
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.1915**	**1.7169**	**2.5547**	**5.2500e-003**	**0.2262**	**0.0251**	**0.2513**	**0.0607**	**0.0231**	**0.0838**		**509.6675**	**509.6675**	**0.0110**		**509.8991**

3.3 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.7348	0.0000	6.7348	3.3951	0.0000	3.3951			0.0000			0.0000
Off-Road	3.8327	40.4161	26.6731	0.0298		2.3284	2.3284		2.1421	2.1421		3,129.0158	3,129.0158	0.9341		3,148.6328
Total	**3.8327**	**40.4161**	**26.6731**	**0.0298**	**6.7348**	**2.3284**	**9.0631**	**3.3951**	**2.1421**	**5.5372**		**3,129.0158**	**3,129.0158**	**0.9341**		**3,148.6328**

3.3 Grading - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	5.3562	67.3105	67.5861	0.1469	3.4891	0.9858	4.4749	0.9539	0.9065	1.8605		14,898.4917	14,898.4917	0.1229		14,901.0716
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**5.4175**	**67.3919**	**68.4985**	**0.1486**	**3.6306**	**0.9869**	**4.6175**	**0.9914**	**0.9076**	**1.8990**		**15,046.1509**	**15,046.1509**	**0.1309**		**15,048.8996**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.6837	0.0000	1.6837	0.8488	0.0000	0.8488			0.0000			0.0000
Off-Road	3.8327	32.3329	26.6731	0.0298		2.3284	2.3284		2.1421	2.1421	0.0000	3,129.0158	3,129.0158	0.9341		3,148.6328
Total	**3.8327**	**32.3329**	**26.6731**	**0.0298**	**1.6837**	**2.3284**	**4.0121**	**0.8488**	**2.1421**	**2.9909**	**0.0000**	**3,129.0158**	**3,129.0158**	**0.9341**		**3,148.6328**

3.3 Grading - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	5.3562	67.3105	67.5861	0.1469	3.4891	0.9858	4.4749	0.9539	0.9065	1.8605		14,898.4917	14,898.4917	0.1229		14,901.0716
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**5.4175**	**67.3919**	**68.4985**	**0.1486**	**3.6306**	**0.9869**	**4.6175**	**0.9914**	**0.9076**	**1.8990**		**15,046.1509**	**15,046.1509**	**0.1309**		**15,048.8996**

3.4 Trenching - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7137	16.7935	11.1225	0.0150		1.1736	1.1736		1.0797	1.0797		1,574.1312	1,574.1312	0.4699		1,584.0000
Total	**1.7137**	**16.7935**	**11.1225**	**0.0150**		**1.1736**	**1.1736**		**1.0797**	**1.0797**		**1,574.1312**	**1,574.1312**	**0.4699**		**1,584.0000**

3.4 Trenching - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0409	0.0543	0.6083	1.1200e-003	0.0943	7.7000e-004	0.0951	0.0250	7.1000e-004	0.0257		98.4394	98.4394	5.3600e-003		98.5520
Total	**0.0409**	**0.0543**	**0.6083**	**1.1200e-003**	**0.0943**	**7.7000e-004**	**0.0951**	**0.0250**	**7.1000e-004**	**0.0257**		**98.4394**	**98.4394**	**5.3600e-003**		**98.5520**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7137	13.4348	11.1225	0.0150		1.1736	1.1736		1.0797	1.0797	0.0000	1,574.1312	1,574.1312	0.4699		1,584.0000
Total	**1.7137**	**13.4348**	**11.1225**	**0.0150**		**1.1736**	**1.1736**		**1.0797**	**1.0797**	**0.0000**	**1,574.1312**	**1,574.1312**	**0.4699**		**1,584.0000**

3.4 Trenching - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0409	0.0543	0.6083	1.1200e-003	0.0943	7.7000e-004	0.0951	0.0250	7.1000e-004	0.0257		98.4394	98.4394	5.3600e-003		98.5520
Total	**0.0409**	**0.0543**	**0.6083**	**1.1200e-003**	**0.0943**	**7.7000e-004**	**0.0951**	**0.0250**	**7.1000e-004**	**0.0257**		**98.4394**	**98.4394**	**5.3600e-003**		**98.5520**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

3.5 Building Construction - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3880	3.3590	4.4898	7.0200e-003	0.1985	0.0538	0.2523	0.0566	0.0495	0.1061		709.1992	709.1992	6.2300e-003		709.3301
Worker	0.4335	0.5753	6.4480	0.0119	0.9996	8.1900e-003	1.0078	0.2651	7.4800e-003	0.2726		1,043.4580	1,043.4580	0.0568		1,044.6513
Total	**0.8215**	**3.9343**	**10.9378**	**0.0189**	**1.1981**	**0.0620**	**1.2601**	**0.3217**	**0.0569**	**0.3787**		**1,752.6573**	**1,752.6573**	**0.0631**		**1,753.9814**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	24.0240	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904	0.0000	2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**24.0240**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**	**0.0000**	**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

3.5 Building Construction - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3880	3.3590	4.4898	7.0200e-003	0.1985	0.0538	0.2523	0.0566	0.0495	0.1061		709.1992	709.1992	6.2300e-003		709.3301
Worker	0.4335	0.5753	6.4480	0.0119	0.9996	8.1900e-003	1.0078	0.2651	7.4800e-003	0.2726		1,043.4580	1,043.4580	0.0568		1,044.6513
Total	**0.8215**	**3.9343**	**10.9378**	**0.0189**	**1.1981**	**0.0620**	**1.2601**	**0.3217**	**0.0569**	**0.3787**		**1,752.6573**	**1,752.6573**	**0.0631**		**1,753.9814**

3.6 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3172	25.1758	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016		2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.3172**	**25.1758**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**		**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

3.6 Paving - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.0613**	**0.0814**	**0.9125**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0600e-003**	**0.0386**		**147.6592**	**147.6592**	**8.0400e-003**		**147.8280**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3172	20.1407	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016	0.0000	2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.3172**	**20.1407**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**	**0.0000**	**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

3.6 Paving - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0814	0.9125	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0600e-003	0.0386		147.6592	147.6592	8.0400e-003		147.8280
Total	**0.0613**	**0.0814**	**0.9125**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0600e-003**	**0.0386**		**147.6592**	**147.6592**	**8.0400e-003**		**147.8280**

3.7 Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	40.7377					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4066	2.5703	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209		281.4481	281.4481	0.0367		282.2177
Total	**41.1443**	**2.5703**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**		**281.4481**	**281.4481**	**0.0367**		**282.2177**

3.7 Coating - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0859	0.1140	1.2774	2.3600e-003	0.1980	1.6200e-003	0.1997	0.0525	1.4800e-003	0.0540		206.7228	206.7228	0.0113		206.9592
Total	**0.0859**	**0.1140**	**1.2774**	**2.3600e-003**	**0.1980**	**1.6200e-003**	**0.1997**	**0.0525**	**1.4800e-003**	**0.0540**		**206.7228**	**206.7228**	**0.0113**		**206.9592**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	40.7377					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4066	2.0563	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209	0.0000	281.4481	281.4481	0.0367		282.2177
Total	**41.1443**	**2.0563**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**	**0.0000**	**281.4481**	**281.4481**	**0.0367**		**282.2177**

3.7 Coating - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0859	0.1140	1.2774	2.3600e-003	0.1980	1.6200e-003	0.1997	0.0525	1.4800e-003	0.0540		206.7228	206.7228	0.0113		206.9592
Total	**0.0859**	**0.1140**	**1.2774**	**2.3600e-003**	**0.1980**	**1.6200e-003**	**0.1997**	**0.0525**	**1.4800e-003**	**0.0540**		**206.7228**	**206.7228**	**0.0113**		**206.9592**

3.7 Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	40.7377					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966		281.4481	281.4481	0.0332		282.1449
Total	**41.1061**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**		**281.4481**	**281.4481**	**0.0332**		**282.1449**

3.7 Coating - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0775	0.1027	1.1535	2.3600e-003	0.1980	1.5300e-003	0.1996	0.0525	1.4000e-003	0.0539		199.9901	199.9901	0.0103		200.2068
Total	**0.0775**	**0.1027**	**1.1535**	**2.3600e-003**	**0.1980**	**1.5300e-003**	**0.1996**	**0.0525**	**1.4000e-003**	**0.0539**		**199.9901**	**199.9901**	**0.0103**		**200.2068**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	40.7377					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	1.8978	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966	0.0000	281.4481	281.4481	0.0332		282.1449
Total	**41.1061**	**1.8978**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**	**0.0000**	**281.4481**	**281.4481**	**0.0332**		**282.1449**

3.7 Coating - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0775	0.1027	1.1535	2.3600e-003	0.1980	1.5300e-003	0.1996	0.0525	1.4000e-003	0.0539		199.9901	199.9901	0.0103		200.2068
Total	**0.0775**	**0.1027**	**1.1535**	**2.3600e-003**	**0.1980**	**1.5300e-003**	**0.1996**	**0.0525**	**1.4000e-003**	**0.0539**		**199.9901**	**199.9901**	**0.0103**		**200.2068**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Unmitigated	5.6965	12.4892	52.5644	0.1549	9.9009	0.2328	10.1337	2.6526	0.2147	2.8673		11,891.2606	11,891.2606	0.3629		11,898.8817
Mitigated	5.6965	12.4892	52.5644	0.1549	9.9009	0.2328	10.1337	2.6526	0.2147	2.8673		11,891.2606	11,891.2606	0.3629		11,898.8817

SSF Station Area - Existing

San Mateo County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	129.88	1000sqft	2.98	129,884.00	0
Government (Civic Center)	150.14	1000sqft	3.45	150,142.00	0
Industrial Park	797.00	1000sqft	18.30	797,005.00	0
Hotel	570.00	Room	19.00	827,640.00	0
Apartments Mid Rise	1,436.00	Dwelling Unit	37.79	1,436,000.00	4107
Automobile Care Center	54.66	1000sqft	1.25	54,664.00	0
Strip Mall	602.64	1000sqft	13.83	602,643.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - .

Construction Phase - No construction, move default phase to before operational year

Demolition -

Vehicle Trips - Based on trip generation from traffic impact analysis

Energy Use - Based on calculations in Utilities section of EIR

Water And Wastewater - Based on calculations in Utilities EIR section

Solid Waste - Based on utility calculations in EIR

Off-road Equipment - no construction

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	100.00	0.00
tblEnergyUse	LightingElect	741.44	1,162.58
tblEnergyUse	LightingElect	3.43	6.38
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	3.58	1.34
tblEnergyUse	LightingElect	4.07	2.77
tblEnergyUse	LightingElect	5.51	6.43
tblEnergyUse	NT24E	2,561.86	4,016.99
tblEnergyUse	NT24E	3.36	6.27
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	2.85	1.07
tblEnergyUse	NT24E	4.80	3.26
tblEnergyUse	NT24E	3.36	3.92
tblEnergyUse	NT24NG	1,662.00	9,280.44
tblEnergyUse	NT24NG	6.90	9.56

tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	7.13	3.82
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	0.70	5.21
tblEnergyUse	T24E	312.05	489.30
tblEnergyUse	T24E	1.48	2.75
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	2.67	1.01
tblEnergyUse	T24E	5.01	9.27
tblEnergyUse	T24E	2.74	3.20
tblEnergyUse	T24NG	7,191.67	40,157.57
tblEnergyUse	T24NG	18.78	26.03
tblEnergyUse	T24NG	19.28	34.01
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	30.92	16.56
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	4.10	30.52
tblLandUse	LandUseSquareFeet	129,880.00	129,884.00
tblLandUse	LandUseSquareFeet	150,140.00	150,142.00
tblLandUse	LandUseSquareFeet	797,000.00	797,005.00
tblLandUse	LandUseSquareFeet	54,660.00	54,664.00
tblLandUse	LandUseSquareFeet	602,640.00	602,643.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblSolidWaste	SolidWasteGenerationRate	660.56	3,205.07

tblSolidWaste	SolidWasteGenerationRate	208.80	311.35
tblSolidWaste	SolidWasteGenerationRate	120.79	739.49
tblSolidWaste	SolidWasteGenerationRate	855.80	191.81
tblSolidWaste	SolidWasteGenerationRate	312.07	1,623.70
tblSolidWaste	SolidWasteGenerationRate	988.28	2,065.53
tblSolidWaste	SolidWasteGenerationRate	632.77	3,431.36
tblVehicleTrips	WD_TR	6.59	5.12
tblVehicleTrips	WD_TR	62.00	42.65
tblVehicleTrips	WD_TR	11.01	25.20
tblVehicleTrips	WD_TR	27.92	19.12
tblVehicleTrips	WD_TR	8.17	5.60
tblVehicleTrips	WD_TR	6.96	4.78
tblVehicleTrips	WD_TR	44.32	30.36
tblWater	IndoorWaterUseRate	93,561,180.79	48,180,000.00
tblWater	IndoorWaterUseRate	5,142,473.33	48,180,000.00
tblWater	IndoorWaterUseRate	23,084,059.19	48,180,000.00
tblWater	IndoorWaterUseRate	29,826,765.24	48,180,000.00
tblWater	IndoorWaterUseRate	14,459,058.90	48,180,000.00
tblWater	IndoorWaterUseRate	184,306,250.00	48,180,000.00
tblWater	IndoorWaterUseRate	44,639,064.35	48,180,000.00
tblWater	OutdoorWaterUseRate	58,984,222.67	32,120,000.00
tblWater	OutdoorWaterUseRate	3,151,838.49	32,120,000.00
tblWater	OutdoorWaterUseRate	14,148,294.34	32,120,000.00
tblWater	OutdoorWaterUseRate	18,280,920.63	32,120,000.00
tblWater	OutdoorWaterUseRate	1,606,562.10	32,120,000.00
tblWater	OutdoorWaterUseRate	0.00	32,120,000.00
tblWater	OutdoorWaterUseRate	27,359,426.54	32,120,000.00

2.0 Emissions Summary

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	608.5362	8.3374	746.2783	0.2597		89.4636	89.4636		89.4506	89.4506	9,231.5201	19,726.5313	28,958.0514	9.3465	1.0073	29,466.5748
Energy	4.4274	39.1049	25.4190	0.2415		3.0589	3.0589		3.0589	3.0589		48,298.8768	48,298.8768	0.9257	0.8855	48,592.8157
Mobile	236.4127	575.8021	2,110.4162	3.2453	207.8763	9.0007	216.8769	55.6783	8.2610	63.9393		302,139.9617	302,139.9617	14.0350		302,434.6975
Total	**849.3762**	**623.2444**	**2,882.1135**	**3.7465**	**207.8763**	**101.5232**	**309.3994**	**55.6783**	**100.7705**	**156.4488**	**9,231.5201**	**370,165.3698**	**379,396.8900**	**24.3073**	**1.8927**	**380,494.0880**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	608.5362	8.3374	746.2783	0.2597		89.4636	89.4636		89.4506	89.4506	9,231.5201	19,726.5313	28,958.0514	9.3465	1.0073	29,466.5748
Energy	4.4274	39.1049	25.4190	0.2415		3.0589	3.0589		3.0589	3.0589		48,298.8768	48,298.8768	0.9257	0.8855	48,592.8157
Mobile	236.4127	575.8021	2,110.4162	3.2453	207.8763	9.0007	216.8769	55.6783	8.2610	63.9393		302,139.9617	302,139.9617	14.0350		302,434.6975
Total	**849.3762**	**623.2444**	**2,882.1135**	**3.7465**	**207.8763**	**101.5232**	**309.3994**	**55.6783**	**100.7705**	**156.4488**	**9,231.5201**	**370,165.3698**	**379,396.8900**	**24.3073**	**1.8927**	**380,494.0880**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2013	12/31/2012	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Unmitigated	236.4127	575.8021	2,110.4162	3.2453	207.8763	9.0007	216.8769	55.6783	8.2610	63.9393		302,139.9617	302,139.9617	14.0350		302,434.6975
Mitigated	236.4127	575.8021	2,110.4162	3.2453	207.8763	9.0007	216.8769	55.6783	8.2610	63.9393		302,139.9617	302,139.9617	14.0350		302,434.6975

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	7,352.32	10,281.76	8716.52	17,782,352	17,782,352
Automobile Care Center	2,331.25	3,388.92	3388.92	2,623,397	2,623,397
General Office Building	3,272.98	307.82	127.28	5,735,399	5,735,399
Government (Civic Center)	2,870.68	0.00	0.00	3,919,780	3,919,780
Hotel	3,192.00	4,668.30	3391.50	6,519,422	6,519,422
Industrial Park	3,809.66	1,984.53	581.81	8,095,696	8,095,696
Strip Mall	18,296.15	25,334.99	12311.94	28,408,697	28,408,697
Total	41,125.03	45,966.31	28,517.97	73,084,744	73,084,744

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
Automobile Care Center	9.50	7.30	7.30	33.00	48.00	19.00	21	51	28
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Government (Civic Center)	9.50	7.30	7.30	75.00	20.00	5.00	50	34	16
Hotel	9.50	7.30	7.30	19.40	61.60	19.00	58	38	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.542757	0.062006	0.168650	0.114572	0.031552	0.004717	0.018583	0.044562	0.001747	0.003723	0.005493	0.000211	0.001428

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	4.4274	39.1049	25.4190	0.2415		3.0589	3.0589		3.0589	3.0589		48,298.8768	48,298.8768	0.9257	0.8855	48,592.8157
NaturalGas Unmitigated	4.4274	39.1049	25.4190	0.2415		3.0589	3.0589		3.0589	3.0589		48,298.8768	48,298.8768	0.9257	0.8855	48,592.8157

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	194501	2.0976	17.9246	7.6275	0.1144		1.4492	1.4492		1.4492	1.4492		22,882.5084	22,882.5084	0.4386	0.4195	23,021.7676
Automobile Care Center	5330.11	0.0575	0.5226	0.4390	3.1400e-003		0.0397	0.0397		0.0397	0.0397		627.0723	627.0723	0.0120	0.0115	630.8885
General Office Building	12735.7	0.1374	1.2486	1.0488	7.4900e-003		0.0949	0.0949		0.0949	0.0949		1,498.3234	1,498.3234	0.0287	0.0275	1,507.4420
Government (Civic Center)	14705.7	0.1586	1.4417	1.2111	8.6500e-003		0.1096	0.1096		0.1096	0.1096		1,730.0811	1,730.0811	0.0332	0.0317	1,740.6101
Hotel	46211.8	0.4984	4.5306	3.8057	0.0272		0.3443	0.3443		0.3443	0.3443		5,436.6811	5,436.6811	0.1042	0.0997	5,469.7679
Industrial Park	78062.8	0.8419	7.6532	6.4287	0.0459		0.5816	0.5816		0.5816	0.5816		9,183.8610	9,183.8610	0.1760	0.1684	9,239.7525
Strip Mall	58993	0.6362	5.7836	4.8582	0.0347		0.4396	0.4396		0.4396	0.4396		6,940.3495	6,940.3495	0.1330	0.1272	6,982.5873
Total		**4.4274**	**39.1049**	**25.4190**	**0.2415**		**3.0589**	**3.0589**		**3.0589**	**3.0589**		**48,298.8768**	**48,298.8768**	**0.9257**	**0.8855**	**48,592.8157**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Automobile Care Center	5.33011	0.0575	0.5226	0.4390	3.1400e-003		0.0397	0.0397		0.0397	0.0397		627.0723	627.0723	0.0120	0.0115	630.8885
General Office Building	12.7357	0.1374	1.2486	1.0488	7.4900e-003		0.0949	0.0949		0.0949	0.0949		1,498.3234	1,498.3234	0.0287	0.0275	1,507.4420
Apartments Mid Rise	194.501	2.0976	17.9246	7.6275	0.1144		1.4492	1.4492		1.4492	1.4492		22,882.5084	22,882.5084	0.4386	0.4195	23,021.7676
Government (Civic Center)	14.7057	0.1586	1.4417	1.2111	8.6500e-003		0.1096	0.1096		0.1096	0.1096		1,730.0811	1,730.0811	0.0332	0.0317	1,740.6101
Hotel	46.2118	0.4984	4.5306	3.8057	0.0272		0.3443	0.3443		0.3443	0.3443		5,436.6811	5,436.6811	0.1042	0.0997	5,469.7679
Industrial Park	78.0628	0.8419	7.6532	6.4287	0.0459		0.5816	0.5816		0.5816	0.5816		9,183.8610	9,183.8610	0.1760	0.1684	9,239.7525
Strip Mall	58.993	0.6362	5.7836	4.8582	0.0347		0.4396	0.4396		0.4396	0.4396		6,940.3495	6,940.3495	0.1330	0.1272	6,982.5873
Total		**4.4274**	**39.1049**	**25.4190**	**0.2415**		**3.0589**	**3.0589**		**3.0589**	**3.0589**		**48,298.8768**	**48,298.8768**	**0.9257**	**0.8855**	**48,592.8157**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Unmitigated	608.5362	8.3374	746.2783	0.2597		89.4636	89.4636		89.4506	89.4506	9,231.5201	19,726.5313	28,958.0514	9.3465	1.0073	29,466.5748
Mitigated	608.5362	8.3374	746.2783	0.2597		89.4636	89.4636		89.4506	89.4506	9,231.5201	19,726.5313	28,958.0514	9.3465	1.0073	29,466.5748

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	12.8590					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	85.5567					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	506.1377	6.8964	624.6666	0.2534		88.8182	88.8182		88.8052	88.8052	9,231.5201	19,512.7059	28,744.2260	9.1176	1.0073	29,247.9413
Landscaping	3.9827	1.4410	121.6117	6.2700e-003		0.6453	0.6453		0.6453	0.6453		213.8254	213.8254	0.2290		218.6335
Total	**608.5362**	**8.3374**	**746.2783**	**0.2597**		**89.4636**	**89.4636**		**89.4506**	**89.4506**	**9,231.5201**	**19,726.5313**	**28,958.0514**	**9.3465**	**1.0073**	**29,466.5748**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	12.8590					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	85.5567					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	506.1377	6.8964	624.6666	0.2534		88.8182	88.8182		88.8052	88.8052	9,231.5201	19,512.7059	28,744.2260	9.1176	1.0073	29,247.9413
Landscaping	3.9827	1.4410	121.6117	6.2700e-003		0.6453	0.6453		0.6453	0.6453		213.8254	213.8254	0.2290		218.6335
Total	**608.5362**	**8.3374**	**746.2783**	**0.2597**		**89.4636**	**89.4636**		**89.4506**	**89.4506**	**9,231.5201**	**19,726.5313**	**28,958.0514**	**9.3465**	**1.0073**	**29,466.5748**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

SSF Station Area Buildout

San Mateo County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	641.66	1000sqft	7.00	641,664.00	0
Government (Civic Center)	150.14	1000sqft	3.45	150,142.00	0
Office Park	268.80	1000sqft	5.00	268,800.00	0
Research & Development	1,185.05	1000sqft	28.00	1,185,049.00	0
Industrial Park	818.30	1000sqft	9.00	818,305.00	0
Hotel	570.00	Room	10.00	827,640.00	0
Apartments Mid Rise	2,871.00	Dwelling Unit	35.00	2,871,000.00	8211
Automobile Care Center	54.66	1000sqft	1.25	54,664.00	0
Strip Mall	602.64	1000sqft	6.00	602,643.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - adjust acreage to reflect project area

Construction Phase - No construction in this run

Vehicle Trips - Based on traffic impact analysis

Woodstoves - Assume no new wood stoves or fireplaces

Energy Use - Based on Utilities EIR Section

Water And Wastewater - Based on Utilities EIR Section

Solid Waste - Based on utilities EIR Section

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	741.44	1,162.58
tblEnergyUse	LightingElect	3.43	6.38
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	3.58	1.34
tblEnergyUse	LightingElect	4.07	2.77
tblEnergyUse	LightingElect	3.95	4.48
tblEnergyUse	LightingElect	3.43	5.37
tblEnergyUse	LightingElect	5.51	6.43
tblEnergyUse	NT24E	2,561.86	4,016.99
tblEnergyUse	NT24E	3.36	6.27
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	2.85	1.07
tblEnergyUse	NT24E	4.80	3.26
tblEnergyUse	NT24E	4.81	5.45
tblEnergyUse	NT24E	3.36	5.26
tblEnergyUse	NT24E	3.36	3.92

tblEnergyUse	NT24NG	1,662.00	9,280.44
tblEnergyUse	NT24NG	6.90	9.56
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	7.13	3.82
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.17	2.14
tblEnergyUse	NT24NG	6.90	6.62
tblEnergyUse	NT24NG	0.70	5.21
tblEnergyUse	T24E	312.05	489.30
tblEnergyUse	T24E	1.48	2.75
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	2.67	1.01
tblEnergyUse	T24E	5.01	9.27
tblEnergyUse	T24E	5.22	3.63
tblEnergyUse	T24E	1.48	2.32
tblEnergyUse	T24E	2.74	3.20
tblEnergyUse	T24NG	7,191.67	40,157.57
tblEnergyUse	T24NG	18.78	26.03
tblEnergyUse	T24NG	19.28	34.01
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	30.92	16.56
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	18.35	33.58
tblEnergyUse	T24NG	18.78	18.03
tblEnergyUse	T24NG	4.10	30.52
tblFireplaces	NumberNoFireplace	890.01	1,090.91

tblFireplaces	NumberWood	401.94	201.04
tblLandUse	LandUseSquareFeet	641,660.00	641,664.00
tblLandUse	LandUseSquareFeet	150,140.00	150,142.00
tblLandUse	LandUseSquareFeet	1,185,050.00	1,185,049.00
tblLandUse	LandUseSquareFeet	818,300.00	818,305.00
tblLandUse	LandUseSquareFeet	54,660.00	54,664.00
tblLandUse	LandUseSquareFeet	602,640.00	602,643.00
tblLandUse	LotAcreage	14.73	7.00
tblLandUse	LotAcreage	6.17	5.00
tblLandUse	LotAcreage	27.21	28.00
tblLandUse	LotAcreage	18.79	9.00
tblLandUse	LotAcreage	19.00	10.00
tblLandUse	LotAcreage	75.55	35.00
tblLandUse	LotAcreage	13.83	6.00
tblProjectCharacteristics	OperationalYear	2014	2022
tblSolidWaste	SolidWasteGenerationRate	1,320.66	6,407.94
tblSolidWaste	SolidWasteGenerationRate	208.80	311.35
tblSolidWaste	SolidWasteGenerationRate	596.74	3,653.65
tblSolidWaste	SolidWasteGenerationRate	855.80	191.81
tblSolidWaste	SolidWasteGenerationRate	312.07	1,623.70
tblSolidWaste	SolidWasteGenerationRate	1,014.69	2,020.65
tblSolidWaste	SolidWasteGenerationRate	249.98	2,162.63
tblSolidWaste	SolidWasteGenerationRate	90.06	1,530.63
tblSolidWaste	SolidWasteGenerationRate	632.77	3,431.36
tblVehicleTrips	WD_TR	6.59	4.81
tblVehicleTrips	WD_TR	62.00	54.45
tblVehicleTrips	WD_TR	11.01	5.94
tblVehicleTrips	WD_TR	27.92	24.41

tblVehicleTrips	WD_TR	8.17	7.14
tblVehicleTrips	WD_TR	6.96	6.00
tblVehicleTrips	WD_TR	11.42	5.94
tblVehicleTrips	WD_TR	8.11	5.94
tblVehicleTrips	WD_TR	44.32	38.76
tblWater	IndoorWaterUseRate	187,057,207.56	51,100,000.00
tblWater	IndoorWaterUseRate	5,142,473.33	51,100,000.00
tblWater	IndoorWaterUseRate	114,044,636.74	51,100,000.00
tblWater	IndoorWaterUseRate	29,826,765.24	51,100,000.00
tblWater	IndoorWaterUseRate	14,459,058.90	51,100,000.00
tblWater	IndoorWaterUseRate	189,231,875.00	51,100,000.00
tblWater	IndoorWaterUseRate	47,774,831.46	51,100,000.00
tblWater	IndoorWaterUseRate	582,681,912.13	51,100,000.00
tblWater	IndoorWaterUseRate	44,639,064.35	51,100,000.00
tblWater	OutdoorWaterUseRate	117,927,369.98	34,066,666.67
tblWater	OutdoorWaterUseRate	3,151,838.49	34,066,666.67
tblWater	OutdoorWaterUseRate	69,898,325.74	34,066,666.67
tblWater	OutdoorWaterUseRate	18,280,920.63	34,066,666.67
tblWater	OutdoorWaterUseRate	1,606,562.10	34,066,666.67
tblWater	OutdoorWaterUseRate	0.00	34,066,666.67
tblWater	OutdoorWaterUseRate	29,281,348.31	34,066,666.67
tblWater	OutdoorWaterUseRate	0.00	34,066,666.67
tblWater	OutdoorWaterUseRate	27,359,426.54	34,066,666.67
tblWoodstoves	NumberCatalytic	14.36	7.18
tblWoodstoves	NumberNoncatalytic	14.36	7.18

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530
Energy	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023
Mobile	197.1768	409.1011	1,746.2531	4.9590	315.3889	7.4902	322.8791	84.4958	6.9068	91.4026		380,588.8311	380,588.8311	11.7292		380,835.1441
Total	**903.3958**	**491.3028**	**2,654.6749**	**5.6741**	**315.3889**	**104.5440**	**419.9329**	**84.4958**	**103.9346**	**188.4304**	**9,231.5201**	**509,853.0304**	**519,084.5505**	**23.3561**	**3.0115**	**520,508.5994**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530
Energy	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023
Mobile	197.1768	409.1011	1,746.2531	4.9590	315.3889	7.4902	322.8791	84.4958	6.9068	91.4026		380,588.8311	380,588.8311	11.7292		380,835.1441
Total	**903.3958**	**491.3028**	**2,654.6749**	**5.6741**	**315.3889**	**104.5440**	**419.9329**	**84.4958**	**103.9346**	**188.4304**	**9,231.5201**	**509,853.0304**	**519,084.5505**	**23.3561**	**3.0115**	**520,508.5994**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	10/7/2015	5	200	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	197.1768	409.1011	1,746.2531	4.9590	315.3889	7.4902	322.8791	84.4958	6.9068	91.4026		380,588.8311	380,588.8311	11.7292		380,835.1441
Unmitigated	197.1768	409.1011	1,746.2531	4.9590	315.3889	7.4902	322.8791	84.4958	6.9068	91.4026		380,588.8311	380,588.8311	11.7292		380,835.1441

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	13,809.51	20,556.36	17426.97	34,133,157	34,133,157
Automobile Care Center	2,976.24	3,388.92	3388.92	3,082,346	3,082,346
General Office Building	3,811.46	1,520.73	628.83	7,239,880	7,239,880
Government (Civic Center)	3,664.92	0.00	0.00	5,004,280	5,004,280
Hotel	4,069.80	4,668.30	3391.50	7,710,679	7,710,679
Industrial Park	4,909.80	2,037.57	597.36	10,181,655	10,181,655
Office Park	1,596.67	440.83	204.29	3,089,301	3,089,301
Research & Development	7,039.20	2,251.60	1315.41	13,878,519	13,878,519
Strip Mall	23,358.33	25,334.99	12311.94	33,977,211	33,977,211
Total	65,235.92	60,199.29	39,265.20	118,297,027	118,297,027

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
Automobile Care Center	9.50	7.30	7.30	33.00	48.00	19.00	21	51	28
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Government (Civic Center)	9.50	7.30	7.30	75.00	20.00	5.00	50	34	16
Hotel	9.50	7.30	7.30	19.40	61.60	19.00	58	38	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Office Park	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Research & Development	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.541883	0.062137	0.166777	0.109558	0.030524	0.004555	0.019308	0.052541	0.001798	0.003633	0.005683	0.000194	0.001411

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023
NaturalGas Unmitigated	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	62918.2	0.6785	6.1685	5.1815	0.0370		0.4688	0.4688		0.4688	0.4688		7,402.1449	7,402.1449	0.1419	0.1357	7,447.1931
Government (Civic Center)	14705.7	0.1586	1.4417	1.2111	8.6500e-003		0.1096	0.1096		0.1096	0.1096		1,730.0811	1,730.0811	0.0332	0.0317	1,740.6101
Hotel	46211.8	0.4984	4.5306	3.8057	0.0272		0.3443	0.3443		0.3443	0.3443		5,436.6811	5,436.6811	0.1042	0.0997	5,469.7679
Industrial Park	80149.1	0.8644	7.8578	6.6005	0.0472		0.5972	0.5972		0.5972	0.5972		9,429.3002	9,429.3002	0.1807	0.1729	9,486.6853
Office Park	26305.6	0.2837	2.5790	2.1663	0.0155		0.1960	0.1960		0.1960	0.1960		3,094.7739	3,094.7739	0.0593	0.0567	3,113.6082
Research & Development	80031.4	0.8631	7.8462	6.5908	0.0471		0.5963	0.5963		0.5963	0.5963		9,415.4578	9,415.4578	0.1805	0.1726	9,472.7587
Strip Mall	58993	0.6362	5.7836	4.8582	0.0347		0.4396	0.4396		0.4396	0.4396		6,940.3495	6,940.3495	0.1330	0.1272	6,982.5873
Apartments Mid Rise	388867	4.1937	35.8368	15.2497	0.2288		2.8974	2.8974		2.8974	2.8974		45,749.0819	45,749.0819	0.8769	0.8387	46,027.5032
Automobile Care Center	5330.11	0.0575	0.5226	0.4390	3.1400e-003		0.0397	0.0397		0.0397	0.0397		627.0723	627.0723	0.0120	0.0115	630.8885
Total		**8.2340**	**72.5667**	**46.1028**	**0.4491**		**5.6889**	**5.6889**		**5.6889**	**5.6889**		**89,824.9427**	**89,824.9427**	**1.7216**	**1.6468**	**90,371.6023**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	62.9182	0.6785	6.1685	5.1815	0.0370		0.4688	0.4688		0.4688	0.4688		7,402.1449	7,402.1449	0.1419	0.1357	7,447.1931
Government (Civic Center)	14.7057	0.1586	1.4417	1.2111	8.6500e-003		0.1096	0.1096		0.1096	0.1096		1,730.0811	1,730.0811	0.0332	0.0317	1,740.6101
Hotel	46.2118	0.4984	4.5306	3.8057	0.0272		0.3443	0.3443		0.3443	0.3443		5,436.6811	5,436.6811	0.1042	0.0997	5,469.7679
Industrial Park	80.1491	0.8644	7.8578	6.6005	0.0472		0.5972	0.5972		0.5972	0.5972		9,429.3002	9,429.3002	0.1807	0.1729	9,486.6853
Office Park	26.3056	0.2837	2.5790	2.1663	0.0155		0.1960	0.1960		0.1960	0.1960		3,094.7739	3,094.7739	0.0593	0.0567	3,113.6082
Research & Development	80.0314	0.8631	7.8462	6.5908	0.0471		0.5963	0.5963		0.5963	0.5963		9,415.4578	9,415.4578	0.1805	0.1726	9,472.7587
Strip Mall	58.993	0.6362	5.7836	4.8582	0.0347		0.4396	0.4396		0.4396	0.4396		6,940.3495	6,940.3495	0.1330	0.1272	6,982.5873
Apartments Mid Rise	388.867	4.1937	35.8368	15.2497	0.2288		2.8974	2.8974		2.8974	2.8974		45,749.0819	45,749.0819	0.8769	0.8387	46,027.5032
Automobile Care Center	5.33011	0.0575	0.5226	0.4390	3.1400e-003		0.0397	0.0397		0.0397	0.0397		627.0723	627.0723	0.0120	0.0115	630.8885
Total		**8.2340**	**72.5667**	**46.1028**	**0.4491**		**5.6889**	**5.6889**		**5.6889**	**5.6889**		**89,824.9427**	**89,824.9427**	**1.7216**	**1.6468**	**90,371.6023**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530
Unmitigated	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	24.0712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	158.7860					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	507.9251	6.8965	624.7641	0.2534		90.0532	90.0532		90.0272	90.0272	9,231.5201	39,011.8235	48,243.3436	9.4913	1.3647	48,865.7273
Landscaping	7.2027	2.7387	237.5550	0.0125		1.3117	1.3117		1.3117	1.3117		427.4330	427.4330	0.4139		436.1257
Total	**697.9850**	**9.6351**	**862.3190**	**0.2660**		**91.3649**	**91.3649**		**91.3389**	**91.3389**	**9,231.5201**	**39,439.2566**	**48,670.7767**	**9.9052**	**1.3647**	**49,301.8530**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	24.0712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	158.7860					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	507.9251	6.8965	624.7641	0.2534		90.0532	90.0532		90.0272	90.0272	9,231.5201	39,011.8235	48,243.3436	9.4913	1.3647	48,865.7273
Landscaping	7.2027	2.7387	237.5550	0.0125		1.3117	1.3117		1.3117	1.3117		427.4330	427.4330	0.4139		436.1257
Total	**697.9850**	**9.6351**	**862.3190**	**0.2660**		**91.3649**	**91.3649**		**91.3389**	**91.3389**	**9,231.5201**	**39,439.2566**	**48,670.7767**	**9.9052**	**1.3647**	**49,301.8530**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

SSF Station Area Buildout

San Mateo County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	641.66	1000sqft	7.00	641,664.00	0
Government (Civic Center)	150.14	1000sqft	3.45	150,142.00	0
Office Park	268.80	1000sqft	5.00	268,800.00	0
Research & Development	1,185.05	1000sqft	28.00	1,185,049.00	0
Industrial Park	818.30	1000sqft	9.00	818,305.00	0
Hotel	570.00	Room	10.00	827,640.00	0
Apartments Mid Rise	2,871.00	Dwelling Unit	35.00	2,871,000.00	8211
Automobile Care Center	54.66	1000sqft	1.25	54,664.00	0
Strip Mall	602.64	1000sqft	6.00	602,643.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - adjust acreage to reflect project area

Construction Phase - No construction in this run

Vehicle Trips - Based on traffic impact analysis

Woodstoves - Assume no new wood stoves or fireplaces

Energy Use - Based on Utilities EIR Section

Water And Wastewater - Based on Utilities EIR Section

Solid Waste - Based on utilities EIR Section

Mobile Land Use Mitigation -

Mobile Commute Mitigation -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	741.44	1,162.58
tblEnergyUse	LightingElect	3.43	6.38
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	3.58	1.34
tblEnergyUse	LightingElect	4.07	2.77
tblEnergyUse	LightingElect	3.95	4.48
tblEnergyUse	LightingElect	3.43	5.37
tblEnergyUse	LightingElect	5.51	6.43
tblEnergyUse	NT24E	2,561.86	4,016.99
tblEnergyUse	NT24E	3.36	6.27
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	2.85	1.07
tblEnergyUse	NT24E	4.80	3.26

tblEnergyUse	NT24E	4.81	5.45
tblEnergyUse	NT24E	3.36	5.26
tblEnergyUse	NT24E	3.36	3.92
tblEnergyUse	NT24NG	1,662.00	9,280.44
tblEnergyUse	NT24NG	6.90	9.56
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	7.13	3.82
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.17	2.14
tblEnergyUse	NT24NG	6.90	6.62
tblEnergyUse	NT24NG	0.70	5.21
tblEnergyUse	T24E	312.05	489.30
tblEnergyUse	T24E	1.48	2.75
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	2.67	1.01
tblEnergyUse	T24E	5.01	9.27
tblEnergyUse	T24E	5.22	3.63
tblEnergyUse	T24E	1.48	2.32
tblEnergyUse	T24E	2.74	3.20
tblEnergyUse	T24NG	7,191.67	40,157.57
tblEnergyUse	T24NG	18.78	26.03
tblEnergyUse	T24NG	19.28	34.01
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	30.92	16.56
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	18.35	33.58

tblEnergyUse	T24NG	18.78	18.03
tblEnergyUse	T24NG	4.10	30.52
tblFireplaces	NumberNoFireplace	890.01	1,090.91
tblFireplaces	NumberWood	401.94	201.04
tblLandUse	LandUseSquareFeet	641,660.00	641,664.00
tblLandUse	LandUseSquareFeet	150,140.00	150,142.00
tblLandUse	LandUseSquareFeet	1,185,050.00	1,185,049.00
tblLandUse	LandUseSquareFeet	818,300.00	818,305.00
tblLandUse	LandUseSquareFeet	54,660.00	54,664.00
tblLandUse	LandUseSquareFeet	602,640.00	602,643.00
tblLandUse	LotAcreage	14.73	7.00
tblLandUse	LotAcreage	6.17	5.00
tblLandUse	LotAcreage	27.21	28.00
tblLandUse	LotAcreage	18.79	9.00
tblLandUse	LotAcreage	19.00	10.00
tblLandUse	LotAcreage	75.55	35.00
tblLandUse	LotAcreage	13.83	6.00
tblProjectCharacteristics	OperationalYear	2014	2022
tblSolidWaste	SolidWasteGenerationRate	1,320.66	6,407.94
tblSolidWaste	SolidWasteGenerationRate	208.80	311.35
tblSolidWaste	SolidWasteGenerationRate	596.74	3,653.65
tblSolidWaste	SolidWasteGenerationRate	855.80	191.81
tblSolidWaste	SolidWasteGenerationRate	312.07	1,623.70
tblSolidWaste	SolidWasteGenerationRate	1,014.69	2,020.65
tblSolidWaste	SolidWasteGenerationRate	249.98	2,162.63
tblSolidWaste	SolidWasteGenerationRate	90.06	1,530.63
tblSolidWaste	SolidWasteGenerationRate	632.77	3,431.36
tblVehicleEF	HHD	0.01	0.01

tblVehicleEF	UBUS	2.1800e-004	2.0400e-004
tblVehicleEF	UBUS	8.6000e-004	5.7800e-004
tblVehicleEF	UBUS	0.04	0.05
tblVehicleEF	UBUS	2.8700e-004	3.4600e-004
tblVehicleEF	UBUS	0.69	0.60
tblVehicleEF	UBUS	0.41	0.44
tblVehicleEF	UBUS	0.47	0.41
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	2.3900e-004	2.1700e-004
tblVehicleEF	UBUS	8.6000e-004	5.7800e-004
tblVehicleEF	UBUS	0.04	0.05
tblVehicleEF	UBUS	2.8700e-004	3.4600e-004
tblVehicleEF	UBUS	0.77	0.68
tblVehicleEF	UBUS	0.41	0.44
tblVehicleEF	UBUS	0.50	0.44
tblVehicleTrips	WD_TR	6.59	4.81
tblVehicleTrips	WD_TR	62.00	54.45
tblVehicleTrips	WD_TR	11.01	5.94
tblVehicleTrips	WD_TR	27.92	24.41
tblVehicleTrips	WD_TR	8.17	7.14
tblVehicleTrips	WD_TR	6.96	6.00
tblVehicleTrips	WD_TR	11.42	5.94
tblVehicleTrips	WD_TR	8.11	5.94
tblVehicleTrips	WD_TR	44.32	38.76
tblWater	IndoorWaterUseRate	187,057,207.56	51,100,000.00
tblWater	IndoorWaterUseRate	5,142,473.33	51,100,000.00
tblWater	IndoorWaterUseRate	114,044,636.74	51,100,000.00
tblWater	IndoorWaterUseRate	29,826,765.24	51,100,000.00

tblWater	IndoorWaterUseRate	14,459,058.90	51,100,000.00
tblWater	IndoorWaterUseRate	189,231,875.00	51,100,000.00
tblWater	IndoorWaterUseRate	47,774,831.46	51,100,000.00
tblWater	IndoorWaterUseRate	582,681,912.13	51,100,000.00
tblWater	IndoorWaterUseRate	44,639,064.35	51,100,000.00
tblWater	OutdoorWaterUseRate	117,927,369.98	34,066,666.67
tblWater	OutdoorWaterUseRate	3,151,838.49	34,066,666.67
tblWater	OutdoorWaterUseRate	69,898,325.74	34,066,666.67
tblWater	OutdoorWaterUseRate	18,280,920.63	34,066,666.67
tblWater	OutdoorWaterUseRate	1,606,562.10	34,066,666.67
tblWater	OutdoorWaterUseRate	0.00	34,066,666.67
tblWater	OutdoorWaterUseRate	29,281,348.31	34,066,666.67
tblWater	OutdoorWaterUseRate	0.00	34,066,666.67
tblWater	OutdoorWaterUseRate	27,359,426.54	34,066,666.67
tblWoodstoves	NumberCatalytic	14.36	7.18
tblWoodstoves	NumberNoncatalytic	14.36	7.18

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530
Energy	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023
Mobile	197.1768	409.1011	1,746.2531	4.9590	315.3889	7.4902	322.8791	84.4958	6.9068	91.4026		380,588.8311	380,588.8311	11.7292		380,835.1441
Total	**903.3958**	**491.3028**	**2,654.6749**	**5.6741**	**315.3889**	**104.5440**	**419.9329**	**84.4958**	**103.9346**	**188.4304**	**9,231.5201**	**509,853.0304**	**519,084.5505**	**23.3561**	**3.0115**	**520,508.5994**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530
Energy	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023
Mobile	190.7943	369.9018	1,607.8214	4.3464	274.6098	6.6106	281.2204	73.5707	6.0961	79.6668		333,565.7885	333,565.7885	10.4180		333,784.5664
Total	**897.0133**	**452.1035**	**2,516.2432**	**5.0615**	**274.6098**	**103.6644**	**378.2741**	**73.5707**	**103.1239**	**176.6946**	**9,231.5201**	**462,829.9878**	**472,061.5079**	**22.0449**	**3.0115**	**473,458.0218**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.71**	**7.98**	**5.21**	**10.80**	**12.93**	**0.84**	**9.92**	**12.93**	**0.78**	**6.23**	**0.00**	**9.22**	**9.06**	**5.61**	**0.00**	**9.04**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	10/7/2015	5	200	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

4.1 Mitigation Measures Mobile

On Street Market Pricing

Transit Subsidy

Implement Employee Parking CashOut

Workplace Parking Charge

Encourage Telecommuting and Alternative Work Schedules

Provide Riade Sharing Program

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	190.7943	369.9018	1,607.8214	4.3464	274.6098	6.6106	281.2204	73.5707	6.0961	79.6668		333,565.7885	333,565.7885	10.4180		333,784.5664
Unmitigated	197.1768	409.1011	1,746.2531	4.9590	315.3889	7.4902	322.8791	84.4958	6.9068	91.4026		380,588.8311	380,588.8311	11.7292		380,835.1441

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	13,809.51	20,556.36	17426.97	34,133,157	31,148,287
Automobile Care Center	2,976.24	3,388.92	3388.92	3,082,346	2,632,460
General Office Building	3,811.46	1,520.73	628.83	7,239,880	6,182,983
Government (Civic Center)	3,664.92	0.00	0.00	5,004,280	4,165,936
Hotel	4,069.80	4,668.30	3391.50	7,710,679	6,593,470
Industrial Park	4,909.80	2,037.57	597.36	10,181,655	8,591,559
Office Park	1,596.67	440.83	204.29	3,089,301	2,638,315
Research & Development	7,039.20	2,251.60	1315.41	13,878,519	11,852,488
Strip Mall	23,358.33	25,334.99	12311.94	33,977,211	29,062,345
Total	65,235.92	60,199.29	39,265.20	118,297,027	102,867,842

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
Automobile Care Center	9.50	7.30	7.30	33.00	48.00	19.00	21	51	28
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Government (Civic Center)	9.50	7.30	7.30	75.00	20.00	5.00	50	34	16
Hotel	9.50	7.30	7.30	19.40	61.60	19.00	58	38	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Office Park	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Research & Development	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.541883	0.062137	0.166777	0.109558	0.030524	0.004555	0.019308	0.052541	0.001798	0.003633	0.005683	0.000194	0.001411

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023
NaturalGas Unmitigated	8.2340	72.5667	46.1028	0.4491		5.6889	5.6889		5.6889	5.6889		89,824.9427	89,824.9427	1.7216	1.6468	90,371.6023

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	62918.2	0.6785	6.1685	5.1815	0.0370		0.4688	0.4688		0.4688	0.4688		7,402.1449	7,402.1449	0.1419	0.1357	7,447.1931
Government (Civic Center)	14705.7	0.1586	1.4417	1.2111	8.6500e-003		0.1096	0.1096		0.1096	0.1096		1,730.0811	1,730.0811	0.0332	0.0317	1,740.6101
Hotel	46211.8	0.4984	4.5306	3.8057	0.0272		0.3443	0.3443		0.3443	0.3443		5,436.6811	5,436.6811	0.1042	0.0997	5,469.7679
Industrial Park	80149.1	0.8644	7.8578	6.6005	0.0472		0.5972	0.5972		0.5972	0.5972		9,429.3002	9,429.3002	0.1807	0.1729	9,486.6853
Office Park	26305.6	0.2837	2.5790	2.1663	0.0155		0.1960	0.1960		0.1960	0.1960		3,094.7739	3,094.7739	0.0593	0.0567	3,113.6082
Research & Development	80031.4	0.8631	7.8462	6.5908	0.0471		0.5963	0.5963		0.5963	0.5963		9,415.4578	9,415.4578	0.1805	0.1726	9,472.7587
Strip Mall	58993	0.6362	5.7836	4.8582	0.0347		0.4396	0.4396		0.4396	0.4396		6,940.3495	6,940.3495	0.1330	0.1272	6,982.5873
Apartments Mid Rise	388867	4.1937	35.8368	15.2497	0.2288		2.8974	2.8974		2.8974	2.8974		45,749.0819	45,749.0819	0.8769	0.8387	46,027.5032
Automobile Care Center	5330.11	0.0575	0.5226	0.4390	3.1400e-003		0.0397	0.0397		0.0397	0.0397		627.0723	627.0723	0.0120	0.0115	630.8885
Total		**8.2340**	**72.5667**	**46.1028**	**0.4491**		**5.6889**	**5.6889**		**5.6889**	**5.6889**		**89,824.9427**	**89,824.9427**	**1.7216**	**1.6468**	**90,371.6023**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	62.9182	0.6785	6.1685	5.1815	0.0370		0.4688	0.4688		0.4688	0.4688		7,402.1449	7,402.1449	0.1419	0.1357	7,447.1931
Government (Civic Center)	14.7057	0.1586	1.4417	1.2111	8.6500e-003		0.1096	0.1096		0.1096	0.1096		1,730.0811	1,730.0811	0.0332	0.0317	1,740.6101
Hotel	46.2118	0.4984	4.5306	3.8057	0.0272		0.3443	0.3443		0.3443	0.3443		5,436.6811	5,436.6811	0.1042	0.0997	5,469.7679
Industrial Park	80.1491	0.8644	7.8578	6.6005	0.0472		0.5972	0.5972		0.5972	0.5972		9,429.3002	9,429.3002	0.1807	0.1729	9,486.6853
Office Park	26.3056	0.2837	2.5790	2.1663	0.0155		0.1960	0.1960		0.1960	0.1960		3,094.7739	3,094.7739	0.0593	0.0567	3,113.6082
Research & Development	80.0314	0.8631	7.8462	6.5908	0.0471		0.5963	0.5963		0.5963	0.5963		9,415.4578	9,415.4578	0.1805	0.1726	9,472.7587
Strip Mall	58.993	0.6362	5.7836	4.8582	0.0347		0.4396	0.4396		0.4396	0.4396		6,940.3495	6,940.3495	0.1330	0.1272	6,982.5873
Apartments Mid Rise	388.867	4.1937	35.8368	15.2497	0.2288		2.8974	2.8974		2.8974	2.8974		45,749.0819	45,749.0819	0.8769	0.8387	46,027.5032
Automobile Care Center	5.33011	0.0575	0.5226	0.4390	3.1400e-003		0.0397	0.0397		0.0397	0.0397		627.0723	627.0723	0.0120	0.0115	630.8885
Total		**8.2340**	**72.5667**	**46.1028**	**0.4491**		**5.6889**	**5.6889**		**5.6889**	**5.6889**		**89,824.9427**	**89,824.9427**	**1.7216**	**1.6468**	**90,371.6023**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530
Unmitigated	697.9850	9.6351	862.3190	0.2660		91.3649	91.3649		91.3389	91.3389	9,231.5201	39,439.2566	48,670.7767	9.9052	1.3647	49,301.8530

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	24.0712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	158.7860					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	507.9251	6.8965	624.7641	0.2534		90.0532	90.0532		90.0272	90.0272	9,231.5201	39,011.8235	48,243.3436	9.4913	1.3647	48,865.7273
Landscaping	7.2027	2.7387	237.5550	0.0125		1.3117	1.3117		1.3117	1.3117		427.4330	427.4330	0.4139		436.1257
Total	**697.9850**	**9.6351**	**862.3190**	**0.2660**		**91.3649**	**91.3649**		**91.3389**	**91.3389**	**9,231.5201**	**39,439.2566**	**48,670.7767**	**9.9052**	**1.3647**	**49,301.8530**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	24.0712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	158.7860					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	507.9251	6.8965	624.7641	0.2534		90.0532	90.0532		90.0272	90.0272	9,231.5201	39,011.8235	48,243.3436	9.4913	1.3647	48,865.7273
Landscaping	7.2027	2.7387	237.5550	0.0125		1.3117	1.3117		1.3117	1.3117		427.4330	427.4330	0.4139		436.1257
Total	**697.9850**	**9.6351**	**862.3190**	**0.2660**		**91.3649**	**91.3649**		**91.3389**	**91.3389**	**9,231.5201**	**39,439.2566**	**48,670.7767**	**9.9052**	**1.3647**	**49,301.8530**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: Baden_Linden_2012PM
              RUN: Hour 1
        POLLUTANT: Carbon Monoxide
```

I. SITE VARIABLES

```
        U=    .5 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG=    .0 DEGREES         VD=   .0 CM/S
     CLAS=     4 (D)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=  1.4 PPM
    SIGTH=    5. DEGREES       TEMP=  4.4 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	150	0	0	AG	262	5.7	.0	9.8
B. Link B	0	0	150	0	AG	302	5.7	.0	9.8
C. Link C	0	0	0	-150	AG	426	5.7	.0	9.8
D. Link D	-150	0	0	0	AG	349	5.7	.0	9.8

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	9	9	1.8
2. Recpt 2	9	-9	1.8
3. Recpt 3	-9	-9	1.8
4. Recpt 4	-9	9	1.8

IV. MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

RECEPTOR	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	1.4	.0	.0	.0	.0
2. Recpt 2	1.5	.0	.0	.0	.0
3. Recpt 3	1.6	.0	.0	.0	.1
4. Recpt 4	1.4	.0	.0	.0	.0

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: East Grand/Gateway
              RUN: Hour 1
        POLLUTANT: Carbon Monoxide

  I.  SITE VARIABLES

        U=    .5 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG=    .0 DEGREES         VD=   .0 CM/S
     CLAS=     4 (D)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=  1.4 PPM
    SIGTH=    5. DEGREES       TEMP=  4.4 DEGREE (C)

 II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
----------------*-------------------------*------------------------------
A. Link A       *     0   150     0     0 *  AG    437   5.7     .0   9.8
B. Link B       *     0     0   150     0 *  AG    440   5.7     .0   9.8
C. Link C       *     0     0     0  -150 *  AG    722   5.7     .0   9.8
D. Link D       *  -150     0     0     0 *  AG   1387   5.7     .0   9.8

III.  RECEPTOR LOCATIONS

            *    COORDINATES (M)
  RECEPTOR  *    X      Y      Z
------------*---------------------
1. Recpt 1  *      9      9   1.8
2. Recpt 2  *      9     -9   1.8
3. Recpt 3  *     -9     -9   1.8
4. Recpt 4  *     -9      9   1.8

 IV.  MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

            * PRED  *      CONC/LINK
            * CONC  *        (PPM)
  RECEPTOR  * (PPM) *   A    B    C    D
-------------*-------*--------------------
1. Recpt 1  *   1.5 *   .0   .0   .0   .0
2. Recpt 2  *   1.6 *   .0   .1   .0   .0
3. Recpt 3  *   1.9 *   .0   .0   .0   .4
4. Recpt 4  *   1.5 *   .0   .0   .0   .0
```

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: Grand/Linden Ex+P PM
              RUN: Hour 1
        POLLUTANT: Carbon Monoxide


  I.  SITE VARIABLES

        U=    .5 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG=    .0 DEGREES         VD=   .0 CM/S
     CLAS=     4 (D)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=  1.4 PPM
    SIGTH=    5. DEGREES       TEMP=  4.4 DEGREE (C)


 II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
----------------*-------------------------*------------------------------
A. Link A       *     0   150     0     0 *  AG    290   5.7     .0   9.8
B. Link B       *     0     0   150     0 *  AG    321   5.7     .0   9.8
C. Link C       *     0     0     0  -150 *  AG    106   5.7     .0   9.8
D. Link D       *  -150     0     0     0 *  AG    689   5.7     .0   9.8


III.  RECEPTOR LOCATIONS

            *    COORDINATES (M)
  RECEPTOR  *    X      Y      Z
------------*---------------------
1. Recpt 1  *      9      9   1.8
2. Recpt 2  *      9     -9   1.8
3. Recpt 3  *     -9     -9   1.8
4. Recpt 4  *     -9      9   1.8


 IV.  MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

            * PRED  *      CONC/LINK
            * CONC  *        (PPM)
  RECEPTOR  * (PPM) *   A    B    C    D
-------------*-------*--------------------
1. Recpt 1  *   1.4 *   .0   .0   .0   .0
2. Recpt 2  *   1.5 *   .0   .0   .0   .0
3. Recpt 3  *   1.7 *   .0   .0   .0   .2
4. Recpt 4  *   1.4 *   .0   .0   .0   .0
```

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: Grand/Airport Ex+P PM
              RUN: Hour 1
        POLLUTANT: Carbon Monoxide


  I.  SITE VARIABLES

        U=    .5 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG=    .0 DEGREES         VD=   .0 CM/S
     CLAS=     4 (D)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=  1.4 PPM
    SIGTH=    5. DEGREES       TEMP=  4.4 DEGREE (C)


 II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
----------------*-------------------------*------------------------------
A. Link A       *     0   150     0     0 *  AG   1098   5.7     .0   9.8
B. Link B       *     0     0   150     0 *  AG    291   5.7     .0   9.8
C. Link C       *     0     0     0  -150 *  AG    682   5.7     .0   9.8
D. Link D       *  -150     0     0     0 *  AG    850   5.7     .0   9.8


III.  RECEPTOR LOCATIONS

            *    COORDINATES (M)
  RECEPTOR  *    X      Y      Z
------------*---------------------
1. Recpt 1  *      9      9   1.8
2. Recpt 2  *      9     -9   1.8
3. Recpt 3  *     -9     -9   1.8
4. Recpt 4  *     -9      9   1.8


 IV.  MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

            * PRED  *      CONC/LINK
            * CONC  *        (PPM)
  RECEPTOR  * (PPM) *   A    B    C    D
-------------*-------*--------------------
1. Recpt 1  *   1.5 *   .1   .0   .0   .0
2. Recpt 2  *   1.6 *   .2   .0   .0   .0
3. Recpt 3  *   1.8 *   .2   .0   .0   .3
4. Recpt 4  *   1.5 *   .1   .0   .0   .0
```

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: Baden/Linden Ex+P PM
              RUN: Hour 1
        POLLUTANT: Carbon Monoxide


  I.  SITE VARIABLES

        U=    .5 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG=    .0 DEGREES         VD=   .0 CM/S
     CLAS=     4 (D)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=  1.4 PPM
    SIGTH=    5. DEGREES       TEMP=  4.4 DEGREE (C)


 II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
----------------*-------------------------*------------------------------
A. Link A       *     0   150     0     0 *  AG    323   5.7     .0   9.8
B. Link B       *     0     0   150     0 *  AG    326   5.7     .0   9.8
C. Link C       *     0     0     0  -150 *  AG    432   5.7     .0   9.8
D. Link D       *  -150     0     0     0 *  AG    390   5.7     .0   9.8


III.  RECEPTOR LOCATIONS

            *    COORDINATES (M)
  RECEPTOR  *    X      Y      Z
------------*---------------------
1. Recpt 1  *      9      9   1.8
2. Recpt 2  *      9     -9   1.8
3. Recpt 3  *     -9     -9   1.8
4. Recpt 4  *     -9      9   1.8


 IV.  MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

            * PRED  *      CONC/LINK
            * CONC  *        (PPM)
  RECEPTOR  * (PPM) *   A    B    C    D
-------------*-------*--------------------
1. Recpt 1  *   1.4 *   .0   .0   .0   .0
2. Recpt 2  *   1.6 *   .0   .0   .0   .0
3. Recpt 3  *   1.6 *   .0   .0   .0   .1
4. Recpt 4  *   1.4 *   .0   .0   .0   .0
```

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: San Mateo/Airport Ex+P PM
              RUN: Hour 1
        POLLUTANT: Carbon Monoxide

  I.  SITE VARIABLES

        U=    .5 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG=    .0 DEGREES         VD=   .0 CM/S
     CLAS=     4 (D)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=  1.4 PPM
    SIGTH=    5. DEGREES       TEMP=  4.4 DEGREE (C)

 II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
----------------*-------------------------*------------------------------
A. Link A       *     0   150     0     0 *  AG    876   5.7     .0   9.8
B. Link B       *     0     0   150     0 *  AG    988   5.7     .0   9.8
C. Link C       *     0     0     0  -150 *  AG    863   5.7     .0   9.8
D. Link D       *  -150     0     0     0 *  AG    414   5.7     .0   9.8

III.  RECEPTOR LOCATIONS

            *    COORDINATES (M)
  RECEPTOR  *    X      Y      Z
------------*---------------------
1. Recpt 1  *      9      9   1.8
2. Recpt 2  *      9     -9   1.8
3. Recpt 3  *     -9     -9   1.8
4. Recpt 4  *     -9      9   1.8

 IV.  MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

            * PRED  *      CONC/LINK
            * CONC  *        (PPM)
  RECEPTOR  * (PPM) *   A    B    C    D
-------------*-------*--------------------
1. Recpt 1  *   1.5 *   .1   .0   .0   .0
2. Recpt 2  *   1.8 *   .1   .3   .0   .0
3. Recpt 3  *   1.7 *   .1   .0   .0   .1
4. Recpt 4  *   1.5 *   .1   .0   .0   .0
```

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: Airport Blvd/Gateway Ex+P PM
              RUN: Hour 1
        POLLUTANT: Carbon Monoxide


  I.  SITE VARIABLES

        U=    .5 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG=    .0 DEGREES         VD=   .0 CM/S
     CLAS=     4 (D)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=  1.4 PPM
    SIGTH=    5. DEGREES       TEMP=  4.4 DEGREE (C)


 II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
----------------*-------------------------*------------------------------
A. Link A       *     0   150     0     0 *  AG    562   5.7     .0   9.8
B. Link B       *     0     0   150     0 *  AG    130   5.7     .0   9.8
C. Link C       *     0     0     0  -150 *  AG   1318   5.7     .0   9.8
D. Link D       *  -150     0     0     0 *  AG   1098   5.7     .0   9.8


III.  RECEPTOR LOCATIONS

            *    COORDINATES (M)
  RECEPTOR  *    X      Y      Z
------------*---------------------
1. Recpt 1  *      9      9   1.8
2. Recpt 2  *      9     -9   1.8
3. Recpt 3  *     -9     -9   1.8
4. Recpt 4  *     -9      9   1.8


 IV.  MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

            * PRED  *      CONC/LINK
            * CONC  *        (PPM)
 RECEPTOR   * (PPM) *   A    B    C    D
-------------*-------*--------------------
1. Recpt 1  *   1.5 *   .0   .0   .0   .0
2. Recpt 2  *   1.5 *   .0   .0   .0   .0
3. Recpt 3  *   1.8 *   .0   .0   .0   .3
4. Recpt 4  *   1.5 *   .0   .0   .0   .0
```

Appendix C Greenhouse Gas Emissions Data

Assumptions and Calculations

SSF Specific Plan EIR
Assumptions

CalEEMod Inputs:

Project Characteristics

Location:	County, San Mateo		
Climate Zone:	5		
Land Use Setting	Urban		
Operational Year:	2012	Existing	
	2030	Future	(CalEEMod doesn't allow 2032)
Utility Company:	PG&E		

Land Use: (From Project Description)

Land Use Designation	**CalEEMod LU/acreage**	*Existing Conditions*		*New Development Under Station Area Plan (25% Buildout)*	
Residential	Residential – Apts Mid Rise (area includes mix of low to high but we don't have breakdown)	1,436	DU	1,435	DU
downtown Commercial	Retail – Strip mall	602,643	sf	—	
Auto-serving Commercial	Retail – automobile care center	54,664	sf	—	
Business Commercial	Commercial – General Office Building	129,884	sf	511,780	sf
Hotel	Recreational – Hotel – Assume 570 rooms based on 500 sf/room (http://www.dimensionsinfo.com/hotel-room-size/ assume 500 to account for common area)	285,165	sf	—	
Industrial	Industrial – Industrial Park	797,055	sf	21,250	sf
Institutional	Commercial – Government (Civic center)	150,142	sf	—	
Commercial	Office Park	—		268,800	sf
Office/R&D	Research & Development	—		1,185,049	sf
Total		2,019,553	sf	1,986,879	sf

SSF Specific Plan EIR
Assumptions

	Population[1]	Employment[2]	Service Population[3]
Residential	4320		
General Office		851	
Office Park		447	7,624
Research & Development		1971	
Industrial Park		35	

[1] 3.01persons per household from pop/housing section

[2] Employment = 0.001663 jobs per square foot

Construction:

No construction.

Vehicle Trips:

Land Use Designation	CalEEMod Trip Rate	Project Trip Rates
Apts Mid Rise	6.59	4.81
General Office	11.01	5.94
Office Park	11.42	5.94
Research & Development	8.11	5.94
Industrial Park	6.96	6

SSF Specific Plan EIR
Assumptions

Hearth:

Assumes no new wood stoves or fireplaces

Utilities: (Based on Utility Section)

Electricity

Land Use Designation	Title -24 (kWhr/size/year)	NonTitle -24 (kWhr/size/year)	Lighting (kWhr/size/year)	Onsite Renewable Generated
Residential	489.3	4,016.99	1,162.58	6,705,931
General Office	4.91	4.7	3.99	
Office Park	3.63	5.45	4.48	
Research & Development	2.32	5.26	5.37	
Industrial Park	9.27	3.26	2.77	

Natural Gas

Land Use Designation	Title -24 (KBTU/size/year)	NonTitle -24 (KBUT/size/year)	Mitigation reduced Title -24 (KBTU/size/year)
Residential	40,157.57	9,280.44	38,901.55
General Office	34.01	1.78	
Office Park	33.58	2.14	
Research & Development	18.03	6.62	
Industrial Park	33.97	1.78	

SSF Specific Plan EIR
Assumptions

Water Demand

Assumes 60% indoors and 40% outdoor use based on CalEEMod
Multiplied daily estimates by 365 days and divided up evenly among uses.

Existing	1.54	mgd
Future	2.1	mgd
New Uses	0.56	mgd
	204.4	mgy
	Indoor	
	122.64	mgy
	24.528	mgy/land use category in use
	24,528,000	g/year/land use category in use
	Outdoor	
	81.76	mgy
	27.25	mgy/land use category in use
	27,253,333	g/year/land use category in use

No Septic Tank Use

	Original	Revised
Septic	10.33	0
Aerobic	87.46	97.54
Lagoons	2.21	2.46

Solid Waste (tons per year)

	Existing	New Growth
Residential	3,205.07	3,202.87
General Office	739.49	2,914.16
Industrial	2,065.53	55.12
Office Park	0.00	2,162.63
Research & Development	0.00	1,530.63

SSF Specific Plan EIR
Assumptions

Determination of Employment Values

	2010	2015	growth / year	2012
Employment (jobs)[1]	3,282	3,474	38	3,359
Non-residential development (SF)				2,019,553
jobs/sf				0.00166314

[1]City of South San Francisco. South San Francisco Downtown Station Area Plan Market Demand Analysis. April 27, 2012.

SSF Specific Plan EIR
Emissions Summary

Existing

	CO_2	CH_4	N_2O	CO_2e
Area	78.93	0.06	0.00	80.85
Electricity	10467.342	0.4733	0.0979	10507.6381
Natural Gas	7,996.42	0.15	0.15	8,045.09
Transportation	35,440.11	1.73	0.00	35,476.53
Waste	2,348.26	138.78	0.00	5,262.61
Water	866.82	11.02	0.27	1,180.96
total				60,553.68

Atkins 2014 taken from the CalEEMod Model.

Note: In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O). The conversion is not shown in the table and therefore the rows will not add across.

Construction

	CO_2	CH_4	N_2O	CO_2e
Annual	720.43	0.09	0.00	722.30
Full Development[1]	14,408.69	1.78	0.00	14,445.99

Atkins 2014 taken from the CalEEMod Model.

Note: In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O). The conversion is not shown in the table and therefore the rows will not add across.

1. Construction emissions were analyzed assuming the same level of construction over 20 years. Approximately one year was analyzed in CalEEMod. Therefore total emissiosn over the full development is the annual emissions times 20.

New Growth ***(UNREDUCED)***

	CO_2	CH_4	N_2O	CO_2e
Area	78.86	0.06	0.00	81
Electricity	4,791.87	0.22	0.04	4,810
Natural Gas	6,875.01	0.13	0.13	6,917
Transportation	21,756.36	0.57	0.00	21,768
Waste	2,002.59	117.35	0.00	4,488
Water	175.65	1.25	0.10	232
total				38,296
per SP				5.02

Atkins 2014 taken from the CalEEMod Model.

Note: In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O). The conversion is not shown in the table and therefore the rows will not add across.

SSF Specific Plan EIR
Emissions Summary

New Growth (Project Design and State Reduction Requirements)

	CO_2	CH_4	N_2O	CO_2e
Area	78.86	0.06	0.00	81
Electricity	4,791.87	0.22	0.04	4,810
Natural Gas	6,875.01	0.13	0.13	6,917
Transportation	15,610.98	0.41	0.00	15,620
Waste	500.65	29.59	0.00	1,122
Water	141.60	1.00	0.08	186
total				28,736
per SP				3.77

Atkins 2014 taken from the CalEEMod Model.

Note: In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O). The conversion is not shown in the table and therefore the rows will not add across.

New Growth (Project Design plus mitigation - CalEEMod)

	CO_2	CH_4	N_2O	CO_2e
Area	63.80	0.02	0.01	64
Electricity	3,570.72	0.16	0.03	3,584
Natural Gas	5,108.37	0.10	0.09	5,139
Transportation	14,860.93	0.39	0.00	14,869
Waste	500.65	29.59	0.00	1,122
Water	127.80	0.87	0.07	166
total				24,946
per SP				3.27

Atkins 2014 taken from the CalEEMod Model.

Note: In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O). The conversion is not shown in the table and therefore the rows will not add across.

SSF Specific Plan EIR
Emissions Summary

New Growth (Additional Calculated Mitigation)

	CO_2	CH_4	N_2O	CO_2e
Area	63.80	0.02	0.01	64
Electricity	3,570.72	0.16	0.03	3,584
Natural Gas	5,108.37	0.10	0.09	5,139
Transportation	13,386.18	0.35	0.00	13,394
Waste	500.65	29.59	0.00	1,122
Water	127.80	0.87	0.07	166
total				23,470
per SP				3.079

Atkins 2014 taken from the CalEEMod Model.

Note: In order to convert CH_4 and N_2O to CO_2e the emissions of each need to be multiplied by their global warming potential (21 and 310 respectively for CH_4 and N_2O). The conversion is not shown in the table and therefore the rows will not add across.

Transportation			
Unreduced	21,768.27		
Project & State	15,619.53	0.282463	
Mitigation	13,393.54	0.384722	0.1425134

SSF Specific Plan EIR
DCAP Reduction Measures

The following outlines the implementation of the Draft South San Francisco CAP measures into the Specific Plan EIR. Within this discussion the following designations apply:

S# = State Reduction Measure
E# = Existing City Measures
P# = Climate Action Plan Measures
(CalEEMod) = means the reductions were accounted for in the CalEEMod modeling.
(Not Applicable) = means the measures in not applicable to the Specific Plan.
(Not Quantified) = means the measure supports other measures in the plan and reductions are not

State Measures

S1 ***California Renewable Portfolio Standard*** (CalEEMod)

33% of electricity delivered in California must be generated by renewable sources by 2020.
Intensity Factors reduced in CalEEMod to account for the use of renewables. CalEEMod uses

In 2011 PG&E renewable energy sources were at:[1]	19.04%
By 2020 PG&E would be at 33%	33%
Need to increase renewables by:	13.96%

	Intensity Factors (lbs/MWh)		
	CO2	CH4	N2O
2008[2]	641.35	0.029	0.006
2011[3]	393	0.017770328	0.00367662
2019[4]	307	0.013881656	0.00287207

[1] California Public Utilities Commission. California Renewables Portfolio Standard (RPS). Accessed 2/7/2014 from:
http://www.cpuc.ca.gov/PUC/energy/Renewables/

[2] CalEEMod defaults

[3] PG&E. Greenhouse Gas Emission Factors: Guidance for PG&E Customers. April 2013 http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf

[4] Intensity factors represent the emission factor anticipated by PG&E for 2019 based on the reductions needed for PG&E to meet its share of the AB32 2020 goals.

S2 AB 1493 (Pavley) Vehicle Standards (CalEEMod)

Reduction is imbedded in the CalEEMod model, no additional reductions available.

S3 Executive Order S-01-07, Low Carbon Fuel Standard (CalEEMod)

Reduction is imbedded in the CalEEMod model, no additional reductions available.

S4 Title 24, Energy Efficiency standards: (CalEEMod)

CalEEMod uses 2008 Title 24 standards as baseline requirement. In June 2014 the next level of Title 24 efficiency requirements will be applicable to the project. These new requirements are 15% more strict than the 2008 Standards. Therefore, Energy Efficiency mitigation is set at a minimum of 15% beyond Title 24 to account for the increase in energy efficiency requirements going into effect in 2014.

SSF Specific Plan EIR
DCAP Reduction Measures

Existing City Measures

E1 Aircraft Noise Insulation Program (ANIP) (Not Applicable)

Retrofit program where all funds have been allocated. Program is closing.
In addition, the proposed project is outside the 65 dB noise conture line for the airport and therefore the reduction would not have been applicable.

E2 Recycle waste from constructin and demolition projects. (Not Quantified)

GHG emissions from construction and demolition waste is not calculated as part of the standard emissions inventory for construction GHG emissions. Therefore, reductions from recycling this

E3 Participate in the California Solar Initiative (CSI). (Not Applicable)

This measures accounts for the existing solar arrays installed in South San Francisco and is not applicable to new development under the Specific Plan. Measure 4.1 accounts for measures from renewable installation for new facilities.

E4 Retrofit municipal facilities for energy efficiency. (Not Applicable)

The measure deals with retrofitting existing facilities and not reductions from growth. Therefore it is not applicable to the Specific Plan GHG analysis.

E5 Community Transportation Plan (Not Quantified)

Development of a community based transportation plan to reduce GHG emissions which includes increased access to transit stops, improving connectivity between transit modes, and ways to make transit more affordable. The primary focus in on the eastern portion of South San Francisco, including the Specific Plan Area.

E6 (Not Applicable)

South San Francisco Unified School District -Chevron Energy Solutions Partnership Solar Project

Implementation of a solar energy program for K-12 schools. Not applicabel to the Specific Plan's new growth.

E7 Transportation Demand Management (Not Applicable)

This measure accounts for the reduction associated with TDM implemented for existing facilities and is not applicable for new growth under the sSpecific Plan. TDM measures for new growth are addressed under measure P1.2.

E8 Expansion fo multi-family development. (Not Quantified)

This measure was instituted to foster multi-family development within the City as a means to reduce Community Wide emissions over what is projected from single family homes. While the implementation of the Specific Plan will support this City-wide measure, there are no direct reductions to the Specific Plan associated with this measure.

SSF Specific Plan EIR
DCAP Reduction Measures

Climate Action Plan Specific Measures

P1.1 Expand active transportation alternatives by providing infrastructure and enahncing connictivity for bicycle and pedestrian access. (CalEEMod)

This measure is accounted for by the project specific traffic study through the reduction in trip rates from the standard ITE rates.

P1.2 Support expansion of public and private transit programs to reduce employee commutes. (Calculated)

The expansion of TDM was estimated to affect 25 to 44 % of all local employment by 2035.
The South San Francisco TDM Ordinance requires that all non-residential developments that produce 100 average vehicl trips per day or more to meet a 35% non-drive-alone peak hour requirement with fees assessed for non-compliance.

Assumptions based on P1.2 back-up data and CAPCOA measrue TRT-1.

% Commute VMT reduction = A * B
% Commute VMT reduction = 0.1 * 0.39
% Commute VMT reduction = 3.90%

where:

A = % reduction in VMT = % based on its urban location = 10.00%
B = % employees eligible = 39% (most conservative reduction)

CO_2 reduction calculations:

employment	3304	area employment
Average commute	24.8	miles (round trip per day)
Total average commute	81,939	miles (round trip / day)
Total Annual commute	21,386,131	miles
Annual commute reduction	834,059	miles
Total Project Annual VMT:	40,067,294	miles
Total VMT Reduction:	2.08%	

Total Vehicle Emissions Reductions:

	CO2	CH4	N2O	CO2e
Unreduced	14,860.93	0.39	0.00	14,869.09
Reduced	14,551.58	0.38	0.00	14,559.57
Difference	309.35	0.01	0.00	309.52

P1.3 Integrate higher-density development and mixed-use development near transit facilities and community facilities, and reduce dependence on autos through smart parking policies. (CalEEMod)

Increase in density is included in the Project Specific trip rates identified in the traffic study.
Smart Parking policies call for a 10% reduction in parking to reduce VMT.

SSF Specific Plan EIR
DCAP Reduction Measures

P2.1 Expand the use of alternative-fuel vehicles (calculated)

Measure assumes:

150 public EV charging stations (not appicable to the Specific Plan)
2,650 houses with EV chargers
180 EV chargers at businesses

	ksq ft Non-res	DU	Total Reduction
Total Plan[1]	12,293	21,140	
Chargers[2]	180	2,650	
chargers per sf	0.014642003		
% development		12.54%	
Total Specific Plan	1,987	1,435	
# Participating	60	200	
gallons of fuel (per station)[2]	390	390	
annual reduction in fuel	23,400	78,000	
CO_2e/gallon[2]	0.0056	0.0056	
Total reduction (trans CO_2e)	131.48	438.26	569.73

[1] Total squarefootage taken from SF General Plan, Housing taken from Pop/Housing section

Zero Emission Vehicles:

Assumes 4.50% all vehicles are zero emission vehicles by 2032
4.50% reduction from all non-residential and all non-commute residential vehicle trips.

	Total Trips	% Commute	Commute Trips	Remaining Trips
Residential	16,207,603	12.40%	2,009,743	14,197,860
Non-Residential	21,856,326	0	0	21,856,326
Total	38,063,929			36,054,186
# Reduced Trips				1,622,438
Reduction				4.26%

P2.2 Reduce emissions from off-road vehicles and equipment (CalEEMod)

A conservative assumption that 25% of all lawnmowers and leaf blowers acquired/used within the Specific Plan area would be electric.

P3.1 Maximize energy efficiency in the built environment through standards and the plan review process. (CalEEMod)

Plan assumes a porton of the new development comply with CALGreen base and Tier 1 standards. The CALGreen base standard for energy efficiency is compliance with 2008 Title-24 energy efficiency standards. Tier 1 is an energy efficiency 15% beyond the 2008 base standard, which is equivalent to the standard coming out in 2014.
The analysis assumes all new buildings will be at a minimum complient with the CALGreen Tier 1 standard.

www.documents.dgs.ca.gov/bsc/CALGreen/2010_CA_Green_Bldg.pdf

SSF Specific Plan EIR
DCAP Reduction Measures

P3.2 Support retrofits to existing residential structures. (Not Applicable)
Not applicable to new development under the Specific Plan

P3.3 Encourage energy efficiency retrofits to the existing nonresidential building stock that reduce operating costs and increase industry competitiveness. (Not Applicable)
Not applicable to new development under the Specific Plan

P3.4 Address heat island issues and expand the urban forest (CalEEMod)

	Sq ft Non-res	DU	Total Reductions
Total Plan[1]	12,293,400	21,140	
New LU Participation	30	880	
Total Specific Plan	1,986,879	1,435	
% of Total Plan	16.16%	6.79%	
Plan Land Use Participation	5	60	
kWh per land use	1,960	12	
Total reduction (kWh)	9,503.35	716.82	10,220.17

[1] Total squarefootage taken from SF General Plan, Housing taken from Pop/Housing section

P3.5 Promote energy information sharing and educate the community about energy-efficient behaviors and construction (CalEEMod)

This measures assumes 100 kWh and 10 therms reduction per participating residence for the behavioral energy reduction efforts. The CAP assumed that 23% of residences would participate.

Total Specific Plan	1,435	residences
Participating	330	residences
Reduction/ residence (kWh)	100	
Reduction/ residence (therms)	10	
Total Reduction (kWh)	33,005	
Reduction (Therms)	3,301	
Reduction (KBTUs)	330,050	
Reduction (KBTU/DU)	230.00	

SSF Specific Plan EIR
DCAP Reduction Measures

P4.1 Energy Reduction (CalEEMod)

180	kWh	per square foot of non-residential roof space converted to solar panels
5,190	kWh	per house with a solar pannel array
90	therms	per house with a solar hot water heater

	Sq ft Non-res	DU (for arrays)	DU (for water heater)	Total Reduction
Total Plan[1]	12,293,400	21,140	21,140	
Reduced	215700	880	2410	
% Participation	1.75%	4.16%	11.40%	
Total Specific Plan	1,986,879	1,794	1,794	
# Participating	34,862	75	205	
Reduction (kWh)	6,275,120	387,585		6,662,706
Reduction (Therms)			18,406.75	18,406.75
Reduction (KBTUs)				1,840,675
Reduction (KBTU/DU)				1,026

[1] Total squarefootage taken from SF General Plan, Housing taken from Pop/Housing section

1	Therm	=	100,000 BTU
1	Therm	=	100 kBTU

P4.2 Reduce the cost of alternative energy installations. (Not Quantified)

Not applicable to the new growth under the Specific Plan

P4.3 Support Green Industries (Not Quantified)

This represents a supportive measures that will enhance the achievements of other reduction measures. There are no reductions applicable to the new development under the Specific Plan.

P5.1 Develop a waste reduction strategy to increase recycling and reuse of materials to achieve a 75% diversion of landfilled waste by 2020. (CalEEMod)

The State has mandated the same reduction goals. This measure reduces emissions from waste decomposition by 75%

P5.2 Reduce landfill emissions. (Not Applicable)

This measure supports the capture and reuse of fugitive landfill gas emissions. This is not applicable to reducing GHG emissions from City growth.

P6.1 Water Reduction (CalEEMod)

This measure anticipates a reduction of up to 40 gallons per capita per day by 2035 and incorporates the CALGreen reduction requirements.

40 gallon reduction per capita per day

172,760	reduced gallons per day
63,057,400	reduced gallons per year
204,400,000	Project estimated total gallons/year
141,342,600	Reduced project total gallons/year
30.85%	% reduction

SSF Specific Plan EIR
DCAP Reduction Measures

P6.2 Provide alternative water resources for irrigation. (Not Quantified)

This measure looks to create water policies to manage storm water and further reduce potent water consumption. This is a supportive measure and its directs effects are not quantified.

P7.1 Promote energy efficiency policies at municipal facilities. (Not Applicable)
This measures is implemented with respect to municipal development and therefore is not applicable to the new community growth under the Sepcific Plan.

P7.2 Conserve municipal water. (Not Applicable)
This measures is implemented with respect to municipal development and therefore is not applicable to the new community growth under the Sepcific Plan.

P7.3 Reduce municipal waste. (Not Applicable)
This measures is implemented with respect to municipal development and therefore is not applicable to the new community growth under the Sepcific Plan.

P7.4 Establish budgeting and administrative practices that support the CAP. (Not Applicable)
This measures is implemented with respect to municipal development and therefore is not applicable to the new community growth under the Sepcific Plan.

SSF Specific Plan EIR
Additional Reductions

Transportation

		CO_2	CH_4	N_2O	CO_2e
From CalEEMod:		14,860.93	0.39	0.00	14,869.09
	P1.2	309.35	0.01	0.00	309.52
	P2.1	569.42	0.01	0.00	569.73
	P2.1	595.98	0.02	0.00	596.30
	Reduced	***13,386.18***	***0.35***	***0.00***	***13,393.54***

Existing CalEEMod Output

SSF Station Area - Existing

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	129.88	1000sqft	2.98	129,884.00	0
Government (Civic Center)	150.14	1000sqft	3.45	150,142.00	0
Industrial Park	797.00	1000sqft	18.30	797,005.00	0
Hotel	570.00	Room	19.00	827,640.00	0
Apartments Mid Rise	1,436.00	Dwelling Unit	37.79	1,436,000.00	4107
Automobile Care Center	54.66	1000sqft	1.25	54,664.00	0
Strip Mall	602.64	1000sqft	13.83	602,643.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - .

Construction Phase - No construction, move default phase to before operational year

Demolition -

Vehicle Trips - Based on trip generation from traffic impact analysis

Energy Use - Based on calculations in Utilities section of EIR

Water And Wastewater - Based on calculations in Utilities EIR section

Solid Waste - Based on utility calculations in EIR

Off-road Equipment - no construction

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	100.00	0.00
tblEnergyUse	LightingElect	741.44	1,162.58
tblEnergyUse	LightingElect	3.43	6.38
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	3.58	1.34
tblEnergyUse	LightingElect	4.07	2.77
tblEnergyUse	LightingElect	5.51	6.43
tblEnergyUse	NT24E	2,561.86	4,016.99
tblEnergyUse	NT24E	3.36	6.27
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	2.85	1.07
tblEnergyUse	NT24E	4.80	3.26
tblEnergyUse	NT24E	3.36	3.92
tblEnergyUse	NT24NG	1,662.00	9,280.44
tblEnergyUse	NT24NG	6.90	9.56

tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	7.13	3.82
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	0.70	5.21
tblEnergyUse	T24E	312.05	489.30
tblEnergyUse	T24E	1.48	2.75
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	2.67	1.01
tblEnergyUse	T24E	5.01	9.27
tblEnergyUse	T24E	2.74	3.20
tblEnergyUse	T24NG	7,191.67	40,157.57
tblEnergyUse	T24NG	18.78	26.03
tblEnergyUse	T24NG	19.28	34.01
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	30.92	16.56
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	4.10	30.52
tblLandUse	LandUseSquareFeet	129,880.00	129,884.00
tblLandUse	LandUseSquareFeet	150,140.00	150,142.00
tblLandUse	LandUseSquareFeet	797,000.00	797,005.00
tblLandUse	LandUseSquareFeet	54,660.00	54,664.00
tblLandUse	LandUseSquareFeet	602,640.00	602,643.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblSolidWaste	SolidWasteGenerationRate	660.56	3,205.07

tblSolidWaste	SolidWasteGenerationRate	208.80	311.35
tblSolidWaste	SolidWasteGenerationRate	120.79	739.49
tblSolidWaste	SolidWasteGenerationRate	855.80	191.81
tblSolidWaste	SolidWasteGenerationRate	312.07	1,623.70
tblSolidWaste	SolidWasteGenerationRate	988.28	2,065.53
tblSolidWaste	SolidWasteGenerationRate	632.77	3,431.36
tblVehicleTrips	WD_TR	6.59	5.12
tblVehicleTrips	WD_TR	62.00	42.65
tblVehicleTrips	WD_TR	11.01	25.20
tblVehicleTrips	WD_TR	27.92	19.12
tblVehicleTrips	WD_TR	8.17	5.60
tblVehicleTrips	WD_TR	6.96	4.78
tblVehicleTrips	WD_TR	44.32	30.36
tblWater	IndoorWaterUseRate	93,561,180.79	48,180,000.00
tblWater	IndoorWaterUseRate	5,142,473.33	48,180,000.00
tblWater	IndoorWaterUseRate	23,084,059.19	48,180,000.00
tblWater	IndoorWaterUseRate	29,826,765.24	48,180,000.00
tblWater	IndoorWaterUseRate	14,459,058.90	48,180,000.00
tblWater	IndoorWaterUseRate	184,306,250.00	48,180,000.00
tblWater	IndoorWaterUseRate	44,639,064.35	48,180,000.00
tblWater	OutdoorWaterUseRate	58,984,222.67	32,120,000.00
tblWater	OutdoorWaterUseRate	3,151,838.49	32,120,000.00
tblWater	OutdoorWaterUseRate	14,148,294.34	32,120,000.00
tblWater	OutdoorWaterUseRate	18,280,920.63	32,120,000.00
tblWater	OutdoorWaterUseRate	1,606,562.10	32,120,000.00
tblWater	OutdoorWaterUseRate	0.00	32,120,000.00
tblWater	OutdoorWaterUseRate	27,359,426.54	32,120,000.00

2.0 Emissions Summary

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	19.4329	0.1486	12.5386	1.9400e-003		0.2900	0.2900		0.2899	0.2899	23.5037	55.4281	78.9318	0.0623	1.9600e-003	80.8484
Energy	0.8080	7.1367	4.6390	0.0441		0.5583	0.5583		0.5583	0.5583	0.0000	18,463.7628	18,463.7628	0.6266	0.2445	18,552.7237
Mobile	31.6875	83.0527	313.1060	0.4195	27.1977	1.2320	28.4297	7.3107	1.1308	8.4414	0.0000	35,440.1071	35,440.1071	1.7345	0.0000	35,476.5318
Waste						0.0000	0.0000		0.0000	0.0000	2,348.2624	0.0000	2,348.2624	138.7783	0.0000	5,262.6073
Water						0.0000	0.0000		0.0000	0.0000	106.9970	759.8182	866.8153	11.0240	0.2666	1,180.9639
Total	**51.9284**	**90.3380**	**330.2835**	**0.4655**	**27.1977**	**2.0802**	**29.2779**	**7.3107**	**1.9790**	**9.2896**	**2,478.7631**	**54,719.1162**	**57,197.8793**	**152.2257**	**0.5131**	**60,553.6751**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	19.4329	0.1486	12.5386	1.9400e-003		0.2900	0.2900		0.2899	0.2899	23.5037	55.4281	78.9318	0.0623	1.9600e-003	80.8484
Energy	0.8080	7.1367	4.6390	0.0441		0.5583	0.5583		0.5583	0.5583	0.0000	18,463.7628	18,463.7628	0.6266	0.2445	18,552.7237
Mobile	31.6875	83.0527	313.1060	0.4195	27.1977	1.2320	28.4297	7.3107	1.1308	8.4414	0.0000	35,440.1071	35,440.1071	1.7345	0.0000	35,476.5318
Waste						0.0000	0.0000		0.0000	0.0000	2,348.2624	0.0000	2,348.2624	138.7783	0.0000	5,262.6073
Water						0.0000	0.0000		0.0000	0.0000	106.9970	759.8182	866.8153	11.0220	0.2662	1,180.7932
Total	**51.9284**	**90.3380**	**330.2835**	**0.4655**	**27.1977**	**2.0802**	**29.2779**	**7.3107**	**1.9790**	**9.2896**	**2,478.7631**	**54,719.1162**	**57,197.8793**	**152.2237**	**0.5127**	**60,553.5044**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.08**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2013	12/31/2012	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	31.6875	83.0527	313.1060	0.4195	27.1977	1.2320	28.4297	7.3107	1.1308	8.4414	0.0000	35,440.1071	35,440.1071	1.7345	0.0000	35,476.5318
Unmitigated	31.6875	83.0527	313.1060	0.4195	27.1977	1.2320	28.4297	7.3107	1.1308	8.4414	0.0000	35,440.1071	35,440.1071	1.7345	0.0000	35,476.5318

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	7,352.32	10,281.76	8716.52	17,782,352	17,782,352
Automobile Care Center	2,331.25	3,388.92	3388.92	2,623,397	2,623,397
General Office Building	3,272.98	307.82	127.28	5,735,399	5,735,399
Government (Civic Center)	2,870.68	0.00	0.00	3,919,780	3,919,780
Hotel	3,192.00	4,668.30	3391.50	6,519,422	6,519,422
Industrial Park	3,809.66	1,984.53	581.81	8,095,696	8,095,696
Strip Mall	18,296.15	25,334.99	12311.94	28,408,697	28,408,697
Total	41,125.03	45,966.31	28,517.97	73,084,744	73,084,744

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
Automobile Care Center	9.50	7.30	7.30	33.00	48.00	19.00	21	51	28
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Government (Civic Center)	9.50	7.30	7.30	75.00	20.00	5.00	50	34	16
Hotel	9.50	7.30	7.30	19.40	61.60	19.00	58	38	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.542757	0.062006	0.168650	0.114572	0.031552	0.004717	0.018583	0.044562	0.001747	0.003723	0.005493	0.000211	0.001428

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
NaturalGas Mitigated	0.8080	7.1367	4.6390	0.0441		0.5583	0.5583		0.5583	0.5583	0.0000	7,996.4207	7,996.4207	0.1533	0.1466	8,045.0856
NaturalGas Unmitigated	0.8080	7.1367	4.6390	0.0441		0.5583	0.5583		0.5583	0.5583	0.0000	7,996.4207	7,996.4207	0.1533	0.1466	8,045.0856
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	10,467.3421	10,467.3421	0.4733	0.0979	10,507.6381
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	10,467.3421	10,467.3421	0.4733	0.0979	10,507.6381

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	7.0993e+007	0.3828	3.2713	1.3920	0.0209		0.2645	0.2645		0.2645	0.2645	0.0000	3,788.4559	3,788.4559	0.0726	0.0695	3,811.5118
Automobile Care Center	1.94549e+006	0.0105	0.0954	0.0801	5.7000e-004		7.2500e-003	7.2500e-003		7.2500e-003	7.2500e-003	0.0000	103.8189	103.8189	1.9900e-003	1.9000e-003	104.4507
General Office Building	4.64855e+006	0.0251	0.2279	0.1914	1.3700e-003		0.0173	0.0173		0.0173	0.0173	0.0000	248.0642	248.0642	4.7500e-003	4.5500e-003	249.5739
Government (Civic Center)	5.36758e+006	0.0289	0.2631	0.2210	1.5800e-003		0.0200	0.0200		0.0200	0.0200	0.0000	286.4343	286.4343	5.4900e-003	5.2500e-003	288.1775
Hotel	1.68673e+007	0.0910	0.8268	0.6945	4.9600e-003		0.0628	0.0628		0.0628	0.0628	0.0000	900.1035	900.1035	0.0173	0.0165	905.5814
Industrial Park	2.84929e+007	0.1536	1.3967	1.1732	8.3800e-003		0.1062	0.1062		0.1062	0.1062	0.0000	1,520.4912	1,520.4912	0.0291	0.0279	1,529.7446
Strip Mall	2.15324e+007	0.1161	1.0555	0.8866	6.3300e-003		0.0802	0.0802		0.0802	0.0802	0.0000	1,149.0527	1,149.0527	0.0220	0.0211	1,156.0456
Total		**0.8080**	**7.1367**	**4.6390**	**0.0441**		**0.5583**	**0.5583**		**0.5583**	**0.5583**	**0.0000**	**7,996.4207**	**7,996.4207**	**0.1533**	**0.1466**	**8,045.0856**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	7.0993e+007	0.3828	3.2713	1.3920	0.0209		0.2645	0.2645		0.2645	0.2645	0.0000	3,788.4559	3,788.4559	0.0726	0.0695	3,811.5118
Automobile Care Center	1.94549e+006	0.0105	0.0954	0.0801	5.7000e-004		7.2500e-003	7.2500e-003		7.2500e-003	7.2500e-003	0.0000	103.8189	103.8189	1.9900e-003	1.9000e-003	104.4507
General Office Building	4.64855e+006	0.0251	0.2279	0.1914	1.3700e-003		0.0173	0.0173		0.0173	0.0173	0.0000	248.0642	248.0642	4.7500e-003	4.5500e-003	249.5739
Government (Civic Center)	5.36758e+006	0.0289	0.2631	0.2210	1.5800e-003		0.0200	0.0200		0.0200	0.0200	0.0000	286.4343	286.4343	5.4900e-003	5.2500e-003	288.1775
Hotel	1.68673e+007	0.0910	0.8268	0.6945	4.9600e-003		0.0628	0.0628		0.0628	0.0628	0.0000	900.1035	900.1035	0.0173	0.0165	905.5814
Industrial Park	2.84929e+007	0.1536	1.3967	1.1732	8.3800e-003		0.1062	0.1062		0.1062	0.1062	0.0000	1,520.4912	1,520.4912	0.0291	0.0279	1,529.7446
Strip Mall	2.15324e+007	0.1161	1.0555	0.8866	6.3300e-003		0.0802	0.0802		0.0802	0.0802	0.0000	1,149.0527	1,149.0527	0.0220	0.0211	1,156.0456
Total		**0.8080**	**7.1367**	**4.6390**	**0.0441**		**0.5583**	**0.5583**		**0.5583**	**0.5583**	**0.0000**	**7,996.4207**	**7,996.4207**	**0.1533**	**0.1466**	**8,045.0856**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	8.1405e+006	2,368.1640	0.1071	0.0222	2,377.2807
Automobile Care Center	841826	244.8967	0.0111	2.2900e-003	245.8395
General Office Building	1.76642e+006	513.8725	0.0232	4.8100e-003	515.8508
Government (Civic Center)	2.04193e+006	594.0212	0.0269	5.5600e-003	596.3080
Hotel	2.83053e+006	823.4333	0.0372	7.7000e-003	826.6033
Industrial Park	1.21942e+007	3,547.4258	0.1604	0.0332	3,561.0823
Strip Mall	8.16581e+006	2,375.5285	0.1074	0.0222	2,384.6736
Total		**10,467.3420**	**0.4733**	**0.0979**	**10,507.6381**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	8.1405e+006	2,368.1640	0.1071	0.0222	2,377.2807
Automobile Care Center	841826	244.8967	0.0111	2.2900e-003	245.8395
General Office Building	1.76642e+006	513.8725	0.0232	4.8100e-003	515.8508
Government (Civic Center)	2.04193e+006	594.0212	0.0269	5.5600e-003	596.3080
Hotel	2.83053e+006	823.4333	0.0372	7.7000e-003	826.6033
Industrial Park	1.21942e+007	3,547.4258	0.1604	0.0332	3,561.0823
Strip Mall	8.16581e+006	2,375.5285	0.1074	0.0222	2,384.6736
Total		**10,467.3420**	**0.4733**	**0.0979**	**10,507.6381**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	19.4329	0.1486	12.5386	1.9400e-003		0.2900	0.2900		0.2899	0.2899	23.5037	55.4281	78.9318	0.0623	1.9600e-003	80.8484
Unmitigated	19.4329	0.1486	12.5386	1.9400e-003		0.2900	0.2900		0.2899	0.2899	23.5037	55.4281	78.9318	0.0623	1.9600e-003	80.8484

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.3468					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	15.6141					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.1136	0.0189	1.5935	1.3700e-003		0.2319	0.2319		0.2319	0.2319	23.5037	37.9700	61.4737	0.0436	1.9600e-003	62.9977
Landscaping	0.3584	0.1297	10.9451	5.6000e-004		0.0581	0.0581		0.0581	0.0581	0.0000	17.4581	17.4581	0.0187	0.0000	17.8507
Total	**19.4329**	**0.1486**	**12.5386**	**1.9300e-003**		**0.2900**	**0.2900**		**0.2899**	**0.2899**	**23.5037**	**55.4281**	**78.9318**	**0.0623**	**1.9600e-003**	**80.8484**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.3468					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	15.6141					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.1136	0.0189	1.5935	1.3700e-003		0.2319	0.2319		0.2319	0.2319	23.5037	37.9700	61.4737	0.0436	1.9600e-003	62.9977
Landscaping	0.3584	0.1297	10.9451	5.6000e-004		0.0581	0.0581		0.0581	0.0581	0.0000	17.4581	17.4581	0.0187	0.0000	17.8507
Total	**19.4329**	**0.1486**	**12.5386**	**1.9300e-003**		**0.2900**	**0.2900**		**0.2899**	**0.2899**	**23.5037**	**55.4281**	**78.9318**	**0.0623**	**1.9600e-003**	**80.8484**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Unmitigated	866.8153	11.0240	0.2666	1,180.9639
Mitigated	866.8153	11.0220	0.2662	1,180.7932

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	48.18 / 32.12	123.8308	1.5749	0.0381	168.7091
Automobile Care Center	48.18 / 32.12	123.8308	1.5749	0.0381	168.7091
General Office Building	48.18 / 32.12	123.8308	1.5749	0.0381	168.7091
Government (Civic Center)	48.18 / 32.12	123.8308	1.5749	0.0381	168.7091
Hotel	48.18 / 32.12	123.8308	1.5749	0.0381	168.7091
Industrial Park	48.18 / 32.12	123.8308	1.5749	0.0381	168.7091
Strip Mall	48.18 / 32.12	123.8308	1.5749	0.0381	168.7091
Total		**866.8153**	**11.0240**	**0.2666**	**1,180.9639**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	48.18 / 32.12	123.8308	1.5746	0.0380	168.6848
Automobile Care Center	48.18 / 32.12	123.8308	1.5746	0.0380	168.6848
General Office Building	48.18 / 32.12	123.8308	1.5746	0.0380	168.6848
Government (Civic Center)	48.18 / 32.12	123.8308	1.5746	0.0380	168.6848
Hotel	48.18 / 32.12	123.8308	1.5746	0.0380	168.6848
Industrial Park	48.18 / 32.12	123.8308	1.5746	0.0380	168.6848
Strip Mall	48.18 / 32.12	123.8308	1.5746	0.0380	168.6848
Total		**866.8153**	**11.0220**	**0.2662**	**1,180.7933**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	2,348.2624	138.7783	0.0000	5,262.6073
Unmitigated	2,348.2624	138.7783	0.0000	5,262.6073

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	3205.07	650.6003	38.4494	0.0000	1,458.0371
Automobile Care Center	311.35	63.2012	3.7351	0.0000	141.6380
General Office Building	739.49	150.1098	8.8712	0.0000	336.4057
Government (Civic Center)	191.81	38.9357	2.3010	0.0000	87.2574
Hotel	1623.7	329.5964	19.4786	0.0000	738.6468
Industrial Park	2065.53	419.2839	24.7790	0.0000	939.6423
Strip Mall	3431.36	696.5351	41.1640	0.0000	1,560.9800
Total		**2,348.2624**	**138.7783**	**0.0000**	**5,262.6073**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	3205.07	650.6003	38.4494	0.0000	1,458.0371
Automobile Care Center	311.35	63.2012	3.7351	0.0000	141.6380
General Office Building	739.49	150.1098	8.8712	0.0000	336.4057
Government (Civic Center)	191.81	38.9357	2.3010	0.0000	87.2574
Hotel	1623.7	329.5964	19.4786	0.0000	738.6468
Industrial Park	2065.53	419.2839	24.7790	0.0000	939.6423
Strip Mall	3431.36	696.5351	41.1640	0.0000	1,560.9800
Total		**2,348.2624**	**138.7783**	**0.0000**	**5,262.6073**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Construction CalEEMod Output

SFF Station Area Construction

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	27.21	1000sqft	0.62	27,213.00	0
Government (Civic Center)	1.88	1000sqft	0.04	1,877.00	0
Office Park	13.44	1000sqft	0.31	13,440.00	0
Research & Development	59.25	1000sqft	1.36	59,252.00	0
Industrial Park	11.03	1000sqft	0.25	11,026.00	0
Hotel	2.46	Room	0.08	3,571.92	0
Apartments Mid Rise	90.00	Dwelling Unit	2.37	90,000.00	257
Automobile Care Center	0.68	1000sqft	0.02	683.00	0
Strip Mall	7.53	1000sqft	0.17	7,533.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Phases assumed to occur within 1 year period

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Assume typical trenching equipment

Demolition -

Grading -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	35.00
tblConstructionPhase	NumDays	230.00	80.00
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	20.00	50.00
tblConstructionPhase	NumDays	20.00	35.00
tblGrading	MaterialExported	0.00	80,666.00
tblLandUse	LandUseSquareFeet	27,210.00	27,213.00
tblLandUse	LandUseSquareFeet	1,880.00	1,877.00
tblLandUse	LandUseSquareFeet	59,250.00	59,252.00
tblLandUse	LandUseSquareFeet	11,030.00	11,026.00
tblLandUse	LandUseSquareFeet	680.00	683.00
tblLandUse	LandUseSquareFeet	7,530.00	7,533.00
tblProjectCharacteristics	OperationalYear	2014	2022

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	1.7251	5.8296	5.1008	7.8600e-003	0.3338	0.2625	0.5963	0.1273	0.2441	0.3715	0.0000	719.5817	719.5817	0.0887	0.0000	721.4450
2016	0.1475	4.9800e-003	5.9900e-003	1.0000e-005	3.8000e-004	4.0000e-004	7.8000e-004	1.0000e-004	4.0000e-004	5.0000e-004	0.0000	0.8530	0.8530	8.0000e-005	0.0000	0.8547
Total	**1.8726**	**5.8346**	**5.1068**	**7.8700e-003**	**0.3342**	**0.2629**	**0.5971**	**0.1274**	**0.2445**	**0.3720**	**0.0000**	**720.4347**	**720.4347**	**0.0888**	**0.0000**	**722.2997**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	1.7251	5.8296	5.1008	7.8600e-003	0.3338	0.2625	0.5963	0.1273	0.2441	0.3715	0.0000	719.5814	719.5814	0.0887	0.0000	721.4447
2016	0.1475	4.9800e-003	5.9900e-003	1.0000e-005	3.8000e-004	4.0000e-004	7.8000e-004	1.0000e-004	4.0000e-004	5.0000e-004	0.0000	0.8530	0.8530	8.0000e-005	0.0000	0.8546
Total	**1.8726**	**5.8346**	**5.1068**	**7.8700e-003**	**0.3342**	**0.2629**	**0.5971**	**0.1274**	**0.2445**	**0.3720**	**0.0000**	**720.4344**	**720.4344**	**0.0888**	**0.0000**	**722.2993**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.0565	8.9100e-003	0.7700	1.2000e-004		0.0182	0.0182		0.0182	0.0182	1.4731	3.4735	4.9466	3.7900e-003	1.2000e-004	5.0644
Energy	0.0193	0.1734	0.1304	1.0500e-003		0.0134	0.0134		0.0134	0.0134	0.0000	681.6654	681.6654	0.0258	8.0900e-003	684.7173
Mobile	0.8436	2.0077	8.8319	0.0222	1.4368	0.0353	1.4721	0.3863	0.0325	0.4188	0.0000	1,553.1888	1,553.1888	0.0499	0.0000	1,554.2363
Waste						0.0000	0.0000		0.0000	0.0000	24.3528	0.0000	24.3528	1.4392	0.0000	54.5763
Water						0.0000	0.0000		0.0000	0.0000	14.5397	81.0427	95.5825	1.4970	0.0360	138.1863
Total	**1.9195**	**2.1899**	**9.7322**	**0.0234**	**1.4368**	**0.0669**	**1.5036**	**0.3863**	**0.0641**	**0.4504**	**40.3656**	**2,319.3705**	**2,359.7361**	**3.0158**	**0.0442**	**2,436.7806**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.0565	8.9100e-003	0.7700	1.2000e-004		0.0182	0.0182		0.0182	0.0182	1.4731	3.4735	4.9466	3.7900e-003	1.2000e-004	5.0644
Energy	0.0193	0.1734	0.1304	1.0500e-003		0.0134	0.0134		0.0134	0.0134	0.0000	681.6654	681.6654	0.0258	8.0900e-003	684.7173
Mobile	0.8436	2.0077	8.8319	0.0222	1.4368	0.0353	1.4721	0.3863	0.0325	0.4188	0.0000	1,553.1888	1,553.1888	0.0499	0.0000	1,554.2363
Waste						0.0000	0.0000		0.0000	0.0000	24.3528	0.0000	24.3528	1.4392	0.0000	54.5763
Water						0.0000	0.0000		0.0000	0.0000	14.5397	81.0427	95.5825	1.4968	0.0360	138.1631
Total	**1.9195**	**2.1899**	**9.7322**	**0.0234**	**1.4368**	**0.0669**	**1.5036**	**0.3863**	**0.0641**	**0.4504**	**40.3656**	**2,319.3705**	**2,359.7361**	**3.0155**	**0.0442**	**2,436.7574**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.14**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	2/25/2015	5	40	
2	Grading	Grading	2/26/2015	5/6/2015	5	50	
3	Trenching	Trenching	5/7/2015	6/10/2015	5	25	
4	Building Construction	Building Construction	6/11/2015	9/30/2015	5	80	
5	Paving	Paving	10/1/2015	11/18/2015	5	35	
6	Coating	Architectural Coating	11/19/2015	1/6/2016	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 25

Acres of Paving: 0

Residential Indoor: 182,250; Residential Outdoor: 60,750; Non-Residential Indoor: 186,894; Non-Residential Outdoor: 62,298 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Trenching	Excavators	1	8.00	162	0.38
Trenching	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Trenching	Trenchers	1	8.00	80	0.50
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38
Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	196.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	10,083.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	4	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	106.00	30.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Coating	1	21.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0213	0.0000	0.0213	3.2200e-003	0.0000	3.2200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0902	0.9673	0.7215	8.0000e-004		0.0490	0.0490		0.0457	0.0457	0.0000	74.8825	74.8825	0.0203	0.0000	75.3088
Total	**0.0902**	**0.9673**	**0.7215**	**8.0000e-004**	**0.0213**	**0.0490**	**0.0703**	**3.2200e-003**	**0.0457**	**0.0489**	**0.0000**	**74.8825**	**74.8825**	**0.0203**	**0.0000**	**75.3088**

3.2 Demolition - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.8200e-003	0.0341	0.0377	7.0000e-005	1.6300e-003	4.8000e-004	2.1100e-003	4.5000e-004	4.4000e-004	8.9000e-004	0.0000	6.5615	6.5615	5.0000e-005	0.0000	6.5627
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1900e-003	1.8500e-003	0.0177	3.0000e-005	2.7100e-003	2.0000e-005	2.7300e-003	7.2000e-004	2.0000e-005	7.4000e-004	0.0000	2.5277	2.5277	1.5000e-004	0.0000	2.5307
Total	**4.0100e-003**	**0.0359**	**0.0554**	**1.0000e-004**	**4.3400e-003**	**5.0000e-004**	**4.8400e-003**	**1.1700e-003**	**4.6000e-004**	**1.6300e-003**	**0.0000**	**9.0892**	**9.0892**	**2.0000e-004**	**0.0000**	**9.0934**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0213	0.0000	0.0213	3.2200e-003	0.0000	3.2200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0902	0.9673	0.7215	8.0000e-004		0.0490	0.0490		0.0457	0.0457	0.0000	74.8825	74.8825	0.0203	0.0000	75.3087
Total	**0.0902**	**0.9673**	**0.7215**	**8.0000e-004**	**0.0213**	**0.0490**	**0.0703**	**3.2200e-003**	**0.0457**	**0.0489**	**0.0000**	**74.8825**	**74.8825**	**0.0203**	**0.0000**	**75.3087**

3.2 Demolition - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.8200e-003	0.0341	0.0377	7.0000e-005	1.6300e-003	4.8000e-004	2.1100e-003	4.5000e-004	4.4000e-004	8.9000e-004	0.0000	6.5615	6.5615	5.0000e-005	0.0000	6.5627
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1900e-003	1.8500e-003	0.0177	3.0000e-005	2.7100e-003	2.0000e-005	2.7300e-003	7.2000e-004	2.0000e-005	7.4000e-004	0.0000	2.5277	2.5277	1.5000e-004	0.0000	2.5307
Total	**4.0100e-003**	**0.0359**	**0.0554**	**1.0000e-004**	**4.3400e-003**	**5.0000e-004**	**4.8400e-003**	**1.1700e-003**	**4.6000e-004**	**1.6300e-003**	**0.0000**	**9.0892**	**9.0892**	**2.0000e-004**	**0.0000**	**9.0934**

3.3 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1684	0.0000	0.1684	0.0849	0.0000	0.0849	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0958	1.0104	0.6668	7.4000e-004		0.0582	0.0582		0.0536	0.0536	0.0000	70.9649	70.9649	0.0212	0.0000	71.4098
Total	**0.0958**	**1.0104**	**0.6668**	**7.4000e-004**	**0.1684**	**0.0582**	**0.2266**	**0.0849**	**0.0536**	**0.1384**	**0.0000**	**70.9649**	**70.9649**	**0.0212**	**0.0000**	**71.4098**

3.3 Grading - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.1452	1.7523	1.9406	3.6700e-003	0.0840	0.0247	0.1087	0.0231	0.0227	0.0458	0.0000	337.5499	337.5499	2.8000e-003	0.0000	337.6087
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4900e-003	2.3200e-003	0.0221	4.0000e-005	3.3900e-003	3.0000e-005	3.4200e-003	9.0000e-004	3.0000e-005	9.3000e-004	0.0000	3.1596	3.1596	1.8000e-004	0.0000	3.1634
Total	**0.1467**	**1.7546**	**1.9627**	**3.7100e-003**	**0.0874**	**0.0247**	**0.1121**	**0.0240**	**0.0227**	**0.0467**	**0.0000**	**340.7095**	**340.7095**	**2.9800e-003**	**0.0000**	**340.7721**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1684	0.0000	0.1684	0.0849	0.0000	0.0849	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0958	1.0104	0.6668	7.4000e-004		0.0582	0.0582		0.0536	0.0536	0.0000	70.9648	70.9648	0.0212	0.0000	71.4097
Total	**0.0958**	**1.0104**	**0.6668**	**7.4000e-004**	**0.1684**	**0.0582**	**0.2266**	**0.0849**	**0.0536**	**0.1384**	**0.0000**	**70.9648**	**70.9648**	**0.0212**	**0.0000**	**71.4097**

3.3 Grading - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.1452	1.7523	1.9406	3.6700e-003	0.0840	0.0247	0.1087	0.0231	0.0227	0.0458	0.0000	337.5499	337.5499	2.8000e-003	0.0000	337.6087
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4900e-003	2.3200e-003	0.0221	4.0000e-005	3.3900e-003	3.0000e-005	3.4200e-003	9.0000e-004	3.0000e-005	9.3000e-004	0.0000	3.1596	3.1596	1.8000e-004	0.0000	3.1634
Total	**0.1467**	**1.7546**	**1.9627**	**3.7100e-003**	**0.0874**	**0.0247**	**0.1121**	**0.0240**	**0.0227**	**0.0467**	**0.0000**	**340.7095**	**340.7095**	**2.9800e-003**	**0.0000**	**340.7721**

3.4 Trenching - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0214	0.2099	0.1390	1.9000e-004		0.0147	0.0147		0.0135	0.0135	0.0000	17.8504	17.8504	5.3300e-003	0.0000	17.9623
Total	**0.0214**	**0.2099**	**0.1390**	**1.9000e-004**		**0.0147**	**0.0147**		**0.0135**	**0.0135**	**0.0000**	**17.8504**	**17.8504**	**5.3300e-003**	**0.0000**	**17.9623**

3.4 Trenching - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-004	7.7000e-004	7.3600e-003	1.0000e-005	1.1300e-003	1.0000e-005	1.1400e-003	3.0000e-004	1.0000e-005	3.1000e-004	0.0000	1.0532	1.0532	6.0000e-005	0.0000	1.0545
Total	**5.0000e-004**	**7.7000e-004**	**7.3600e-003**	**1.0000e-005**	**1.1300e-003**	**1.0000e-005**	**1.1400e-003**	**3.0000e-004**	**1.0000e-005**	**3.1000e-004**	**0.0000**	**1.0532**	**1.0532**	**6.0000e-005**	**0.0000**	**1.0545**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0214	0.2099	0.1390	1.9000e-004		0.0147	0.0147		0.0135	0.0135	0.0000	17.8503	17.8503	5.3300e-003	0.0000	17.9622
Total	**0.0214**	**0.2099**	**0.1390**	**1.9000e-004**		**0.0147**	**0.0147**		**0.0135**	**0.0135**	**0.0000**	**17.8503**	**17.8503**	**5.3300e-003**	**0.0000**	**17.9622**

3.4 Trenching - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-004	7.7000e-004	7.3600e-003	1.0000e-005	1.1300e-003	1.0000e-005	1.1400e-003	3.0000e-004	1.0000e-005	3.1000e-004	0.0000	1.0532	1.0532	6.0000e-005	0.0000	1.0545
Total	**5.0000e-004**	**7.7000e-004**	**7.3600e-003**	**1.0000e-005**	**1.1300e-003**	**1.0000e-005**	**1.1400e-003**	**3.0000e-004**	**1.0000e-005**	**3.1000e-004**	**0.0000**	**1.0532**	**1.0532**	**6.0000e-005**	**0.0000**	**1.0545**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1464	1.2012	0.7498	1.0700e-003		0.0847	0.0847		0.0796	0.0796	0.0000	97.5977	97.5977	0.0245	0.0000	98.1120
Total	**0.1464**	**1.2012**	**0.7498**	**1.0700e-003**		**0.0847**	**0.0847**		**0.0796**	**0.0796**	**0.0000**	**97.5977**	**97.5977**	**0.0245**	**0.0000**	**98.1120**

3.5 Building Construction - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0174	0.1393	0.2225	2.8000e-004	7.6600e-003	2.1600e-003	9.8200e-003	2.2000e-003	1.9900e-003	4.1800e-003	0.0000	25.6509	25.6509	2.3000e-004	0.0000	25.6557
Worker	0.0169	0.0262	0.2496	4.5000e-004	0.0383	3.3000e-004	0.0387	0.0102	3.0000e-004	0.0105	0.0000	35.7242	35.7242	2.0600e-003	0.0000	35.7675
Total	**0.0343**	**0.1655**	**0.4721**	**7.3000e-004**	**0.0460**	**2.4900e-003**	**0.0485**	**0.0124**	**2.2900e-003**	**0.0147**	**0.0000**	**61.3750**	**61.3750**	**2.2900e-003**	**0.0000**	**61.4231**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1464	1.2012	0.7498	1.0700e-003		0.0847	0.0847		0.0796	0.0796	0.0000	97.5976	97.5976	0.0245	0.0000	98.1119
Total	**0.1464**	**1.2012**	**0.7498**	**1.0700e-003**		**0.0847**	**0.0847**		**0.0796**	**0.0796**	**0.0000**	**97.5976**	**97.5976**	**0.0245**	**0.0000**	**98.1119**

3.5 Building Construction - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0174	0.1393	0.2225	2.8000e-004	7.6600e-003	2.1600e-003	9.8200e-003	2.2000e-003	1.9900e-003	4.1800e-003	0.0000	25.6509	25.6509	2.3000e-004	0.0000	25.6557
Worker	0.0169	0.0262	0.2496	4.5000e-004	0.0383	3.3000e-004	0.0387	0.0102	3.0000e-004	0.0105	0.0000	35.7242	35.7242	2.0600e-003	0.0000	35.7675
Total	**0.0343**	**0.1655**	**0.4721**	**7.3000e-004**	**0.0460**	**2.4900e-003**	**0.0485**	**0.0124**	**2.2900e-003**	**0.0147**	**0.0000**	**61.3750**	**61.3750**	**2.2900e-003**	**0.0000**	**61.4231**

3.6 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0406	0.4406	0.2621	3.9000e-004		0.0248	0.0248		0.0228	0.0228	0.0000	37.1476	37.1476	0.0111	0.0000	37.3805
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0406**	**0.4406**	**0.2621**	**3.9000e-004**		**0.0248**	**0.0248**		**0.0228**	**0.0228**	**0.0000**	**37.1476**	**37.1476**	**0.0111**	**0.0000**	**37.3805**

3.6 Paving - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0500e-003	1.6200e-003	0.0155	3.0000e-005	2.3700e-003	2.0000e-005	2.3900e-003	6.3000e-004	2.0000e-005	6.5000e-004	0.0000	2.2117	2.2117	1.3000e-004	0.0000	2.2144
Total	**1.0500e-003**	**1.6200e-003**	**0.0155**	**3.0000e-005**	**2.3700e-003**	**2.0000e-005**	**2.3900e-003**	**6.3000e-004**	**2.0000e-005**	**6.5000e-004**	**0.0000**	**2.2117**	**2.2117**	**1.3000e-004**	**0.0000**	**2.2144**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0406	0.4406	0.2621	3.9000e-004		0.0248	0.0248		0.0228	0.0228	0.0000	37.1476	37.1476	0.0111	0.0000	37.3805
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0406**	**0.4406**	**0.2621**	**3.9000e-004**		**0.0248**	**0.0248**		**0.0228**	**0.0228**	**0.0000**	**37.1476**	**37.1476**	**0.0111**	**0.0000**	**37.3805**

3.6 Paving - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0500e-003	1.6200e-003	0.0155	3.0000e-005	2.3700e-003	2.0000e-005	2.3900e-003	6.3000e-004	2.0000e-005	6.5000e-004	0.0000	2.2117	2.2117	1.3000e-004	0.0000	2.2144
Total	**1.0500e-003**	**1.6200e-003**	**0.0155**	**3.0000e-005**	**2.3700e-003**	**2.0000e-005**	**2.3900e-003**	**6.3000e-004**	**2.0000e-005**	**6.5000e-004**	**0.0000**	**2.2117**	**2.2117**	**1.3000e-004**	**0.0000**	**2.2144**

3.7 Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.1366					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3000e-003	0.0398	0.0295	5.0000e-005		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003	0.0000	3.9575	3.9575	5.2000e-004	0.0000	3.9684
Total	**1.1429**	**0.0398**	**0.0295**	**5.0000e-005**		**3.4200e-003**	**3.4200e-003**		**3.4200e-003**	**3.4200e-003**	**0.0000**	**3.9575**	**3.9575**	**5.2000e-004**	**0.0000**	**3.9684**

3.7 Coating - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3000e-003	2.0100e-003	0.0192	3.0000e-005	2.9400e-003	3.0000e-005	2.9700e-003	7.8000e-004	2.0000e-005	8.1000e-004	0.0000	2.7425	2.7425	1.6000e-004	0.0000	2.7458
Total	**1.3000e-003**	**2.0100e-003**	**0.0192**	**3.0000e-005**	**2.9400e-003**	**3.0000e-005**	**2.9700e-003**	**7.8000e-004**	**2.0000e-005**	**8.1000e-004**	**0.0000**	**2.7425**	**2.7425**	**1.6000e-004**	**0.0000**	**2.7458**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.1366					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3000e-003	0.0398	0.0295	5.0000e-005		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003	0.0000	3.9575	3.9575	5.2000e-004	0.0000	3.9684
Total	**1.1429**	**0.0398**	**0.0295**	**5.0000e-005**		**3.4200e-003**	**3.4200e-003**		**3.4200e-003**	**3.4200e-003**	**0.0000**	**3.9575**	**3.9575**	**5.2000e-004**	**0.0000**	**3.9684**

3.7 Coating - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3000e-003	2.0100e-003	0.0192	3.0000e-005	2.9400e-003	3.0000e-005	2.9700e-003	7.8000e-004	2.0000e-005	8.1000e-004	0.0000	2.7425	2.7425	1.6000e-004	0.0000	2.7458
Total	**1.3000e-003**	**2.0100e-003**	**0.0192**	**3.0000e-005**	**2.9400e-003**	**3.0000e-005**	**2.9700e-003**	**7.8000e-004**	**2.0000e-005**	**8.1000e-004**	**0.0000**	**2.7425**	**2.7425**	**1.6000e-004**	**0.0000**	**2.7458**

3.7 Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1467					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4000e-004	4.7400e-003	3.7700e-003	1.0000e-005		3.9000e-004	3.9000e-004		3.9000e-004	3.9000e-004	0.0000	0.5107	0.5107	6.0000e-005	0.0000	0.5119
Total	**0.1474**	**4.7400e-003**	**3.7700e-003**	**1.0000e-005**		**3.9000e-004**	**3.9000e-004**		**3.9000e-004**	**3.9000e-004**	**0.0000**	**0.5107**	**0.5107**	**6.0000e-005**	**0.0000**	**0.5119**

3.7 Coating - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	2.3000e-004	2.2200e-003	0.0000	3.8000e-004	0.0000	3.8000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3423	0.3423	2.0000e-005	0.0000	0.3427
Total	**1.5000e-004**	**2.3000e-004**	**2.2200e-003**	**0.0000**	**3.8000e-004**	**0.0000**	**3.8000e-004**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3423**	**0.3423**	**2.0000e-005**	**0.0000**	**0.3427**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1467					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4000e-004	4.7400e-003	3.7700e-003	1.0000e-005		3.9000e-004	3.9000e-004		3.9000e-004	3.9000e-004	0.0000	0.5107	0.5107	6.0000e-005	0.0000	0.5119
Total	**0.1474**	**4.7400e-003**	**3.7700e-003**	**1.0000e-005**		**3.9000e-004**	**3.9000e-004**		**3.9000e-004**	**3.9000e-004**	**0.0000**	**0.5107**	**0.5107**	**6.0000e-005**	**0.0000**	**0.5119**

3.7 Coating - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	2.3000e-004	2.2200e-003	0.0000	3.8000e-004	0.0000	3.8000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3423	0.3423	2.0000e-005	0.0000	0.3427
Total	**1.5000e-004**	**2.3000e-004**	**2.2200e-003**	**0.0000**	**3.8000e-004**	**0.0000**	**3.8000e-004**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3423**	**0.3423**	**2.0000e-005**	**0.0000**	**0.3427**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Unmitigated	0.8436	2.0077	8.8319	0.0222	1.4368	0.0353	1.4721	0.3863	0.0325	0.4188	0.0000	1,553.1888	1,553.1888	0.0499	0.0000	1,554.2363
Mitigated	0.8436	2.0077	8.8319	0.0222	1.4368	0.0353	1.4721	0.3863	0.0325	0.4188	0.0000	1,553.1888	1,553.1888	0.0499	0.0000	1,554.2363

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	593.10	644.40	546.30	1,325,451	1,325,451
Automobile Care Center	42.16	42.16	42.16	41,999	41,999
General Office Building	299.58	64.49	26.67	542,496	542,496
Government (Civic Center)	52.49	0.00	0.00	71,672	71,672
Hotel	20.10	20.15	14.64	36,716	36,716
Industrial Park	76.77	27.46	8.05	157,070	157,070
Office Park	153.48	22.04	10.21	286,314	286,314
Research & Development	480.52	112.58	65.77	924,064	924,064
Strip Mall	333.73	316.56	153.84	470,600	470,600
Total	2,051.93	1,249.84	867.63	3,856,383	3,856,383

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
Automobile Care Center	9.50	7.30	7.30	33.00	48.00	19.00	21	51	28
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Government (Civic Center)	9.50	7.30	7.30	75.00	20.00	5.00	50	34	16
Hotel	9.50	7.30	7.30	19.40	61.60	19.00	58	38	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Office Park	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Research & Development	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.541883	0.062137	0.166777	0.109558	0.030524	0.004555	0.019308	0.052541	0.001798	0.003633	0.005683	0.000194	0.001411

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
NaturalGas Mitigated	0.0193	0.1734	0.1304	1.0500e-003		0.0134	0.0134		0.0134	0.0134	0.0000	191.2737	191.2737	3.6700e-003	3.5100e-003	192.4378
NaturalGas Unmitigated	0.0193	0.1734	0.1304	1.0500e-003		0.0134	0.0134		0.0134	0.0134	0.0000	191.2737	191.2737	3.6700e-003	3.5100e-003	192.4378
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	490.3917	490.3917	0.0222	4.5900e-003	492.2796
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	490.3917	490.3917	0.0222	4.5900e-003	492.2796

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	796830	4.3000e-003	0.0367	0.0156	2.3000e-004		2.9700e-003	2.9700e-003		2.9700e-003	2.9700e-003	0.0000	42.5219	42.5219	8.2000e-004	7.8000e-004	42.7807
Automobile Care Center	17539.4	9.0000e-005	8.6000e-004	7.2000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	0.9360	0.9360	2.0000e-005	2.0000e-005	0.9417
General Office Building	552152	2.9800e-003	0.0271	0.0227	1.6000e-004		2.0600e-003	2.0600e-003		2.0600e-003	2.0600e-003	0.0000	29.4649	29.4649	5.6000e-004	5.4000e-004	29.6442
Government (Civic Center)	38084.3	2.1000e-004	1.8700e-003	1.5700e-003	1.0000e-005		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004	0.0000	2.0323	2.0323	4.0000e-005	4.0000e-005	2.0447
Hotel	135912	7.3000e-004	6.6600e-003	5.6000e-003	4.0000e-005		5.1000e-004	5.1000e-004		5.1000e-004	5.1000e-004	0.0000	7.2528	7.2528	1.4000e-004	1.3000e-004	7.2969
Industrial Park	223718	1.2100e-003	0.0110	9.2100e-003	7.0000e-005		8.3000e-004	8.3000e-004		8.3000e-004	8.3000e-004	0.0000	11.9384	11.9384	2.3000e-004	2.2000e-004	12.0111
Office Park	262349	1.4100e-003	0.0129	0.0108	8.0000e-005		9.8000e-004	9.8000e-004		9.8000e-004	9.8000e-004	0.0000	13.9999	13.9999	2.7000e-004	2.6000e-004	14.0851
Research & Development	1.52159e+006	8.2000e-003	0.0746	0.0627	4.5000e-004		5.6700e-003	5.6700e-003		5.6700e-003	5.6700e-003	0.0000	81.1979	81.1979	1.5600e-003	1.4900e-003	81.6921
Strip Mall	36158.4	1.9000e-004	1.7700e-003	1.4900e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004	0.0000	1.9296	1.9296	4.0000e-005	4.0000e-005	1.9413
Total		**0.0193**	**0.1734**	**0.1304**	**1.0600e-003**		**0.0134**	**0.0134**		**0.0134**	**0.0134**	**0.0000**	**191.2737**	**191.2737**	**3.6800e-003**	**3.5200e-003**	**192.4378**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	796830	4.3000e-003	0.0367	0.0156	2.3000e-004		2.9700e-003	2.9700e-003		2.9700e-003	2.9700e-003	0.0000	42.5219	42.5219	8.2000e-004	7.8000e-004	42.7807
Automobile Care Center	17539.4	9.0000e-005	8.6000e-004	7.2000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	0.9360	0.9360	2.0000e-005	2.0000e-005	0.9417
General Office Building	552152	2.9800e-003	0.0271	0.0227	1.6000e-004		2.0600e-003	2.0600e-003		2.0600e-003	2.0600e-003	0.0000	29.4649	29.4649	5.6000e-004	5.4000e-004	29.6442
Government (Civic Center)	38084.3	2.1000e-004	1.8700e-003	1.5700e-003	1.0000e-005		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004	0.0000	2.0323	2.0323	4.0000e-005	4.0000e-005	2.0447
Hotel	135912	7.3000e-004	6.6600e-003	5.6000e-003	4.0000e-005		5.1000e-004	5.1000e-004		5.1000e-004	5.1000e-004	0.0000	7.2528	7.2528	1.4000e-004	1.3000e-004	7.2969
Industrial Park	223718	1.2100e-003	0.0110	9.2100e-003	7.0000e-005		8.3000e-004	8.3000e-004		8.3000e-004	8.3000e-004	0.0000	11.9384	11.9384	2.3000e-004	2.2000e-004	12.0111
Office Park	262349	1.4100e-003	0.0129	0.0108	8.0000e-005		9.8000e-004	9.8000e-004		9.8000e-004	9.8000e-004	0.0000	13.9999	13.9999	2.7000e-004	2.6000e-004	14.0851
Research & Development	1.52159e+006	8.2000e-003	0.0746	0.0627	4.5000e-004		5.6700e-003	5.6700e-003		5.6700e-003	5.6700e-003	0.0000	81.1979	81.1979	1.5600e-003	1.4900e-003	81.6921
Strip Mall	36158.4	1.9000e-004	1.7700e-003	1.4900e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004	0.0000	1.9296	1.9296	4.0000e-005	4.0000e-005	1.9413
Total		**0.0193**	**0.1734**	**0.1304**	**1.0600e-003**		**0.0134**	**0.0134**		**0.0134**	**0.0134**	**0.0000**	**191.2737**	**191.2737**	**3.6800e-003**	**3.5200e-003**	**192.4378**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	325382	94.6572	4.2800e-003	8.9000e-004	95.0216
Automobile Care Center	5648.41	1.6432	7.0000e-005	2.0000e-005	1.6495
General Office Building	377716	109.8820	4.9700e-003	1.0300e-003	110.3051
Government (Civic Center)	26052.8	7.5791	3.4000e-004	7.0000e-005	7.6082
Hotel	32504.5	9.4559	4.3000e-004	9.0000e-005	9.4923
Industrial Park	153041	44.5214	2.0100e-003	4.2000e-004	44.6927
Office Park	187891	54.6597	2.4700e-003	5.1000e-004	54.8701
Research & Development	490014	142.5507	6.4500e-003	1.3300e-003	143.0995
Strip Mall	87458.1	25.4426	1.1500e-003	2.4000e-004	25.5405
Total		**490.3917**	**0.0222**	**4.6000e-003**	**492.2796**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	325382	94.6572	4.2800e-003	8.9000e-004	95.0216
Automobile Care Center	5648.41	1.6432	7.0000e-005	2.0000e-005	1.6495
General Office Building	377716	109.8820	4.9700e-003	1.0300e-003	110.3051
Government (Civic Center)	26052.8	7.5791	3.4000e-004	7.0000e-005	7.6082
Hotel	32504.5	9.4559	4.3000e-004	9.0000e-005	9.4923
Industrial Park	153041	44.5214	2.0100e-003	4.2000e-004	44.6927
Office Park	187891	54.6597	2.4700e-003	5.1000e-004	54.8701
Research & Development	490014	142.5507	6.4500e-003	1.3300e-003	143.0995
Strip Mall	87458.1	25.4426	1.1500e-003	2.4000e-004	25.5405
Total		**490.3917**	**0.0222**	**4.6000e-003**	**492.2796**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Unmitigated	1.0565	8.9100e-003	0.7700	1.2000e-004		0.0182	0.0182		0.0182	0.0182	1.4731	3.4735	4.9466	3.7900e-003	1.2000e-004	5.0644
Mitigated	1.0565	8.9100e-003	0.7700	1.2000e-004		0.0182	0.0182		0.0182	0.0182	1.4731	3.4735	4.9466	3.7900e-003	1.2000e-004	5.0644

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1283					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.8381					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0698	1.1900e-003	0.0999	9.0000e-005		0.0145	0.0145		0.0145	0.0145	1.4731	2.3797	3.8528	2.7400e-003	1.2000e-004	3.9483
Landscaping	0.0203	7.7300e-003	0.6701	4.0000e-005		3.7000e-003	3.7000e-003		3.7000e-003	3.7000e-003	0.0000	1.0938	1.0938	1.0600e-003	0.0000	1.1160
Total	**1.0565**	**8.9200e-003**	**0.7700**	**1.3000e-004**		**0.0182**	**0.0182**		**0.0182**	**0.0182**	**1.4731**	**3.4735**	**4.9466**	**3.8000e-003**	**1.2000e-004**	**5.0644**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1283					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.8381					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0698	1.1900e-003	0.0999	9.0000e-005		0.0145	0.0145		0.0145	0.0145	1.4731	2.3797	3.8528	2.7400e-003	1.2000e-004	3.9483
Landscaping	0.0203	7.7300e-003	0.6701	4.0000e-005		3.7000e-003	3.7000e-003		3.7000e-003	3.7000e-003	0.0000	1.0938	1.0938	1.0600e-003	0.0000	1.1160
Total	**1.0565**	**8.9200e-003**	**0.7700**	**1.3000e-004**		**0.0182**	**0.0182**		**0.0182**	**0.0182**	**1.4731**	**3.4735**	**4.9466**	**3.8000e-003**	**1.2000e-004**	**5.0644**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Unmitigated	95.5825	1.4970	0.0360	138.1863
Mitigated	95.5825	1.4968	0.0360	138.1631

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	5.86386 / 3.69678	14.8548	0.1917	4.6300e-003	20.3160
Automobile Care Center	0.0639751 / 0.0392106	0.1609	2.0900e-003	5.0000e-005	0.2205
General Office Building	4.83614 / 2.96408	12.1650	0.1581	3.8200e-003	16.6687
Government (Civic Center)	0.37348 / 0.228907	0.9395	0.0122	3.0000e-004	1.2873
Hotel	0.0624022 / 0.0069335	0.1251	2.0400e-003	5.0000e-005	0.1831
Industrial Park	2.55069 / 0	4.8243	0.0833	2.0000e-003	7.1935
Office Park	2.38874 / 1.46407	6.0087	0.0781	1.8900e-003	8.2333
Research & Development	29.1329 / 0	55.1012	0.9514	0.0228	82.1616
Strip Mall	0.557766 / 0.341857	1.4030	0.0182	4.4000e-004	1.9225
Total		**95.5825**	**1.4970**	**0.0360**	**138.1863**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	5.86386 / 3.69678	14.8548	0.1916	4.6300e-003	20.3130
Automobile Care Center	0.0639751 / 0.0392106	0.1609	2.0900e-003	5.0000e-005	0.2205
General Office Building	4.83614 / 2.96408	12.1650	0.1580	3.8100e-003	16.6662
Government (Civic Center)	0.37348 / 0.228907	0.9395	0.0122	2.9000e-004	1.2871
Hotel	0.0624022 / 0.0069335	0.1251	2.0400e-003	5.0000e-005	0.1830
Industrial Park	2.55069 / 0	4.8243	0.0833	2.0000e-003	7.1923
Office Park	2.38874 / 1.46407	6.0087	0.0781	1.8800e-003	8.2320
Research & Development	29.1329 / 0	55.1012	0.9512	0.0228	82.1468
Strip Mall	0.557766 / 0.341857	1.4030	0.0182	4.4000e-004	1.9222
Total		**95.5825**	**1.4968**	**0.0360**	**138.1631**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	24.3528	1.4392	0.0000	54.5763
Unmitigated	24.3528	1.4392	0.0000	54.5763

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	41.4	8.4038	0.4967	0.0000	18.8335
Automobile Care Center	2.6	0.5278	0.0312	0.0000	1.1828
General Office Building	25.31	5.1377	0.3036	0.0000	11.5139
Government (Civic Center)	10.72	2.1761	0.1286	0.0000	4.8767
Hotel	1.35	0.2740	0.0162	0.0000	0.6141
Industrial Park	13.68	2.7769	0.1641	0.0000	6.2233
Office Park	12.5	2.5374	0.1500	0.0000	5.6865
Research & Development	4.5	0.9135	0.0540	0.0000	2.0471
Strip Mall	7.91	1.6057	0.0949	0.0000	3.5984
Total		**24.3528**	**1.4392**	**0.0000**	**54.5763**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	41.4	8.4038	0.4967	0.0000	18.8335
Automobile Care Center	2.6	0.5278	0.0312	0.0000	1.1828
General Office Building	25.31	5.1377	0.3036	0.0000	11.5139
Government (Civic Center)	10.72	2.1761	0.1286	0.0000	4.8767
Hotel	1.35	0.2740	0.0162	0.0000	0.6141
Industrial Park	13.68	2.7769	0.1641	0.0000	6.2233
Office Park	12.5	2.5374	0.1500	0.0000	5.6865
Research & Development	4.5	0.9135	0.0540	0.0000	2.0471
Strip Mall	7.91	1.6057	0.0949	0.0000	3.5984
Total		**24.3528**	**1.4392**	**0.0000**	**54.5763**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Station Area Plan Growth CalEEMod Output

SSF Station Specific Plan EIR - Project Design and State Policies

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	511.78	1000sqft	7.00	511,780.00	0
Office Park	268.80	1000sqft	5.00	268,800.00	0
Research & Development	1,185.05	1000sqft	28.00	1,185,049.00	0
Industrial Park	21.25	1000sqft	9.00	21,250.00	0
Apartments Mid Rise	1,435.00	Dwelling Unit	35.00	1,435,000.00	4319

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2030
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	307	**CH4 Intensity (lb/MWhr)**	0.01388166	**N2O Intensity (lb/MWhr)**	0.0028721

1.3 User Entered Comments & Non-Default Data

Project Characteristics - GHG Emissions from Growth to appropriately account for reductions - Incorporates Project Design features and State Policies that reduce emissions

Land Use - 105 Acres. Population (based on 3.01 persons per household), Lot Acerage based on AQ modeling

Construction Phase - No Construction

Off-road Equipment - no construction

Trips and VMT - no construction

Vehicle Trips - Project Specific Trip Rates

Woodstoves - Defaults

Energy Use - Based on Project Specific Data

Water And Wastewater - Based on project specific total water usage

Solid Waste - Based on Project Specific Information

Mobile Land Use Mitigation - Reductions from the "Land Use" section are built into the project specific trip rates

Area Mitigation -

Energy Mitigation -

Water Mitigation - CalGreen Reduction Requirements

Waste Mitigation - State Requirement by 2020

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	250.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	250.00
tblConstructionPhase	NumDays	110.00	0.00
tblEnergyUse	LightingElect	741.44	1,162.58
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	4.07	2.77
tblEnergyUse	LightingElect	3.95	4.48
tblEnergyUse	LightingElect	3.43	5.37
tblEnergyUse	NT24E	2,561.86	4,016.99

tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	4.80	3.26
tblEnergyUse	NT24E	4.81	5.45
tblEnergyUse	NT24E	3.36	5.26
tblEnergyUse	NT24NG	1,662.00	9,280.44
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.17	2.14
tblEnergyUse	NT24NG	6.90	6.62
tblEnergyUse	T24E	312.05	489.30
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	5.01	9.27
tblEnergyUse	T24E	5.22	3.63
tblEnergyUse	T24E	1.48	2.32
tblEnergyUse	T24NG	7,191.67	40,157.57
tblEnergyUse	T24NG	19.28	34.01
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	18.35	33.58
tblEnergyUse	T24NG	18.78	18.03
tblLandUse	LandUseSquareFeet	1,185,050.00	1,185,049.00
tblLandUse	LotAcreage	11.75	7.00
tblLandUse	LotAcreage	6.17	5.00
tblLandUse	LotAcreage	27.21	28.00
tblLandUse	LotAcreage	0.49	9.00
tblLandUse	LotAcreage	37.76	35.00
tblLandUse	Population	4,104.00	4,319.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.01388166

tblProjectCharacteristics	CO2IntensityFactor	641.35	307
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.0028721
tblProjectCharacteristics	OperationalYear	2014	2030
tblSolidWaste	SolidWasteGenerationRate	660.10	3,202.88
tblSolidWaste	SolidWasteGenerationRate	475.96	2,914.16
tblSolidWaste	SolidWasteGenerationRate	26.35	55.12
tblSolidWaste	SolidWasteGenerationRate	249.98	1,530.63
tblSolidWaste	SolidWasteGenerationRate	90.06	2,162.63
tblTripsAndVMT	WorkerTripNumber	334.00	0.00
tblVehicleEF	HHD	9.5200e-003	9.8940e-003
tblVehicleEF	HHD	2.16	1.04
tblVehicleEF	HHD	62.72	57.45
tblVehicleEF	HHD	1,512.20	1,550.91
tblVehicleEF	HHD	4.8130e-003	0.06
tblVehicleEF	HHD	2.13	2.02
tblVehicleEF	HHD	4.01	3.60
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.03	0.04
tblVehicleEF	HHD	0.07	0.07
tblVehicleEF	HHD	5.6200e-004	4.9300e-004
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.5250e-003	8.7810e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	5.2100e-004	4.5800e-004
tblVehicleEF	HHD	1.3390e-003	1.2210e-003
tblVehicleEF	HHD	0.09	0.08
tblVehicleEF	HHD	1.0940e-003	9.0600e-004
tblVehicleEF	HHD	0.23	0.21

tblVehicleEF	HHD	0.56	0.41
tblVehicleEF	HHD	1.38	1.22
tblVehicleEF	HHD	0.02	0.02
tblVehicleEF	HHD	1.5750e-003	1.4870e-003
tblVehicleEF	HHD	1.3390e-003	1.2210e-003
tblVehicleEF	HHD	0.09	0.08
tblVehicleEF	HHD	1.0940e-003	9.0600e-004
tblVehicleEF	HHD	0.26	0.24
tblVehicleEF	HHD	0.56	0.41
tblVehicleEF	HHD	1.48	1.31
tblVehicleEF	HHD	9.5200e-003	9.8940e-003
tblVehicleEF	HHD	2.21	1.05
tblVehicleEF	HHD	43.78	39.49
tblVehicleEF	HHD	1,512.20	1,550.91
tblVehicleEF	HHD	4.8130e-003	0.06
tblVehicleEF	HHD	2.04	1.94
tblVehicleEF	HHD	3.73	3.34
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.03	0.04
tblVehicleEF	HHD	0.07	0.07
tblVehicleEF	HHD	5.6200e-004	4.9300e-004
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.5250e-003	8.7810e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	5.2100e-004	4.5800e-004
tblVehicleEF	HHD	3.0810e-003	2.8800e-003
tblVehicleEF	HHD	0.10	0.08
tblVehicleEF	HHD	1.8000e-003	1.8720e-003

tblVehicleEF	HHD	0.23	0.21
tblVehicleEF	HHD	0.53	0.40
tblVehicleEF	HHD	1.13	0.99
tblVehicleEF	HHD	0.02	0.02
tblVehicleEF	HHD	1.2700e-003	1.1980e-003
tblVehicleEF	HHD	3.0810e-003	2.8800e-003
tblVehicleEF	HHD	0.10	0.08
tblVehicleEF	HHD	1.8000e-003	1.8720e-003
tblVehicleEF	HHD	0.26	0.24
tblVehicleEF	HHD	0.53	0.40
tblVehicleEF	HHD	1.20	1.06
tblVehicleEF	HHD	9.5200e-003	9.8940e-003
tblVehicleEF	HHD	2.14	1.04
tblVehicleEF	HHD	77.76	73.09
tblVehicleEF	HHD	1,512.20	1,550.91
tblVehicleEF	HHD	4.8130e-003	0.06
tblVehicleEF	HHD	2.17	2.05
tblVehicleEF	HHD	4.20	3.80
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.03	0.04
tblVehicleEF	HHD	0.07	0.07
tblVehicleEF	HHD	5.6200e-004	4.9300e-004
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.5250e-003	8.7810e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	5.2100e-004	4.5800e-004
tblVehicleEF	HHD	9.0100e-004	6.0300e-004
tblVehicleEF	HHD	0.10	0.08

tblVehicleEF	HHD	4.9500e-004	4.6300e-004
tblVehicleEF	HHD	0.22	0.21
tblVehicleEF	HHD	0.63	0.47
tblVehicleEF	HHD	1.57	1.42
tblVehicleEF	HHD	0.02	0.02
tblVehicleEF	HHD	1.8170e-003	1.7380e-003
tblVehicleEF	HHD	9.0100e-004	6.0300e-004
tblVehicleEF	HHD	0.10	0.08
tblVehicleEF	HHD	4.9500e-004	4.6300e-004
tblVehicleEF	HHD	0.26	0.24
tblVehicleEF	HHD	0.63	0.47
tblVehicleEF	HHD	1.68	1.51
tblVehicleEF	LDA	7.2340e-003	7.6880e-003
tblVehicleEF	LDA	3.6810e-003	3.8050e-003
tblVehicleEF	LDA	0.53	0.55
tblVehicleEF	LDA	1.06	1.09
tblVehicleEF	LDA	201.98	206.76
tblVehicleEF	LDA	45.14	45.07
tblVehicleEF	LDA	0.58	0.54
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	1.9570e-003	2.0540e-003
tblVehicleEF	LDA	5.0170e-003	5.0330e-003
tblVehicleEF	LDA	1.8150e-003	1.9060e-003
tblVehicleEF	LDA	4.6550e-003	4.6700e-003
tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	0.02	0.02

tblVehicleEF	LDA	9.2680e-003	9.9430e-003
tblVehicleEF	LDA	0.17	0.18
tblVehicleEF	LDA	0.07	0.07
tblVehicleEF	LDA	3.3280e-003	3.4110e-003
tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.17	0.18
tblVehicleEF	LDA	0.07	0.07
tblVehicleEF	LDA	7.2340e-003	7.6880e-003
tblVehicleEF	LDA	3.6810e-003	3.8050e-003
tblVehicleEF	LDA	0.61	0.66
tblVehicleEF	LDA	0.74	0.72
tblVehicleEF	LDA	214.81	223.66
tblVehicleEF	LDA	45.14	45.07
tblVehicleEF	LDA	0.58	0.54
tblVehicleEF	LDA	0.05	0.05
tblVehicleEF	LDA	0.05	0.05
tblVehicleEF	LDA	1.9570e-003	2.0540e-003
tblVehicleEF	LDA	5.0170e-003	5.0330e-003
tblVehicleEF	LDA	1.8150e-003	1.9060e-003
tblVehicleEF	LDA	4.6550e-003	4.6700e-003
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.06	0.07
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.16	0.16

tblVehicleEF	LDA	0.05	0.05
tblVehicleEF	LDA	3.5410e-003	3.6910e-003
tblVehicleEF	LDA	7.5100e-004	7.5000e-004
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.06	0.07
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.16	0.16
tblVehicleEF	LDA	0.05	0.05
tblVehicleEF	LDA	7.2340e-003	7.6880e-003
tblVehicleEF	LDA	3.6810e-003	3.8050e-003
tblVehicleEF	LDA	0.53	0.55
tblVehicleEF	LDA	1.27	1.34
tblVehicleEF	LDA	201.19	205.07
tblVehicleEF	LDA	45.14	45.07
tblVehicleEF	LDA	0.58	0.54
tblVehicleEF	LDA	0.06	0.07
tblVehicleEF	LDA	0.06	0.07
tblVehicleEF	LDA	1.9570e-003	2.0540e-003
tblVehicleEF	LDA	5.0170e-003	5.0330e-003
tblVehicleEF	LDA	1.8150e-003	1.9060e-003
tblVehicleEF	LDA	4.6550e-003	4.6700e-003
tblVehicleEF	LDA	9.2420e-003	7.5200e-003
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	8.0130e-003	8.6730e-003
tblVehicleEF	LDA	9.0960e-003	9.6940e-003
tblVehicleEF	LDA	0.21	0.21
tblVehicleEF	LDA	0.08	0.08

tblVehicleEF	LDA	3.3150e-003	3.3830e-003
tblVehicleEF	LDA	7.6000e-004	7.6100e-004
tblVehicleEF	LDA	9.2420e-003	7.5200e-003
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	8.0130e-003	8.6730e-003
tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.21	0.21
tblVehicleEF	LDA	0.08	0.08
tblVehicleEF	LDT1	0.01	0.01
tblVehicleEF	LDT1	7.1200e-003	7.6180e-003
tblVehicleEF	LDT1	0.95	0.93
tblVehicleEF	LDT1	1.93	2.03
tblVehicleEF	LDT1	252.76	254.57
tblVehicleEF	LDT1	56.08	55.75
tblVehicleEF	LDT1	0.06	0.06
tblVehicleEF	LDT1	0.10	0.10
tblVehicleEF	LDT1	0.11	0.11
tblVehicleEF	LDT1	2.2190e-003	2.3220e-003
tblVehicleEF	LDT1	4.7250e-003	4.8560e-003
tblVehicleEF	LDT1	2.0590e-003	2.1540e-003
tblVehicleEF	LDT1	4.3840e-003	4.5050e-003
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.15	0.16
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.52	0.54
tblVehicleEF	LDT1	0.13	0.14
tblVehicleEF	LDT1	3.8640e-003	3.9590e-003

tblVehicleEF	LDT1	8.9000e-004	8.9100e-004
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.15	0.16
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.52	0.54
tblVehicleEF	LDT1	0.13	0.14
tblVehicleEF	LDT1	0.01	0.01
tblVehicleEF	LDT1	7.1200e-003	7.6180e-003
tblVehicleEF	LDT1	1.07	1.09
tblVehicleEF	LDT1	1.34	1.34
tblVehicleEF	LDT1	268.02	274.46
tblVehicleEF	LDT1	56.08	55.75
tblVehicleEF	LDT1	0.06	0.06
tblVehicleEF	LDT1	0.09	0.09
tblVehicleEF	LDT1	0.09	0.10
tblVehicleEF	LDT1	2.2190e-003	2.3220e-003
tblVehicleEF	LDT1	4.7250e-003	4.8560e-003
tblVehicleEF	LDT1	2.0590e-003	2.1540e-003
tblVehicleEF	LDT1	4.3840e-003	4.5050e-003
tblVehicleEF	LDT1	0.13	0.15
tblVehicleEF	LDT1	0.16	0.18
tblVehicleEF	LDT1	0.09	0.12
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.47	0.49
tblVehicleEF	LDT1	0.10	0.10
tblVehicleEF	LDT1	4.1000e-003	4.2720e-003
tblVehicleEF	LDT1	0.13	0.15

tblVehicleEF	LDT1	0.16	0.18
tblVehicleEF	LDT1	0.09	0.12
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.47	0.49
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.01	0.01
tblVehicleEF	LDT1	7.1200e-003	7.6180e-003
tblVehicleEF	LDT1	0.95	0.93
tblVehicleEF	LDT1	2.31	2.49
tblVehicleEF	LDT1	251.83	252.58
tblVehicleEF	LDT1	56.08	55.75
tblVehicleEF	LDT1	0.06	0.06
tblVehicleEF	LDT1	0.11	0.11
tblVehicleEF	LDT1	0.11	0.12
tblVehicleEF	LDT1	2.2190e-003	2.3220e-003
tblVehicleEF	LDT1	4.7250e-003	4.8560e-003
tblVehicleEF	LDT1	2.0590e-003	2.1540e-003
tblVehicleEF	LDT1	4.3840e-003	4.5050e-003
tblVehicleEF	LDT1	0.03	0.02
tblVehicleEF	LDT1	0.16	0.17
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.64	0.66
tblVehicleEF	LDT1	0.15	0.16
tblVehicleEF	LDT1	3.8500e-003	3.9280e-003
tblVehicleEF	LDT1	8.9700e-004	8.9900e-004
tblVehicleEF	LDT1	0.03	0.02
tblVehicleEF	LDT1	0.16	0.17

tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.64	0.66
tblVehicleEF	LDT1	0.16	0.17
tblVehicleEF	LDT2	9.4620e-003	9.7140e-003
tblVehicleEF	LDT2	4.9380e-003	5.0320e-003
tblVehicleEF	LDT2	0.69	0.69
tblVehicleEF	LDT2	1.40	1.42
tblVehicleEF	LDT2	314.74	320.82
tblVehicleEF	LDT2	70.23	70.17
tblVehicleEF	LDT2	0.17	0.17
tblVehicleEF	LDT2	0.08	0.08
tblVehicleEF	LDT2	0.09	0.09
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
tblVehicleEF	LDT2	4.8650e-003	4.8810e-003
tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
tblVehicleEF	LDT2	4.5140e-003	4.5290e-003
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.10	0.11
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.37	0.36
tblVehicleEF	LDT2	0.09	0.09
tblVehicleEF	LDT2	4.5270e-003	4.6380e-003
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.10	0.11
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.02	0.02

tblVehicleEF	LDT2	0.37	0.36
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	9.4620e-003	9.7140e-003
tblVehicleEF	LDT2	4.9380e-003	5.0320e-003
tblVehicleEF	LDT2	0.79	0.81
tblVehicleEF	LDT2	0.97	0.93
tblVehicleEF	LDT2	334.04	346.27
tblVehicleEF	LDT2	70.23	70.17
tblVehicleEF	LDT2	0.17	0.17
tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	0.08	0.08
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
tblVehicleEF	LDT2	4.8650e-003	4.8810e-003
tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
tblVehicleEF	LDT2	4.5140e-003	4.5290e-003
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.07	0.09
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.33	0.34
tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	4.8060e-003	5.0080e-003
tblVehicleEF	LDT2	1.0250e-003	1.0240e-003
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.07	0.09
tblVehicleEF	LDT2	0.02	0.03
tblVehicleEF	LDT2	0.33	0.34

tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	9.4620e-003	9.7140e-003
tblVehicleEF	LDT2	4.9380e-003	5.0320e-003
tblVehicleEF	LDT2	0.69	0.68
tblVehicleEF	LDT2	1.67	1.74
tblVehicleEF	LDT2	313.55	318.27
tblVehicleEF	LDT2	70.23	70.17
tblVehicleEF	LDT2	0.17	0.17
tblVehicleEF	LDT2	0.09	0.09
tblVehicleEF	LDT2	0.10	0.10
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
tblVehicleEF	LDT2	4.8650e-003	4.8810e-003
tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
tblVehicleEF	LDT2	4.5140e-003	4.5290e-003
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.44	0.44
tblVehicleEF	LDT2	0.10	0.11
tblVehicleEF	LDT2	4.5100e-003	4.6020e-003
tblVehicleEF	LDT2	1.0370e-003	1.0380e-003
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.44	0.44
tblVehicleEF	LDT2	0.11	0.11

tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17
tblVehicleEF	LHD1	0.62	0.63
tblVehicleEF	LHD1	3.27	3.11
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.48	0.53
tblVehicleEF	LHD1	1.10	1.06
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003
tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	1.4760e-003	1.5500e-003
tblVehicleEF	LHD1	0.07	0.06
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.1090e-003	1.0580e-003
tblVehicleEF	LHD1	0.05	0.06

tblVehicleEF	LHD1	0.39	0.36
tblVehicleEF	LHD1	0.25	0.24
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003
tblVehicleEF	LHD1	5.2800e-004	5.0500e-004
tblVehicleEF	LHD1	1.4760e-003	1.5500e-003
tblVehicleEF	LHD1	0.07	0.06
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.1090e-003	1.0580e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.39	0.36
tblVehicleEF	LHD1	0.27	0.25
tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17
tblVehicleEF	LHD1	0.63	0.65
tblVehicleEF	LHD1	2.29	2.13
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.45	0.50
tblVehicleEF	LHD1	1.03	0.98
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003

tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	3.4290e-003	3.6990e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.8130e-003	2.1850e-003
tblVehicleEF	LHD1	0.05	0.06
tblVehicleEF	LHD1	0.37	0.35
tblVehicleEF	LHD1	0.21	0.19
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003
tblVehicleEF	LHD1	5.1100e-004	4.8800e-004
tblVehicleEF	LHD1	3.4290e-003	3.6990e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.8130e-003	2.1850e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.37	0.35
tblVehicleEF	LHD1	0.22	0.21
tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17

tblVehicleEF	LHD1	0.61	0.62
tblVehicleEF	LHD1	4.07	3.96
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.49	0.54
tblVehicleEF	LHD1	1.16	1.12
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003
tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	9.5100e-004	7.2100e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	5.0300e-004	5.4000e-004
tblVehicleEF	LHD1	0.05	0.06
tblVehicleEF	LHD1	0.44	0.41
tblVehicleEF	LHD1	0.29	0.28
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003

tblVehicleEF	LHD1	5.4200e-004	5.2000e-004
tblVehicleEF	LHD1	9.5100e-004	7.2100e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	5.0300e-004	5.4000e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.44	0.41
tblVehicleEF	LHD1	0.31	0.30
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.57	0.59
tblVehicleEF	LHD2	2.03	1.86
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003
tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.67	0.73
tblVehicleEF	LHD2	0.70	0.63
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03

tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	6.2800e-004	5.6700e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.19	0.17
tblVehicleEF	LHD2	0.14	0.13
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.6700e-004	3.3600e-004
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	6.2800e-004	5.6700e-004
tblVehicleEF	LHD2	0.07	0.08
tblVehicleEF	LHD2	0.19	0.17
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.58	0.60
tblVehicleEF	LHD2	1.42	1.27
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003

tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.64	0.70
tblVehicleEF	LHD2	0.65	0.59
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	1.8260e-003	1.8790e-003
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.0180e-003	1.1610e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.18	0.17
tblVehicleEF	LHD2	0.11	0.10
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.5700e-004	3.2600e-004
tblVehicleEF	LHD2	1.8260e-003	1.8790e-003
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.0180e-003	1.1610e-003
tblVehicleEF	LHD2	0.07	0.08

tblVehicleEF	LHD2	0.18	0.17
tblVehicleEF	LHD2	0.12	0.11
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.57	0.59
tblVehicleEF	LHD2	2.53	2.37
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003
tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.68	0.74
tblVehicleEF	LHD2	0.73	0.67
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	5.2900e-004	3.8400e-004
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02

tblVehicleEF	LHD2	2.8800e-004	2.9200e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.21	0.19
tblVehicleEF	LHD2	0.16	0.15
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.7600e-004	3.4400e-004
tblVehicleEF	LHD2	5.2900e-004	3.8400e-004
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	2.8800e-004	2.9200e-004
tblVehicleEF	LHD2	0.07	0.08
tblVehicleEF	LHD2	0.21	0.19
tblVehicleEF	LHD2	0.17	0.16
tblVehicleEF	MCY	23.41	23.81
tblVehicleEF	MCY	11.42	11.30
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.23	1.22
tblVehicleEF	MCY	0.32	0.32
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	0.53	0.59
tblVehicleEF	MCY	0.35	0.35
tblVehicleEF	MCY	0.30	0.34
tblVehicleEF	MCY	2.60	2.64
tblVehicleEF	MCY	1.17	1.17

tblVehicleEF	MCY	2.23	2.21
tblVehicleEF	MCY	2.1150e-003	2.1420e-003
tblVehicleEF	MCY	6.5500e-004	6.5300e-004
tblVehicleEF	MCY	0.53	0.59
tblVehicleEF	MCY	0.35	0.35
tblVehicleEF	MCY	0.30	0.34
tblVehicleEF	MCY	2.85	2.89
tblVehicleEF	MCY	1.17	1.17
tblVehicleEF	MCY	2.39	2.37
tblVehicleEF	MCY	21.78	22.45
tblVehicleEF	MCY	9.06	8.85
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.08	1.07
tblVehicleEF	MCY	0.29	0.29
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	1.60	1.80
tblVehicleEF	MCY	0.44	0.51
tblVehicleEF	MCY	0.78	1.10
tblVehicleEF	MCY	2.50	2.55
tblVehicleEF	MCY	1.03	1.06
tblVehicleEF	MCY	1.82	1.78
tblVehicleEF	MCY	2.0860e-003	2.1180e-003
tblVehicleEF	MCY	6.0500e-004	6.0000e-004
tblVehicleEF	MCY	1.60	1.80
tblVehicleEF	MCY	0.44	0.51

tblVehicleEF	MCY	0.78	1.10
tblVehicleEF	MCY	2.75	2.79
tblVehicleEF	MCY	1.03	1.06
tblVehicleEF	MCY	1.95	1.91
tblVehicleEF	MCY	25.23	25.90
tblVehicleEF	MCY	13.37	13.51
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.31	1.31
tblVehicleEF	MCY	0.34	0.34
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	0.22	0.14
tblVehicleEF	MCY	0.41	0.40
tblVehicleEF	MCY	0.09	0.10
tblVehicleEF	MCY	2.68	2.74
tblVehicleEF	MCY	1.48	1.48
tblVehicleEF	MCY	2.55	2.58
tblVehicleEF	MCY	2.1460e-003	2.1780e-003
tblVehicleEF	MCY	6.9600e-004	6.9900e-004
tblVehicleEF	MCY	0.22	0.14
tblVehicleEF	MCY	0.41	0.40
tblVehicleEF	MCY	0.09	0.10
tblVehicleEF	MCY	2.94	3.00
tblVehicleEF	MCY	1.48	1.48
tblVehicleEF	MCY	2.74	2.77
tblVehicleEF	MDV	0.01	0.01

tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	1.03	1.07
tblVehicleEF	MDV	2.69	2.74
tblVehicleEF	MDV	416.43	427.07
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.13	0.14
tblVehicleEF	MDV	0.21	0.21
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.06	0.07
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	0.07	0.08
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.56	0.58
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	5.7930e-003	5.9340e-003
tblVehicleEF	MDV	1.3310e-003	1.3320e-003
tblVehicleEF	MDV	0.06	0.07
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	0.07	0.08
tblVehicleEF	MDV	0.03	0.04
tblVehicleEF	MDV	0.56	0.58
tblVehicleEF	MDV	0.20	0.21
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	0.01	0.01

tblVehicleEF	MDV	1.17	1.26
tblVehicleEF	MDV	1.86	1.81
tblVehicleEF	MDV	441.90	460.68
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.12	0.12
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.14	0.16
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	0.12	0.15
tblVehicleEF	MDV	0.02	0.03
tblVehicleEF	MDV	0.51	0.54
tblVehicleEF	MDV	0.15	0.15
tblVehicleEF	MDV	6.1490e-003	6.4040e-003
tblVehicleEF	MDV	1.3170e-003	1.3150e-003
tblVehicleEF	MDV	0.14	0.16
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	0.12	0.15
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.51	0.54
tblVehicleEF	MDV	0.16	0.16
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	1.03	1.06

tblVehicleEF	MDV	3.21	3.36
tblVehicleEF	MDV	414.87	423.71
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.14	0.15
tblVehicleEF	MDV	0.22	0.23
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.19	0.19
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.67	0.70
tblVehicleEF	MDV	0.22	0.23
tblVehicleEF	MDV	5.7710e-003	5.8870e-003
tblVehicleEF	MDV	1.3410e-003	1.3420e-003
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.19	0.19
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.03	0.04
tblVehicleEF	MDV	0.67	0.70
tblVehicleEF	MDV	0.24	0.25
tblVehicleEF	MH	0.34	0.34
tblVehicleEF	MH	4.75	4.94
tblVehicleEF	MH	681.67	666.32
tblVehicleEF	MH	27.72	28.78

tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.87	0.75
tblVehicleEF	MH	0.56	0.58
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.36	0.41
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.20	0.20
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.65	0.71
tblVehicleEF	MH	0.25	0.26
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	3.9000e-004	4.0500e-004
tblVehicleEF	MH	0.36	0.41
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.20	0.20
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.65	0.71
tblVehicleEF	MH	0.26	0.27
tblVehicleEF	MH	0.35	0.35
tblVehicleEF	MH	3.30	3.37
tblVehicleEF	MH	681.67	666.32

tblVehicleEF	MH	27.72	28.78
tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.83	0.71
tblVehicleEF	MH	0.52	0.54
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.79	0.95
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.33	0.42
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.62	0.69
tblVehicleEF	MH	0.20	0.21
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	3.6600e-004	3.7900e-004
tblVehicleEF	MH	0.79	0.95
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.33	0.42
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.62	0.69
tblVehicleEF	MH	0.21	0.22
tblVehicleEF	MH	0.34	0.34
tblVehicleEF	MH	5.91	6.31

tblVehicleEF	MH	681.67	666.32
tblVehicleEF	MH	27.72	28.78
tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.89	0.77
tblVehicleEF	MH	0.58	0.61
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.25	0.20
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.08	0.11
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.71	0.78
tblVehicleEF	MH	0.28	0.30
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	4.0900e-004	4.2800e-004
tblVehicleEF	MH	0.25	0.20
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.08	0.11
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.71	0.78
tblVehicleEF	MH	0.30	0.32
tblVehicleEF	MHD	4.6090e-003	4.8160e-003

tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	11.12	10.36
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.94	0.97
tblVehicleEF	MHD	1.22	1.11
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	1.1590e-003	1.3660e-003
tblVehicleEF	MHD	0.07	0.07
tblVehicleEF	MHD	8.8500e-004	9.3000e-004
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.38	0.39
tblVehicleEF	MHD	0.64	0.59
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	7.4200e-004	7.2800e-004
tblVehicleEF	MHD	1.1590e-003	1.3660e-003
tblVehicleEF	MHD	0.07	0.07
tblVehicleEF	MHD	8.8500e-004	9.3000e-004
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.38	0.39

tblVehicleEF	MHD	0.68	0.63
tblVehicleEF	MHD	4.6090e-003	4.8160e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	7.76	7.12
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.90	0.93
tblVehicleEF	MHD	1.13	1.03
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	2.7270e-003	3.3120e-003
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	1.4790e-003	1.9650e-003
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.36	0.37
tblVehicleEF	MHD	0.52	0.48
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	6.8500e-004	6.7400e-004
tblVehicleEF	MHD	2.7270e-003	3.3120e-003
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	1.4790e-003	1.9650e-003

tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.36	0.37
tblVehicleEF	MHD	0.55	0.51
tblVehicleEF	MHD	4.6090e-003	4.8160e-003
tblVehicleEF	MHD	0.43	0.42
tblVehicleEF	MHD	13.78	13.18
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.96	0.98
tblVehicleEF	MHD	1.28	1.17
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	7.4400e-004	6.2200e-004
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	3.9400e-004	4.6400e-004
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.43	0.44
tblVehicleEF	MHD	0.73	0.68
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	7.8600e-004	7.7500e-004
tblVehicleEF	MHD	7.4400e-004	6.2200e-004

tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	3.9400e-004	4.6400e-004
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.43	0.44
tblVehicleEF	MHD	0.77	0.73
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.64	0.62
tblVehicleEF	OBUS	7.33	7.25
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	32.73	32.73
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.19	1.09
tblVehicleEF	OBUS	0.98	0.94
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	5.8400e-004	6.6800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	3.5100e-004	3.5400e-004
tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.28	0.29
tblVehicleEF	OBUS	0.45	0.42
tblVehicleEF	OBUS	0.01	0.01

tblVehicleEF	OBUS	4.9200e-004	4.9000e-004
tblVehicleEF	OBUS	5.8400e-004	6.6800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	3.5100e-004	3.5400e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.28	0.29
tblVehicleEF	OBUS	0.48	0.45
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.65	0.63
tblVehicleEF	OBUS	5.11	4.95
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.14	1.04
tblVehicleEF	OBUS	0.91	0.87
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	1.2860e-003	1.5560e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	5.7500e-004	7.3200e-004
tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.27	0.28
tblVehicleEF	OBUS	0.36	0.34

tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	4.5500e-004	4.5200e-004
tblVehicleEF	OBUS	1.2860e-003	1.5560e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	5.7500e-004	7.3200e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.27	0.28
tblVehicleEF	OBUS	0.39	0.37
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.64	0.62
tblVehicleEF	OBUS	9.14	9.26
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.21	1.11
tblVehicleEF	OBUS	1.03	0.99
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	4.1300e-004	3.3800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	1.4200e-004	1.9000e-004
tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.31	0.32

tblVehicleEF	OBUS	0.51	0.49
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	5.2300e-004	5.2400e-004
tblVehicleEF	OBUS	4.1300e-004	3.3800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	1.4200e-004	1.9000e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.31	0.32
tblVehicleEF	OBUS	0.54	0.53
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.39	2.30
tblVehicleEF	SBUS	27.83	21.92
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	115.30	115.30
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.71	4.02
tblVehicleEF	SBUS	2.57	2.17
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.20	0.20
tblVehicleEF	SBUS	9.1610e-003	8.7240e-003

tblVehicleEF	SBUS	0.39	0.26
tblVehicleEF	SBUS	1.67	2.92
tblVehicleEF	SBUS	1.82	1.33
tblVehicleEF	SBUS	9.8330e-003	0.01
tblVehicleEF	SBUS	1.7730e-003	1.6650e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.20	0.20
tblVehicleEF	SBUS	9.1610e-003	8.7240e-003
tblVehicleEF	SBUS	0.44	0.30
tblVehicleEF	SBUS	1.67	2.92
tblVehicleEF	SBUS	1.95	1.42
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.52	2.36
tblVehicleEF	SBUS	22.57	17.30
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.51	3.82
tblVehicleEF	SBUS	2.39	1.99
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.04	0.05
tblVehicleEF	SBUS	0.20	0.21

tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.40	0.26
tblVehicleEF	SBUS	1.46	2.57
tblVehicleEF	SBUS	1.61	1.16
tblVehicleEF	SBUS	9.8350e-003	0.01
tblVehicleEF	SBUS	1.6840e-003	1.5870e-003
tblVehicleEF	SBUS	0.04	0.05
tblVehicleEF	SBUS	0.20	0.21
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.45	0.30
tblVehicleEF	SBUS	1.46	2.57
tblVehicleEF	SBUS	1.72	1.23
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.30	2.25
tblVehicleEF	SBUS	32.27	25.92
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.81	4.11
tblVehicleEF	SBUS	2.70	2.30
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.01	8.3260e-003

tblVehicleEF	SBUS	0.22	0.22
tblVehicleEF	SBUS	3.3240e-003	4.3910e-003
tblVehicleEF	SBUS	0.38	0.26
tblVehicleEF	SBUS	2.07	3.59
tblVehicleEF	SBUS	1.99	1.47
tblVehicleEF	SBUS	9.8310e-003	0.01
tblVehicleEF	SBUS	1.8480e-003	1.7320e-003
tblVehicleEF	SBUS	0.01	8.3260e-003
tblVehicleEF	SBUS	0.22	0.22
tblVehicleEF	SBUS	3.3240e-003	4.3910e-003
tblVehicleEF	SBUS	0.43	0.30
tblVehicleEF	SBUS	2.07	3.59
tblVehicleEF	SBUS	2.12	1.57
tblVehicleEF	UBUS	2.87	2.40
tblVehicleEF	UBUS	4.95	4.33
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.72	9.03
tblVehicleEF	UBUS	0.70	0.63
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	1.2010e-003	1.3720e-003
tblVehicleEF	UBUS	0.03	0.03

tblVehicleEF	UBUS	7.0500e-004	6.8000e-004
tblVehicleEF	UBUS	0.52	0.40
tblVehicleEF	UBUS	0.27	0.34
tblVehicleEF	UBUS	0.37	0.34
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	2.1000e-004	1.8900e-004
tblVehicleEF	UBUS	1.2010e-003	1.3720e-003
tblVehicleEF	UBUS	0.03	0.03
tblVehicleEF	UBUS	7.0500e-004	6.8000e-004
tblVehicleEF	UBUS	0.59	0.45
tblVehicleEF	UBUS	0.27	0.34
tblVehicleEF	UBUS	0.39	0.36
tblVehicleEF	UBUS	2.90	2.43
tblVehicleEF	UBUS	3.83	3.27
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.28	8.65
tblVehicleEF	UBUS	0.65	0.59
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	2.9510e-003	3.4810e-003
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	1.2330e-003	1.4720e-003

tblVehicleEF	UBUS	0.52	0.40
tblVehicleEF	UBUS	0.24	0.31
tblVehicleEF	UBUS	0.32	0.29
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	1.9100e-004	1.7000e-004
tblVehicleEF	UBUS	2.9510e-003	3.4810e-003
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	1.2330e-003	1.4720e-003
tblVehicleEF	UBUS	0.59	0.46
tblVehicleEF	UBUS	0.24	0.31
tblVehicleEF	UBUS	0.34	0.31
tblVehicleEF	UBUS	2.85	2.38
tblVehicleEF	UBUS	5.84	5.23
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.88	9.18
tblVehicleEF	UBUS	0.74	0.67
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	7.7000e-004	5.2900e-004
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	2.8400e-004	3.3000e-004
tblVehicleEF	UBUS	0.52	0.40

tblVehicleEF	UBUS	0.34	0.43
tblVehicleEF	UBUS	0.41	0.38
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	2.2500e-004	2.0400e-004
tblVehicleEF	UBUS	7.7000e-004	5.2900e-004
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	2.8400e-004	3.3000e-004
tblVehicleEF	UBUS	0.59	0.45
tblVehicleEF	UBUS	0.34	0.43
tblVehicleEF	UBUS	0.43	0.40
tblVehicleTrips	WD_TR	6.59	4.81
tblVehicleTrips	WD_TR	11.01	5.94
tblVehicleTrips	WD_TR	6.96	6.00
tblVehicleTrips	WD_TR	11.42	5.94
tblVehicleTrips	WD_TR	8.11	5.94
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	IndoorWaterUseRate	93,496,026.77	24,528,000.00
tblWater	IndoorWaterUseRate	90,960,577.55	24,528,000.00
tblWater	IndoorWaterUseRate	4,914,062.50	24,528,000.00

tblWater	IndoorWaterUseRate	47,774,831.46	24,528,000.00
tblWater	IndoorWaterUseRate	582,681,912.13	24,528,000.00
tblWater	OutdoorWaterUseRate	58,943,147.31	27,253,333.00
tblWater	OutdoorWaterUseRate	55,750,031.40	27,253,333.00
tblWater	OutdoorWaterUseRate	29,281,348.31	27,253,333.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00

2.0 Emissions Summary

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373
Energy	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	11,666.9066	11,666.9066	0.3485	0.1709	11,727.1943
Mobile	6.6301	15.9213	72.1356	0.2334	14.9417	0.3684	15.3101	4.0182	0.3398	4.3580	0.0000	15,610.9827	15,610.9827	0.4070	0.0000	15,619.5294
Waste						0.0000	0.0000		0.0000	0.0000	2,002.5911	0.0000	2,002.5911	118.3497	0.0000	4,487.9357
Water						0.0000	0.0000		0.0000	0.0000	43.3902	132.2575	175.6477	1.2517	0.0956	231.5680
Total	**24.1674**	**22.1696**	**88.1475**	**0.2732**	**14.9417**	**1.1392**	**16.0809**	**4.0182**	**1.1106**	**5.1288**	**2,069.4622**	**27,465.5307**	**29,534.9929**	**120.4171**	**0.2684**	**32,146.9647**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373
Energy	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	11,666.9066	11,666.9066	0.3485	0.1709	11,727.1943
Mobile	6.6301	15.9213	72.1356	0.2334	14.9417	0.3684	15.3101	4.0182	0.3398	4.3580	0.0000	15,610.9827	15,610.9827	0.4070	0.0000	15,619.5294
Waste						0.0000	0.0000		0.0000	0.0000	500.6478	0.0000	500.6478	29.5874	0.0000	1,121.9839
Water						0.0000	0.0000		0.0000	0.0000	34.7122	106.8899	141.6021	1.0014	0.0765	186.3425
Total	**24.1674**	**22.1696**	**88.1475**	**0.2732**	**14.9417**	**1.1392**	**16.0809**	**4.0182**	**1.1106**	**5.1288**	**558.8409**	**27,440.1631**	**27,999.0039**	**31.4045**	**0.2493**	**28,735.7874**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**73.00**	**0.09**	**5.20**	**73.92**	**7.12**	**10.61**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	1/1/2015	12/31/2014	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 2,905,875; Residential Outdoor: 968,625; Non-Residential Indoor: 2,980,319; Non-Residential Outdoor: 993,440 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	6.6301	15.9213	72.1356	0.2334	14.9417	0.3684	15.3101	4.0182	0.3398	4.3580	0.0000	15,610.9827	15,610.9827	0.4070	0.0000	15,619.5294
Unmitigated	6.6301	15.9213	72.1356	0.2334	14.9417	0.3684	15.3101	4.0182	0.3398	4.3580	0.0000	15,610.9827	15,610.9827	0.4070	0.0000	15,619.5294

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	6,902.35	10,274.60	8710.45	17,060,634	17,060,634
General Office Building	3,039.97	1,212.92	501.54	5,774,438	5,774,438
Industrial Park	127.50	52.91	15.51	264,402	264,402
Office Park	1,596.67	440.83	204.29	3,089,301	3,089,301
Research & Development	7,039.20	2,251.60	1315.41	13,878,519	13,878,519
Total	18,705.69	14,232.86	10,747.20	40,067,294	40,067,294

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Office Park	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Research & Development	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.537592	0.061793	0.165057	0.108770	0.030585	0.004597	0.020545	0.058479	0.001878	0.003474	0.005689	0.000175	0.001366

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
NaturalGas Mitigated	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	6,875.0105	6,875.0105	0.1318	0.1260	6,916.8507
NaturalGas Unmitigated	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	6,875.0105	6,875.0105	0.1318	0.1260	6,916.8507
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4,791.8961	4,791.8961	0.2167	0.0448	4,810.3436
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4,791.8961	4,791.8961	0.2167	0.0448	4,810.3436

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	7.09435e+007	0.3825	3.2690	1.3911	0.0209		0.2643	0.2643		0.2643	0.2643	0.0000	3,785.8177	3,785.8177	0.0726	0.0694	3,808.8576
General Office Building	1.83166e+007	0.0988	0.8979	0.7542	5.3900e-003		0.0682	0.0682		0.0682	0.0682	0.0000	977.4439	977.4439	0.0187	0.0179	983.3924
Industrial Park	759688	4.1000e-003	0.0372	0.0313	2.2000e-004		2.8300e-003	2.8300e-003		2.8300e-003	2.8300e-003	0.0000	40.5398	40.5398	7.8000e-004	7.4000e-004	40.7865
Office Park	9.60154e+006	0.0518	0.4707	0.3954	2.8200e-003		0.0358	0.0358		0.0358	0.0358	0.0000	512.3745	512.3745	9.8200e-003	9.3900e-003	515.4928
Research & Development	2.92115e+007	0.1575	1.4319	1.2028	8.5900e-003		0.1088	0.1088		0.1088	0.1088	0.0000	1,558.8346	1,558.8346	0.0299	0.0286	1,568.3214
Total		**0.6947**	**6.1067**	**3.7747**	**0.0379**		**0.4800**	**0.4800**		**0.4800**	**0.4800**	**0.0000**	**6,875.0105**	**6,875.0105**	**0.1318**	**0.1260**	**6,916.8507**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	7.09435e+007	0.3825	3.2690	1.3911	0.0209		0.2643	0.2643		0.2643	0.2643	0.0000	3,785.8177	3,785.8177	0.0726	0.0694	3,808.8576
General Office Building	1.83166e+007	0.0988	0.8979	0.7542	5.3900e-003		0.0682	0.0682		0.0682	0.0682	0.0000	977.4439	977.4439	0.0187	0.0179	983.3924
Industrial Park	759688	4.1000e-003	0.0372	0.0313	2.2000e-004		2.8300e-003	2.8300e-003		2.8300e-003	2.8300e-003	0.0000	40.5398	40.5398	7.8000e-004	7.4000e-004	40.7865
Office Park	9.60154e+006	0.0518	0.4707	0.3954	2.8200e-003		0.0358	0.0358		0.0358	0.0358	0.0000	512.3745	512.3745	9.8200e-003	9.3900e-003	515.4928
Research & Development	2.92115e+007	0.1575	1.4319	1.2028	8.5900e-003		0.1088	0.1088		0.1088	0.1088	0.0000	1,558.8346	1,558.8346	0.0299	0.0286	1,568.3214
Total		**0.6947**	**6.1067**	**3.7747**	**0.0379**		**0.4800**	**0.4800**		**0.4800**	**0.4800**	**0.0000**	**6,875.0105**	**6,875.0105**	**0.1318**	**0.1260**	**6,916.8507**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	8.13483e+006	1,132.7981	0.0512	0.0106	1,137.1591
General Office Building	6.96021e+006	969.2289	0.0438	9.0700e-003	972.9601
Industrial Park	325125	45.2746	2.0500e-003	4.2000e-004	45.4489
Office Park	3.64493e+006	507.5666	0.0230	4.7500e-003	509.5206
Research & Development	1.53464e+007	2,137.0279	0.0966	0.0200	2,145.2549
Total		**4,791.8961**	**0.2167**	**0.0448**	**4,810.3436**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	8.13483e+006	1,132.7981	0.0512	0.0106	1,137.1591
General Office Building	6.96021e+006	969.2289	0.0438	9.0700e-003	972.9601
Industrial Park	325125	45.2746	2.0500e-003	4.2000e-004	45.4489
Office Park	3.64493e+006	507.5666	0.0230	4.7500e-003	509.5206
Research & Development	1.53464e+007	2,137.0279	0.0966	0.0200	2,145.2549
Total		**4,791.8961**	**0.2167**	**0.0448**	**4,810.3436**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373
Unmitigated	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0462					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	13.3642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.1128	0.0189	1.5921	1.3700e-003		0.2317	0.2317		0.2317	0.2317	23.4809	37.9436	61.4245	0.0436	1.9600e-003	62.9468
Landscaping	0.3195	0.1227	10.6451	5.6000e-004		0.0592	0.0592		0.0592	0.0592	0.0000	17.4403	17.4403	0.0167	0.0000	17.7905
Total	**16.8426**	**0.1416**	**12.2372**	**1.9300e-003**		**0.2908**	**0.2908**		**0.2908**	**0.2908**	**23.4809**	**55.3839**	**78.8648**	**0.0603**	**1.9600e-003**	**80.7373**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0462					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	13.3642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.1128	0.0189	1.5921	1.3700e-003		0.2317	0.2317		0.2317	0.2317	23.4809	37.9436	61.4245	0.0436	1.9600e-003	62.9468
Landscaping	0.3195	0.1227	10.6451	5.6000e-004		0.0592	0.0592		0.0592	0.0592	0.0000	17.4403	17.4403	0.0167	0.0000	17.7905
Total	**16.8426**	**0.1416**	**12.2372**	**1.9300e-003**		**0.2908**	**0.2908**		**0.2908**	**0.2908**	**23.4809**	**55.3839**	**78.8648**	**0.0603**	**1.9600e-003**	**80.7373**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Unmitigated	175.6477	1.2517	0.0956	231.5680
Mitigated	141.6021	1.0014	0.0765	186.3425

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6472
General Office Building	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6472
Industrial Park	24.528 / 0	27.1598	0.2500	0.0190	38.3132
Office Park	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6472
Research & Development	24.528 / 0	27.1598	0.2500	0.0190	38.3132
Total		**175.6477**	**1.2517**	**0.0956**	**231.5680**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	19.6224 / 27.2533	33.6336	0.2005	0.0154	42.6021
General Office Building	19.6224 / 27.2533	33.6336	0.2005	0.0154	42.6021
Industrial Park	19.6224 / 0	20.3507	0.1999	0.0152	29.2681
Office Park	19.6224 / 27.2533	33.6336	0.2005	0.0154	42.6021
Research & Development	19.6224 / 0	20.3507	0.1999	0.0152	29.2681
Total		**141.6021**	**1.0014**	**0.0765**	**186.3425**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	500.6478	29.5874	0.0000	1,121.9839
Unmitigated	2,002.5911	118.3497	0.0000	4,487.9357

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	3202.88	650.1557	38.4231	0.0000	1,457.0408
General Office Building	2914.16	591.5481	34.9595	0.0000	1,325.6975
Industrial Park	55.12	11.1889	0.6612	0.0000	25.0750
Office Park	1530.63	310.7041	18.3621	0.0000	696.3078
Research & Development	2162.63	438.9944	25.9438	0.0000	983.8146
Total		**2,002.5911**	**118.3497**	**0.0000**	**4,487.9357**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	800.72	162.5389	9.6058	0.0000	364.2602
General Office Building	728.54	147.8870	8.7399	0.0000	331.4244
Industrial Park	13.78	2.7972	0.1653	0.0000	6.2687
Office Park	382.658	77.6760	4.5905	0.0000	174.0770
Research & Development	540.658	109.7486	6.4860	0.0000	245.9537
Total		**500.6478**	**29.5874**	**0.0000**	**1,121.9839**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

SSF Station Specific Plan EIR - Project Design and State Policies

San Mateo County, Mitigation Report

Construction Mitigation Summary

Phase	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												

OFFROAD Equipment Mitigation

Equipment Type	Fuel Type	Tier	Number Mitigated	Total Number of Equipment	DPF	Oxidation Catalyst
Air Compressors	Diesel	No Change	0	0	No Change	0.00

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Unmitigated tons/yr							Unmitigated mt/yr					

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Mitigated tons/yr							Mitigated mt/yr					

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												

Fugitive Dust Mitigation

Yes/No	Mitigation Measure	Mitigation Input	Mitigation Input	Mitigation Input

No	Soil Stabilizer for unpaved Roads	PM10 Reduction		PM2.5 Reduction			
No	Replace Ground Cover of Area Disturbed	PM10 Reduction		PM2.5 Reduction			
No	Water Exposed Area	PM10 Reduction		PM2.5 Reduction		Frequency (per day)	
No	Unpaved Road Mitigation	Moisture Content %		Vehicle Speed (mph)			
No	Clean Paved Road	% PM Reduction	0.00				

		Unmitigated		Mitigated		Percent Reduction	
Phase	Source	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5

Operational Percent Reduction Summary

Category	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Indoor	0.00	0.00	0.00	0.00	0.00	0.00	20.00	19.18	19.38	20.00	19.99	19.53
Water Outdoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Operational Mobile Mitigation

Project Setting:

Mitigation	Category	Measure	% Reduction	Input Value 1	Input Value 2	Input Value
No	Land Use	Increase Density	0.00			
No	Land Use	Increase Diversity	0.20	0.48		
No	Land Use	Improve Walkability Design	0.00			
No	Land Use	Improve Destination Accessibility	0.00			
No	Land Use	Increase Transit Accessibility	0.25			
No	Land Use	Integrate Below Market Rate Housing	0.00			
	Land Use	Land Use SubTotal	0.00			
No	Neighborhood Enhancements	Improve Pedestrian Network				
No	Neighborhood Enhancements	Provide Traffic Calming Measures				
No	Neighborhood Enhancements	Implement NEV Network	0.00			
	Neighborhood Enhancements	Neighborhood Enhancements Subtotal	0.00			
No	Parking Policy Pricing	Limit Parking Supply	0.00			
No	Parking Policy Pricing	Unbundle Parking Costs	0.00			
No	Parking Policy Pricing	On-street Market Pricing	0.00			
	Parking Policy Pricing	Parking Policy Pricing Subtotal	0.00			
No	Transit Improvements	Provide BRT System	0.00			
No	Transit Improvements	Expand Transit Network	0.00			
No	Transit Improvements	Increase Transit Frequency	0.00			
	Transit Improvements	Transit Improvements Subtotal	0.00			

		Land Use and Site Enhancement Subtotal	0.00			
No	Commute	Implement Trip Reduction Program				
No	Commute	Transit Subsidy				
No	Commute	Implement Employee Parking "Cash Out"				
No	Commute	Workplace Parking Charge				
No	Commute	Encourage Telecommuting and Alternative Work Schedules	0.00			
No	Commute	Market Commute Trip Reduction Option	0.00			
No	Commute	Employee Vanpool/Shuttle	0.00		2.00	
No	Commute	Provide Ride Sharing Program				
	Commute	Commute Subtotal	0.00			
No	School Trip	Implement School Bus Program	0.00			
		Total VMT Reduction	0.00			

Area Mitigation

Measure Implemented	Mitigation Measure	Input Value
No	Only Natural Gas Hearth	
No	No Hearth	
No	Use Low VOC Cleaning Supplies	
No	Use Low VOC Paint (Residential Interior)	100.00
No	Use Low VOC Paint (Residential Exterior)	150.00
No	Use Low VOC Paint (Non-residential Interior)	100.00
No	Use Low VOC Paint (Non-residential Exterior)	150.00
No	% Electric Lawnmower	0.00

No	% Electric Leafblower	0.00
No	% Electric Chainsaw	0.00

Energy Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Exceed Title 24		
No	Install High Efficiency Lighting		
No	On-site Renewable		

Appliance Type	Land Use Subtype	% Improvement
ClothWasher		30.00
DishWasher		15.00
Fan		50.00
Refrigerator		15.00

Water Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
Yes	Apply Water Conservation on Strategy	20.00	0.00
No	Use Reclaimed Water	0.00	0.00
No	Use Grey Water	0.00	
No	Install low-flow bathroom faucet	32.00	
No	Install low-flow Kitchen faucet	18.00	
No	Install low-flow Toilet	20.00	

No	Install low-flow Shower	20.00	
No	Turf Reduction	0.00	
No	Use Water Efficient Irrigation Systems	6.10	
No	Water Efficient Landscape	0.00	0.00

Solid Waste Mitigation

Mitigation Measures	Input Value
Institute Recycling and Composting Services Percent Reduction in Waste Disposed	75.00

SSF Station Specific Plan EIR - Reduced

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	511.78	1000sqft	7.00	511,780.00	0
Office Park	268.80	1000sqft	5.00	268,800.00	0
Research & Development	1,185.05	1000sqft	28.00	1,185,049.00	0
Industrial Park	21.25	1000sqft	9.00	21,250.00	0
Apartments Mid Rise	1,435.00	Dwelling Unit	35.00	1,435,000.00	4319

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2030
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	307	**CH4 Intensity (lb/MWhr)**	0.01388166	**N2O Intensity (lb/MWhr)**	0.0028721

1.3 User Entered Comments & Non-Default Data

Project Characteristics - GHG Emissions from Growth to appropriately account for reductions - Incorporates Project Design features, State Policies (including RPS), and mitigation that reduces emissions

Land Use - 85 Acres. Population (based on 3.01 persons per household), Lot Acerage based on AQ modeling

Construction Phase - No Construction

Off-road Equipment - no construction

Trips and VMT - no construction

Vehicle Trips - Project Specific Trip Rates

Woodstoves - No wood stoves per GP

Energy Use - Based on Project Specific Data. T-24 NG for Apartments reduced per unit to implement NG reductions from CAP Measures P3.5, P4.1.

Water And Wastewater - Based on project specific total water usage

Solid Waste - Based on Project Specific Information

Mobile Land Use Mitigation - Reductions from the "Land Use" section are built into the project specific trip rates. Parking supply throuhg P1.3

Mobile Commute Mitigation -

Area Mitigation - Assumes no wood stoves and only natural gas fireplaces are included in new residential development (GP), Landscape Equipment CAP measure P2.2

Energy Mitigation - 15% beyond 2008 T-24, equals the 2013 T-24 going into effect in July 2014. Minimum reduction 15% beyond 2013 T-24 (P4.1). kWh reduction based on CAP measures P3.4, P3.5, P4.1

Water Mitigation - SSF Cap Reduction measure P6.1

Waste Mitigation - State Requirement by 2020

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	250.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	250.00
tblConstructionPhase	NumDays	110.00	0.00
tblEnergyUse	LightingElect	741.44	1,162.58
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	4.07	2.77
tblEnergyUse	LightingElect	3.95	4.48

tblEnergyUse	LightingElect	3.43	5.37
tblEnergyUse	NT24E	2,561.86	4,016.99
tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	4.80	3.26
tblEnergyUse	NT24E	4.81	5.45
tblEnergyUse	NT24E	3.36	5.26
tblEnergyUse	NT24NG	1,662.00	9,280.44
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.17	2.14
tblEnergyUse	NT24NG	6.90	6.62
tblEnergyUse	T24E	312.05	489.30
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	5.01	9.27
tblEnergyUse	T24E	5.22	3.63
tblEnergyUse	T24E	1.48	2.32
tblEnergyUse	T24NG	7,191.67	38,901.59
tblEnergyUse	T24NG	19.28	34.01
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	18.35	33.58
tblEnergyUse	T24NG	18.78	18.03
tblLandUse	LandUseSquareFeet	1,185,050.00	1,185,049.00
tblLandUse	LotAcreage	11.75	7.00
tblLandUse	LotAcreage	6.17	5.00
tblLandUse	LotAcreage	27.21	28.00
tblLandUse	LotAcreage	0.49	9.00
tblLandUse	LotAcreage	37.76	35.00
tblLandUse	Population	4,104.00	4,319.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.01388166
tblProjectCharacteristics	CO2IntensityFactor	641.35	307
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.0028721
tblProjectCharacteristics	OperationalYear	2014	2030
tblSolidWaste	SolidWasteGenerationRate	660.10	3,202.88
tblSolidWaste	SolidWasteGenerationRate	475.96	2,914.16
tblSolidWaste	SolidWasteGenerationRate	26.35	55.12
tblSolidWaste	SolidWasteGenerationRate	249.98	1,530.63
tblSolidWaste	SolidWasteGenerationRate	90.06	2,162.63
tblTripsAndVMT	WorkerTripNumber	334.00	0.00
tblVehicleEF	HHD	9.5200e-003	9.8940e-003
tblVehicleEF	HHD	2.16	1.04
tblVehicleEF	HHD	62.72	57.45
tblVehicleEF	HHD	1,512.20	1,550.91
tblVehicleEF	HHD	4.8130e-003	0.06
tblVehicleEF	HHD	2.13	2.02
tblVehicleEF	HHD	4.01	3.60
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.03	0.04
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tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.5250e-003	8.7810e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	5.2100e-004	4.5800e-004
tblVehicleEF	HHD	1.3390e-003	1.2210e-003
tblVehicleEF	HHD	0.09	0.08

tblVehicleEF	HHD	1.0940e-003	9.0600e-004
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tblVehicleEF	HHD	0.56	0.41
tblVehicleEF	HHD	1.38	1.22
tblVehicleEF	HHD	0.02	0.02
tblVehicleEF	HHD	1.5750e-003	1.4870e-003
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tblVehicleEF	HHD	0.09	0.08
tblVehicleEF	HHD	1.0940e-003	9.0600e-004
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tblVehicleEF	HHD	0.56	0.41
tblVehicleEF	HHD	1.48	1.31
tblVehicleEF	HHD	9.5200e-003	9.8940e-003
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tblVehicleEF	LDT1	0.05	0.06
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tblVehicleEF	LDT1	0.52	0.54
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tblVehicleEF	LDT2	0.04	0.04
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tblVehicleEF	LDT2	0.10	0.11

tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.37	0.36
tblVehicleEF	LDT2	0.09	0.10
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tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	0.08	0.08
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
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tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
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tblVehicleEF	LDT2	0.33	0.34
tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	4.8060e-003	5.0080e-003
tblVehicleEF	LDT2	1.0250e-003	1.0240e-003
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.07	0.09

tblVehicleEF	LDT2	0.02	0.03
tblVehicleEF	LDT2	0.33	0.34
tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	9.4620e-003	9.7140e-003
tblVehicleEF	LDT2	4.9380e-003	5.0320e-003
tblVehicleEF	LDT2	0.69	0.68
tblVehicleEF	LDT2	1.67	1.74
tblVehicleEF	LDT2	313.55	318.27
tblVehicleEF	LDT2	70.23	70.17
tblVehicleEF	LDT2	0.17	0.17
tblVehicleEF	LDT2	0.09	0.09
tblVehicleEF	LDT2	0.10	0.10
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
tblVehicleEF	LDT2	4.8650e-003	4.8810e-003
tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
tblVehicleEF	LDT2	4.5140e-003	4.5290e-003
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.44	0.44
tblVehicleEF	LDT2	0.10	0.11
tblVehicleEF	LDT2	4.5100e-003	4.6020e-003
tblVehicleEF	LDT2	1.0370e-003	1.0380e-003
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.02	0.02

tblVehicleEF	LDT2	0.44	0.44
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17
tblVehicleEF	LHD1	0.62	0.63
tblVehicleEF	LHD1	3.27	3.11
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.48	0.53
tblVehicleEF	LHD1	1.10	1.06
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003
tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	1.4760e-003	1.5500e-003
tblVehicleEF	LHD1	0.07	0.06
tblVehicleEF	LHD1	0.03	0.03

tblVehicleEF	LHD1	1.1090e-003	1.0580e-003
tblVehicleEF	LHD1	0.05	0.06
tblVehicleEF	LHD1	0.39	0.36
tblVehicleEF	LHD1	0.25	0.24
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003
tblVehicleEF	LHD1	5.2800e-004	5.0500e-004
tblVehicleEF	LHD1	1.4760e-003	1.5500e-003
tblVehicleEF	LHD1	0.07	0.06
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.1090e-003	1.0580e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.39	0.36
tblVehicleEF	LHD1	0.27	0.25
tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17
tblVehicleEF	LHD1	0.63	0.65
tblVehicleEF	LHD1	2.29	2.13
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.45	0.50
tblVehicleEF	LHD1	1.03	0.98
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004

tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003
tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	3.4290e-003	3.6990e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.8130e-003	2.1850e-003
tblVehicleEF	LHD1	0.05	0.06
tblVehicleEF	LHD1	0.37	0.35
tblVehicleEF	LHD1	0.21	0.19
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003
tblVehicleEF	LHD1	5.1100e-004	4.8800e-004
tblVehicleEF	LHD1	3.4290e-003	3.6990e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.8130e-003	2.1850e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.37	0.35
tblVehicleEF	LHD1	0.22	0.21
tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01

tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17
tblVehicleEF	LHD1	0.61	0.62
tblVehicleEF	LHD1	4.07	3.96
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.49	0.54
tblVehicleEF	LHD1	1.16	1.12
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003
tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	9.5100e-004	7.2100e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	5.0300e-004	5.4000e-004
tblVehicleEF	LHD1	0.05	0.06
tblVehicleEF	LHD1	0.44	0.41
tblVehicleEF	LHD1	0.29	0.28

tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003
tblVehicleEF	LHD1	5.4200e-004	5.2000e-004
tblVehicleEF	LHD1	9.5100e-004	7.2100e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	5.0300e-004	5.4000e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.44	0.41
tblVehicleEF	LHD1	0.31	0.30
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.57	0.59
tblVehicleEF	LHD2	2.03	1.86
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003
tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.67	0.73
tblVehicleEF	LHD2	0.70	0.63
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004

tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	6.2800e-004	5.6700e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.19	0.17
tblVehicleEF	LHD2	0.14	0.13
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.6700e-004	3.3600e-004
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	6.2800e-004	5.6700e-004
tblVehicleEF	LHD2	0.07	0.08
tblVehicleEF	LHD2	0.19	0.17
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.58	0.60
tblVehicleEF	LHD2	1.42	1.27
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32

tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003
tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.64	0.70
tblVehicleEF	LHD2	0.65	0.59
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	1.8260e-003	1.8790e-003
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.0180e-003	1.1610e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.18	0.17
tblVehicleEF	LHD2	0.11	0.10
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.5700e-004	3.2600e-004
tblVehicleEF	LHD2	1.8260e-003	1.8790e-003
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02

tblVehicleEF	LHD2	1.0180e-003	1.1610e-003
tblVehicleEF	LHD2	0.07	0.08
tblVehicleEF	LHD2	0.18	0.17
tblVehicleEF	LHD2	0.12	0.11
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.57	0.59
tblVehicleEF	LHD2	2.53	2.37
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003
tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.68	0.74
tblVehicleEF	LHD2	0.73	0.67
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	5.2900e-004	3.8400e-004

tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	2.8800e-004	2.9200e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.21	0.19
tblVehicleEF	LHD2	0.16	0.15
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.7600e-004	3.4400e-004
tblVehicleEF	LHD2	5.2900e-004	3.8400e-004
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	2.8800e-004	2.9200e-004
tblVehicleEF	LHD2	0.07	0.08
tblVehicleEF	LHD2	0.21	0.19
tblVehicleEF	LHD2	0.17	0.16
tblVehicleEF	MCY	23.41	23.81
tblVehicleEF	MCY	11.42	11.30
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.23	1.22
tblVehicleEF	MCY	0.32	0.32
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	0.53	0.59
tblVehicleEF	MCY	0.35	0.35
tblVehicleEF	MCY	0.30	0.34

tblVehicleEF	MCY	2.60	2.64
tblVehicleEF	MCY	1.17	1.17
tblVehicleEF	MCY	2.23	2.21
tblVehicleEF	MCY	2.1150e-003	2.1420e-003
tblVehicleEF	MCY	6.5500e-004	6.5300e-004
tblVehicleEF	MCY	0.53	0.59
tblVehicleEF	MCY	0.35	0.35
tblVehicleEF	MCY	0.30	0.34
tblVehicleEF	MCY	2.85	2.89
tblVehicleEF	MCY	1.17	1.17
tblVehicleEF	MCY	2.39	2.37
tblVehicleEF	MCY	21.78	22.45
tblVehicleEF	MCY	9.06	8.85
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.08	1.07
tblVehicleEF	MCY	0.29	0.29
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	1.60	1.80
tblVehicleEF	MCY	0.44	0.51
tblVehicleEF	MCY	0.78	1.10
tblVehicleEF	MCY	2.50	2.55
tblVehicleEF	MCY	1.03	1.06
tblVehicleEF	MCY	1.82	1.78
tblVehicleEF	MCY	2.0860e-003	2.1180e-003
tblVehicleEF	MCY	6.0500e-004	6.0000e-004

tblVehicleEF	MCY	1.60	1.80
tblVehicleEF	MCY	0.44	0.51
tblVehicleEF	MCY	0.78	1.10
tblVehicleEF	MCY	2.75	2.79
tblVehicleEF	MCY	1.03	1.06
tblVehicleEF	MCY	1.95	1.91
tblVehicleEF	MCY	25.23	25.90
tblVehicleEF	MCY	13.37	13.51
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.31	1.31
tblVehicleEF	MCY	0.34	0.34
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	0.22	0.14
tblVehicleEF	MCY	0.41	0.40
tblVehicleEF	MCY	0.09	0.10
tblVehicleEF	MCY	2.68	2.74
tblVehicleEF	MCY	1.48	1.48
tblVehicleEF	MCY	2.55	2.58
tblVehicleEF	MCY	2.1460e-003	2.1780e-003
tblVehicleEF	MCY	6.9600e-004	6.9900e-004
tblVehicleEF	MCY	0.22	0.14
tblVehicleEF	MCY	0.41	0.40
tblVehicleEF	MCY	0.09	0.10
tblVehicleEF	MCY	2.94	3.00
tblVehicleEF	MCY	1.48	1.48

tblVehicleEF	MCY	2.74	2.77
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	1.03	1.07
tblVehicleEF	MDV	2.69	2.74
tblVehicleEF	MDV	416.43	427.07
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.13	0.14
tblVehicleEF	MDV	0.21	0.21
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.06	0.07
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	0.07	0.08
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.56	0.58
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	5.7930e-003	5.9340e-003
tblVehicleEF	MDV	1.3310e-003	1.3320e-003
tblVehicleEF	MDV	0.06	0.07
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	0.07	0.08
tblVehicleEF	MDV	0.03	0.04
tblVehicleEF	MDV	0.56	0.58
tblVehicleEF	MDV	0.20	0.21

tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	1.17	1.26
tblVehicleEF	MDV	1.86	1.81
tblVehicleEF	MDV	441.90	460.68
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.12	0.12
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.14	0.16
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	0.12	0.15
tblVehicleEF	MDV	0.02	0.03
tblVehicleEF	MDV	0.51	0.54
tblVehicleEF	MDV	0.15	0.15
tblVehicleEF	MDV	6.1490e-003	6.4040e-003
tblVehicleEF	MDV	1.3170e-003	1.3150e-003
tblVehicleEF	MDV	0.14	0.16
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	0.12	0.15
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.51	0.54
tblVehicleEF	MDV	0.16	0.16
tblVehicleEF	MDV	0.01	0.01

tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	1.03	1.06
tblVehicleEF	MDV	3.21	3.36
tblVehicleEF	MDV	414.87	423.71
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.14	0.15
tblVehicleEF	MDV	0.22	0.23
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.19	0.19
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.67	0.70
tblVehicleEF	MDV	0.22	0.23
tblVehicleEF	MDV	5.7710e-003	5.8870e-003
tblVehicleEF	MDV	1.3410e-003	1.3420e-003
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.19	0.19
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.03	0.04
tblVehicleEF	MDV	0.67	0.70
tblVehicleEF	MDV	0.24	0.25
tblVehicleEF	MH	0.34	0.34
tblVehicleEF	MH	4.75	4.94

tblVehicleEF	MH	681.67	666.32
tblVehicleEF	MH	27.72	28.78
tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.87	0.75
tblVehicleEF	MH	0.56	0.58
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.36	0.41
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.20	0.20
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.65	0.71
tblVehicleEF	MH	0.25	0.26
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	3.9000e-004	4.0500e-004
tblVehicleEF	MH	0.36	0.41
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.20	0.20
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.65	0.71
tblVehicleEF	MH	0.26	0.27
tblVehicleEF	MH	0.35	0.35

tblVehicleEF	MH	3.30	3.37
tblVehicleEF	MH	681.67	666.32
tblVehicleEF	MH	27.72	28.78
tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.83	0.71
tblVehicleEF	MH	0.52	0.54
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.79	0.95
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.33	0.42
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.62	0.69
tblVehicleEF	MH	0.20	0.21
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	3.6600e-004	3.7900e-004
tblVehicleEF	MH	0.79	0.95
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.33	0.42
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.62	0.69
tblVehicleEF	MH	0.21	0.22

tblVehicleEF	MH	0.34	0.34
tblVehicleEF	MH	5.91	6.31
tblVehicleEF	MH	681.67	666.32
tblVehicleEF	MH	27.72	28.78
tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.89	0.77
tblVehicleEF	MH	0.58	0.61
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.25	0.20
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.08	0.11
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.71	0.78
tblVehicleEF	MH	0.28	0.30
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	4.0900e-004	4.2800e-004
tblVehicleEF	MH	0.25	0.20
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.08	0.11
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.71	0.78

tblVehicleEF	MH	0.30	0.32
tblVehicleEF	MHD	4.6090e-003	4.8160e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	11.12	10.36
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.94	0.97
tblVehicleEF	MHD	1.22	1.11
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	1.1590e-003	1.3660e-003
tblVehicleEF	MHD	0.07	0.07
tblVehicleEF	MHD	8.8500e-004	9.3000e-004
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.38	0.39
tblVehicleEF	MHD	0.64	0.59
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	7.4200e-004	7.2800e-004
tblVehicleEF	MHD	1.1590e-003	1.3660e-003
tblVehicleEF	MHD	0.07	0.07
tblVehicleEF	MHD	8.8500e-004	9.3000e-004

tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.38	0.39
tblVehicleEF	MHD	0.68	0.63
tblVehicleEF	MHD	4.6090e-003	4.8160e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	7.76	7.12
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.90	0.93
tblVehicleEF	MHD	1.13	1.03
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	2.7270e-003	3.3120e-003
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	1.4790e-003	1.9650e-003
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.36	0.37
tblVehicleEF	MHD	0.52	0.48
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	6.8500e-004	6.7400e-004
tblVehicleEF	MHD	2.7270e-003	3.3120e-003

tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	1.4790e-003	1.9650e-003
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.36	0.37
tblVehicleEF	MHD	0.55	0.51
tblVehicleEF	MHD	4.6090e-003	4.8160e-003
tblVehicleEF	MHD	0.43	0.42
tblVehicleEF	MHD	13.78	13.18
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.96	0.98
tblVehicleEF	MHD	1.28	1.17
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	7.4400e-004	6.2200e-004
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	3.9400e-004	4.6400e-004
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.43	0.44
tblVehicleEF	MHD	0.73	0.68
tblVehicleEF	MHD	0.01	0.01

tblVehicleEF	MHD	7.8600e-004	7.7500e-004
tblVehicleEF	MHD	7.4400e-004	6.2200e-004
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	3.9400e-004	4.6400e-004
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.43	0.44
tblVehicleEF	MHD	0.77	0.73
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.64	0.62
tblVehicleEF	OBUS	7.33	7.25
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	32.73	32.73
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.19	1.09
tblVehicleEF	OBUS	0.98	0.94
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	5.8400e-004	6.6800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	3.5100e-004	3.5400e-004
tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.28	0.29

tblVehicleEF	OBUS	0.45	0.42
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	4.9200e-004	4.9000e-004
tblVehicleEF	OBUS	5.8400e-004	6.6800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	3.5100e-004	3.5400e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.28	0.29
tblVehicleEF	OBUS	0.48	0.45
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.65	0.63
tblVehicleEF	OBUS	5.11	4.95
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.14	1.04
tblVehicleEF	OBUS	0.91	0.87
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	1.2860e-003	1.5560e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	5.7500e-004	7.3200e-004
tblVehicleEF	OBUS	0.13	0.12

tblVehicleEF	OBUS	0.27	0.28
tblVehicleEF	OBUS	0.36	0.34
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	4.5500e-004	4.5200e-004
tblVehicleEF	OBUS	1.2860e-003	1.5560e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	5.7500e-004	7.3200e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.27	0.28
tblVehicleEF	OBUS	0.39	0.37
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.64	0.62
tblVehicleEF	OBUS	9.14	9.26
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.21	1.11
tblVehicleEF	OBUS	1.03	0.99
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	4.1300e-004	3.3800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	1.4200e-004	1.9000e-004

tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.31	0.32
tblVehicleEF	OBUS	0.51	0.49
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	5.2300e-004	5.2400e-004
tblVehicleEF	OBUS	4.1300e-004	3.3800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	1.4200e-004	1.9000e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.31	0.32
tblVehicleEF	OBUS	0.54	0.53
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.39	2.30
tblVehicleEF	SBUS	27.83	21.92
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	115.30	115.30
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.71	4.02
tblVehicleEF	SBUS	2.57	2.17
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.02	0.02

tblVehicleEF	SBUS	0.20	0.20
tblVehicleEF	SBUS	9.1610e-003	8.7240e-003
tblVehicleEF	SBUS	0.39	0.26
tblVehicleEF	SBUS	1.67	2.92
tblVehicleEF	SBUS	1.82	1.33
tblVehicleEF	SBUS	9.8330e-003	0.01
tblVehicleEF	SBUS	1.7730e-003	1.6650e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.20	0.20
tblVehicleEF	SBUS	9.1610e-003	8.7240e-003
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tblVehicleEF	SBUS	1.67	2.92
tblVehicleEF	SBUS	1.95	1.42
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.52	2.36
tblVehicleEF	SBUS	22.57	17.30
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.51	3.82
tblVehicleEF	SBUS	2.39	1.99
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003

tblVehicleEF	SBUS	0.04	0.05
tblVehicleEF	SBUS	0.20	0.21
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.40	0.26
tblVehicleEF	SBUS	1.46	2.57
tblVehicleEF	SBUS	1.61	1.16
tblVehicleEF	SBUS	9.8350e-003	0.01
tblVehicleEF	SBUS	1.6840e-003	1.5870e-003
tblVehicleEF	SBUS	0.04	0.05
tblVehicleEF	SBUS	0.20	0.21
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.45	0.30
tblVehicleEF	SBUS	1.46	2.57
tblVehicleEF	SBUS	1.72	1.23
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.30	2.25
tblVehicleEF	SBUS	32.27	25.92
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.81	4.11
tblVehicleEF	SBUS	2.70	2.30
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03

tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.01	8.3260e-003
tblVehicleEF	SBUS	0.22	0.22
tblVehicleEF	SBUS	3.3240e-003	4.3910e-003
tblVehicleEF	SBUS	0.38	0.26
tblVehicleEF	SBUS	2.07	3.59
tblVehicleEF	SBUS	1.99	1.47
tblVehicleEF	SBUS	9.8310e-003	0.01
tblVehicleEF	SBUS	1.8480e-003	1.7320e-003
tblVehicleEF	SBUS	0.01	8.3260e-003
tblVehicleEF	SBUS	0.22	0.22
tblVehicleEF	SBUS	3.3240e-003	4.3910e-003
tblVehicleEF	SBUS	0.43	0.30
tblVehicleEF	SBUS	2.07	3.59
tblVehicleEF	SBUS	2.12	1.57
tblVehicleEF	UBUS	2.87	2.40
tblVehicleEF	UBUS	4.95	4.33
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.72	9.03
tblVehicleEF	UBUS	0.70	0.63
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004

tblVehicleEF	UBUS	1.2010e-003	1.3720e-003
tblVehicleEF	UBUS	0.03	0.03
tblVehicleEF	UBUS	7.0500e-004	6.8000e-004
tblVehicleEF	UBUS	0.52	0.40
tblVehicleEF	UBUS	0.27	0.34
tblVehicleEF	UBUS	0.37	0.34
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	2.1000e-004	1.8900e-004
tblVehicleEF	UBUS	1.2010e-003	1.3720e-003
tblVehicleEF	UBUS	0.03	0.03
tblVehicleEF	UBUS	7.0500e-004	6.8000e-004
tblVehicleEF	UBUS	0.59	0.45
tblVehicleEF	UBUS	0.27	0.34
tblVehicleEF	UBUS	0.39	0.36
tblVehicleEF	UBUS	2.90	2.43
tblVehicleEF	UBUS	3.83	3.27
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.28	8.65
tblVehicleEF	UBUS	0.65	0.59
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	2.9510e-003	3.4810e-003

tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	1.2330e-003	1.4720e-003
tblVehicleEF	UBUS	0.52	0.40
tblVehicleEF	UBUS	0.24	0.31
tblVehicleEF	UBUS	0.32	0.29
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	1.9100e-004	1.7000e-004
tblVehicleEF	UBUS	2.9510e-003	3.4810e-003
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	1.2330e-003	1.4720e-003
tblVehicleEF	UBUS	0.59	0.46
tblVehicleEF	UBUS	0.24	0.31
tblVehicleEF	UBUS	0.34	0.31
tblVehicleEF	UBUS	2.85	2.38
tblVehicleEF	UBUS	5.84	5.23
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.88	9.18
tblVehicleEF	UBUS	0.74	0.67
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	7.7000e-004	5.2900e-004
tblVehicleEF	UBUS	0.03	0.04

tblVehicleEF	UBUS	2.8400e-004	3.3000e-004
tblVehicleEF	UBUS	0.52	0.40
tblVehicleEF	UBUS	0.34	0.43
tblVehicleEF	UBUS	0.41	0.38
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	2.2500e-004	2.0400e-004
tblVehicleEF	UBUS	7.7000e-004	5.2900e-004
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	2.8400e-004	3.3000e-004
tblVehicleEF	UBUS	0.59	0.45
tblVehicleEF	UBUS	0.34	0.43
tblVehicleEF	UBUS	0.43	0.40
tblVehicleTrips	WD_TR	6.59	4.81
tblVehicleTrips	WD_TR	11.01	5.94
tblVehicleTrips	WD_TR	6.96	6.00
tblVehicleTrips	WD_TR	11.42	5.94
tblVehicleTrips	WD_TR	8.11	5.94
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	IndoorWaterUseRate	93,496,026.77	24,528,000.00

tblWater	IndoorWaterUseRate	90,960,577.55	24,528,000.00
tblWater	IndoorWaterUseRate	4,914,062.50	24,528,000.00
tblWater	IndoorWaterUseRate	47,774,831.46	24,528,000.00
tblWater	IndoorWaterUseRate	582,681,912.13	24,528,000.00
tblWater	OutdoorWaterUseRate	58,943,147.31	27,253,333.00
tblWater	OutdoorWaterUseRate	55,750,031.40	27,253,333.00
tblWater	OutdoorWaterUseRate	29,281,348.31	27,253,333.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWoodstoves	WoodstoveDayYear	10.82	0.00

2.0 Emissions Summary

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373
Energy	0.6850	6.0236	3.7394	0.0374		0.4733	0.4733		0.4733	0.4733	0.0000	11,570.7274	11,570.7274	0.3466	0.1691	11,630.4297
Mobile	6.6301	15.9213	72.1356	0.2334	14.9417	0.3684	15.3101	4.0182	0.3398	4.3580	0.0000	15,610.9827	15,610.9827	0.4070	0.0000	15,619.5294
Waste						0.0000	0.0000		0.0000	0.0000	2,002.5911	0.0000	2,002.5911	118.3497	0.0000	4,487.9357
Water						0.0000	0.0000		0.0000	0.0000	43.3902	132.2575	175.6477	1.2517	0.0956	231.5680
Total	**24.1577**	**22.0865**	**88.1122**	**0.2727**	**14.9417**	**1.1325**	**16.0742**	**4.0182**	**1.1038**	**5.1220**	**2,069.4622**	**27,369.3514**	**29,438.8136**	**120.4153**	**0.2667**	**32,050.2001**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	15.7075	0.1166	10.0344	5.2000e-004		0.0588	0.0588		0.0587	0.0587	0.0000	63.8028	63.8028	0.0162	8.7000e-004	64.4132
Energy	0.5162	4.5384	2.8116	0.0282		0.3566	0.3566		0.3566	0.3566	0.0000	8,679.0946	8,679.0946	0.2594	0.1271	8,723.9296
Mobile	6.5320	15.3350	70.3198	0.2222	14.1946	0.3517	14.5463	3.8173	0.3244	4.1417	0.0000	14,860.9294	14,860.9294	0.3888	0.0000	14,869.0937
Waste						0.0000	0.0000		0.0000	0.0000	500.6478	0.0000	500.6478	29.5874	0.0000	1,121.9839
Water						0.0000	0.0000		0.0000	0.0000	30.0043	97.7974	127.8017	0.8658	0.0662	166.4950
Total	**22.7557**	**19.9900**	**83.1658**	**0.2508**	**14.1946**	**0.7671**	**14.9617**	**3.8173**	**0.7398**	**4.5570**	**530.6521**	**23,701.6243**	**24,232.2764**	**31.1176**	**0.1941**	**24,945.9155**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**5.80**	**9.49**	**5.61**	**8.00**	**5.00**	**32.26**	**6.92**	**5.00**	**32.98**	**11.03**	**74.36**	**13.40**	**17.69**	**74.16**	**27.22**	**22.17**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	1/1/2015	12/31/2014	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 2,905,875; Residential Outdoor: 968,625; Non-Residential Indoor: 2,980,319; Non-Residential Outdoor: 993,440 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Limit Parking Supply

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	6.5320	15.3350	70.3198	0.2222	14.1946	0.3517	14.5463	3.8173	0.3244	4.1417	0.0000	14,860.9294	14,860.9294	0.3888	0.0000	14,869.0937
Unmitigated	6.6301	15.9213	72.1356	0.2334	14.9417	0.3684	15.3101	4.0182	0.3398	4.3580	0.0000	15,610.9827	15,610.9827	0.4070	0.0000	15,619.5294

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	6,902.35	10,274.60	8710.45	17,060,634	16,207,603
General Office Building	3,039.97	1,212.92	501.54	5,774,438	5,485,716
Industrial Park	127.50	52.91	15.51	264,402	251,182
Office Park	1,596.67	440.83	204.29	3,089,301	2,934,836
Research & Development	7,039.20	2,251.60	1315.41	13,878,519	13,184,593
Total	18,705.69	14,232.86	10,747.20	40,067,294	38,063,929

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Office Park	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Research & Development	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.537592	0.061793	0.165057	0.108770	0.030585	0.004597	0.020545	0.058479	0.001878	0.003474	0.005689	0.000175	0.001366

4.4 Fleet Mix

Historical Energy Use: N

5.0 Energy Detail

5.1 Mitigation Measures Energy

Exceed Title 24

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
NaturalGas Mitigated	0.5162	4.5384	2.8116	0.0282		0.3566	0.3566		0.3566	0.3566	0.0000	5,108.3730	5,108.3730	0.0979	0.0937	5,139.4617
NaturalGas Unmitigated	0.6850	6.0236	3.7394	0.0374		0.4733	0.4733		0.4733	0.4733	0.0000	6,778.8313	6,778.8313	0.1299	0.1243	6,820.0861
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,570.7216	3,570.7216	0.1615	0.0334	3,584.4679
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4,791.8961	4,791.8961	0.2167	0.0448	4,810.3436

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	6.91412e+007	0.3728	3.1859	1.3557	0.0203		0.2576	0.2576		0.2576	0.2576	0.0000	3,689.6384	3,689.6384	0.0707	0.0676	3,712.0930
General Office Building	1.83166e+007	0.0988	0.8979	0.7542	5.3900e-003		0.0682	0.0682		0.0682	0.0682	0.0000	977.4439	977.4439	0.0187	0.0179	983.3924
Industrial Park	759688	4.1000e-003	0.0372	0.0313	2.2000e-004		2.8300e-003	2.8300e-003		2.8300e-003	2.8300e-003	0.0000	40.5398	40.5398	7.8000e-004	7.4000e-004	40.7865
Office Park	9.60154e+006	0.0518	0.4707	0.3954	2.8200e-003		0.0358	0.0358		0.0358	0.0358	0.0000	512.3745	512.3745	9.8200e-003	9.3900e-003	515.4928
Research & Development	2.92115e+007	0.1575	1.4319	1.2028	8.5900e-003		0.1088	0.1088		0.1088	0.1088	0.0000	1,558.8346	1,558.8346	0.0299	0.0286	1,568.3214
Total		**0.6850**	**6.0236**	**3.7394**	**0.0374**		**0.4733**	**0.4733**		**0.4733**	**0.4733**	**0.0000**	**6,778.8313**	**6,778.8313**	**0.1299**	**0.1243**	**6,820.0861**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	5.23941e+007	0.2825	2.4142	1.0273	0.0154		0.1952	0.1952		0.1952	0.1952	0.0000	2,795.9476	2,795.9476	0.0536	0.0513	2,812.9632
General Office Building	1.30949e+007	0.0706	0.6419	0.5392	3.8500e-003		0.0488	0.0488		0.0488	0.0488	0.0000	698.7945	698.7945	0.0134	0.0128	703.0473
Industrial Park	543129	2.9300e-003	0.0266	0.0224	1.6000e-004		2.0200e-003	2.0200e-003		2.0200e-003	2.0200e-003	0.0000	28.9834	28.9834	5.6000e-004	5.3000e-004	29.1598
Office Park	6.89364e+006	0.0372	0.3379	0.2839	2.0300e-003		0.0257	0.0257		0.0257	0.0257	0.0000	367.8711	367.8711	7.0500e-003	6.7400e-003	370.1099
Research & Development	2.28015e+007	0.1230	1.1177	0.9389	6.7100e-003		0.0850	0.0850		0.0850	0.0850	0.0000	1,216.7764	1,216.7764	0.0233	0.0223	1,224.1815
Total		**0.5162**	**4.5384**	**2.8116**	**0.0282**		**0.3566**	**0.3566**		**0.3566**	**0.3566**	**0.0000**	**5,108.3730**	**5,108.3730**	**0.0979**	**0.0937**	**5,139.4617**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	8.13483e+006	1,132.7981	0.0512	0.0106	1,137.1591
General Office Building	6.96021e+006	969.2289	0.0438	9.0700e-003	972.9601
Industrial Park	325125	45.2746	2.0500e-003	4.2000e-004	45.4489
Office Park	3.64493e+006	507.5666	0.0230	4.7500e-003	509.5206
Research & Development	1.53464e+007	2,137.0279	0.0966	0.0200	2,145.2549
Total		**4,791.8961**	**0.2167**	**0.0448**	**4,810.3436**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	6.59851e+006	918.8616	0.0416	8.6000e-003	922.3990
General Office Building	4.88068e+006	679.6490	0.0307	6.3600e-003	682.2655
Industrial Park	-1.05964e+006	-147.5585	-0.0067	-0.0014	-148.1266
Office Park	2.02653e+006	282.2003	0.0128	2.6400e-003	283.2867
Research & Development	1.31959e+007	1,837.5692	0.0831	0.0172	1,844.6433
Total		**3,570.7216**	**0.1615**	**0.0334**	**3,584.4679**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	15.7075	0.1166	10.0344	5.2000e-004		0.0588	0.0588		0.0587	0.0587	0.0000	63.8028	63.8028	0.0162	8.7000e-004	64.4132
Unmitigated	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0462					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	13.3642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.1128	0.0189	1.5921	1.3700e-003		0.2317	0.2317		0.2317	0.2317	23.4809	37.9436	61.4245	0.0436	1.9600e-003	62.9468
Landscaping	0.3195	0.1227	10.6451	5.6000e-004		0.0592	0.0592		0.0592	0.0592	0.0000	17.4403	17.4403	0.0167	0.0000	17.7905
Total	**16.8426**	**0.1416**	**12.2372**	**1.9300e-003**		**0.2908**	**0.2908**		**0.2908**	**0.2908**	**23.4809**	**55.3839**	**78.8648**	**0.0603**	**1.9600e-003**	**80.7373**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0462					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	13.3642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	4.8100e-003	0.0000	2.6000e-004	0.0000		3.3200e-003	3.3200e-003		3.2900e-003	3.2900e-003	0.0000	47.6019	47.6019	9.1000e-004	8.7000e-004	47.8916
Landscaping	0.2923	0.1166	10.0341	5.2000e-004		0.0554	0.0554		0.0554	0.0554	0.0000	16.2009	16.2009	0.0153	0.0000	16.5216
Total	**15.7075**	**0.1166**	**10.0343**	**5.2000e-004**		**0.0588**	**0.0588**		**0.0587**	**0.0587**	**0.0000**	**63.8028**	**63.8028**	**0.0162**	**8.7000e-004**	**64.4132**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Unmitigated	175.6477	1.2517	0.0956	231.5680
Mitigated	127.8017	0.8658	0.0662	166.4950

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6472
General Office Building	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6472
Industrial Park	24.528 / 0	27.1598	0.2500	0.0190	38.3132
Office Park	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6472
Research & Development	24.528 / 0	27.1598	0.2500	0.0190	38.3132
Total		**175.6477**	**1.2517**	**0.0956**	**231.5680**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	16.9611 / 27.2533	30.8735	0.1734	0.0133	38.6326
General Office Building	16.9611 / 27.2533	30.8735	0.1734	0.0133	38.6326
Industrial Park	16.9611 / 0	17.5906	0.1728	0.0132	25.2986
Office Park	16.9611 / 27.2533	30.8735	0.1734	0.0133	38.6326
Research & Development	16.9611 / 0	17.5906	0.1728	0.0132	25.2986
Total		**127.8018**	**0.8658**	**0.0662**	**166.4951**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	500.6478	29.5874	0.0000	1,121.9839
Unmitigated	2,002.5911	118.3497	0.0000	4,487.9357

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	3202.88	650.1557	38.4231	0.0000	1,457.0408
General Office Building	2914.16	591.5481	34.9595	0.0000	1,325.6975
Industrial Park	55.12	11.1889	0.6612	0.0000	25.0750
Office Park	1530.63	310.7041	18.3621	0.0000	696.3078
Research & Development	2162.63	438.9944	25.9438	0.0000	983.8146
Total		**2,002.5911**	**118.3497**	**0.0000**	**4,487.9357**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	800.72	162.5389	9.6058	0.0000	364.2602
General Office Building	728.54	147.8870	8.7399	0.0000	331.4244
Industrial Park	13.78	2.7972	0.1653	0.0000	6.2687
Office Park	382.658	77.6760	4.5905	0.0000	174.0770
Research & Development	540.658	109.7486	6.4860	0.0000	245.9537
Total		**500.6478**	**29.5874**	**0.0000**	**1,121.9839**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

SSF Station Specific Plan EIR - Reduced

San Mateo County, Mitigation Report

Construction Mitigation Summary

Phase	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												

OFFROAD Equipment Mitigation

Equipment Type	Fuel Type	Tier	Number Mitigated	Total Number of Equipment	DPF	Oxidation Catalyst
Air Compressors	Diesel	No Change	0	0	No Change	0.00

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Unmitigated tons/yr							Unmitigated mt/yr					

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Mitigated tons/yr							Mitigated mt/yr					

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												

Fugitive Dust Mitigation

Yes/No	Mitigation Measure	Mitigation Input	Mitigation Input	Mitigation Input

No	Soil Stabilizer for unpaved Roads	PM10 Reduction		PM2.5 Reduction			
No	Replace Ground Cover of Area Disturbed	PM10 Reduction		PM2.5 Reduction			
No	Water Exposed Area	PM10 Reduction		PM2.5 Reduction		Frequency (per day)	
No	Unpaved Road Mitigation	Moisture Content %		Vehicle Speed (mph)			
No	Clean Paved Road	% PM Reduction	0.00				

		Unmitigated		Mitigated		Percent Reduction	
Phase	Source	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5

Operational Percent Reduction Summary

Category	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.48	25.48	25.48	25.47	25.48
Hearth	99.57	100.00	99.98	100.00	98.57	98.58	100.00	-25.45	22.50	97.91	55.61	23.92
Landscaping	8.51	4.92	5.74	7.14	6.27	6.27	0.00	7.11	7.11	8.40	0.00	7.13
Mobile	1.48	3.68	2.52	4.80	4.53	4.53	0.00	4.80	4.80	4.48	0.00	4.80
Natural Gas	24.64	24.66	24.81	24.63	24.64	24.64	0.00	24.64	24.64	24.64	24.64	24.64
Water Indoor	0.00	0.00	0.00	0.00	0.00	0.00	30.85	26.06	27.24	30.83	30.79	28.10
Water Outdoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Operational Mobile Mitigation

Project Setting:

Mitigation	Category	Measure	% Reduction	Input Value 1	Input Value 2	Input Value
No	Land Use	Increase Density	0.00	0.00	0.00	
No	Land Use	Increase Diversity	0.20	0.48		
No	Land Use	Improve Walkability Design	0.00	0.00		
No	Land Use	Improve Destination Accessibility	0.00	0.00		
No	Land Use	Increase Transit Accessibility	0.25	0.00		
No	Land Use	Integrate Below Market Rate Housing	0.00	0.00		
	Land Use	Land Use SubTotal	0.00			
No	Neighborhood Enhancements	Improve Pedestrian Network				
No	Neighborhood Enhancements	Provide Traffic Calming Measures				
No	Neighborhood Enhancements	Implement NEV Network	0.00			
	Neighborhood Enhancements	Neighborhood Enhancements Subtotal	0.00			
No	Parking Policy Pricing	Limit Parking Supply	0.05	10.00		
No	Parking Policy Pricing	Unbundle Parking Costs	0.00	0.00		
No	Parking Policy Pricing	On-street Market Pricing	0.00	0.00		
	Parking Policy Pricing	Parking Policy Pricing Subtotal	0.05			
No	Transit Improvements	Provide BRT System	0.00	0.00		
No	Transit Improvements	Expand Transit Network	0.00	0.00		
No	Transit Improvements	Increase Transit Frequency	0.00		0.00	
	Transit Improvements	Transit Improvements Subtotal	0.00			

		Land Use and Site Enhancement Subtotal	0.05			
No	Commute	Implement Trip Reduction Program		0.00	Required	
No	Commute	Transit Subsidy		0.00		
No	Commute	Implement Employee Parking "Cash Out"		0.00		
No	Commute	Workplace Parking Charge		0.00		
No	Commute	Encourage Telecommuting and Alternative Work Schedules	0.00			
No	Commute	Market Commute Trip Reduction Option	0.00	0.00		
No	Commute	Employee Vanpool/Shuttle	0.00	0.00	2.00	
No	Commute	Provide Ride Sharing Program		0.00		
	Commute	Commute Subtotal	0.00			
No	School Trip	Implement School Bus Program	0.00	0.00		
		Total VMT Reduction	0.05			

Area Mitigation

Measure Implemented	Mitigation Measure	Input Value
Yes	Only Natural Gas Hearth	
No	No Hearth	
No	Use Low VOC Cleaning Supplies	
No	Use Low VOC Paint (Residential Interior)	100.00
No	Use Low VOC Paint (Residential Exterior)	150.00
No	Use Low VOC Paint (Non-residential Interior)	100.00
No	Use Low VOC Paint (Non-residential Exterior)	150.00
Yes	% Electric Lawnmower	25.00

Yes	% Electric Leafblower	25.00
No	% Electric Chainsaw	0.00

Energy Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
Yes	Exceed Title 24	30.00	
No	Install High Efficiency Lighting	0.00	
Yes	On-site Renewable	6,628,366.00	0.00

Appliance Type	Land Use Subtype	% Improvement
ClothWasher		30.00
DishWasher		15.00
Fan		50.00
Refrigerator		15.00

Water Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
Yes	Apply Water Conservation on Strategy	30.85	0.00
No	Use Reclaimed Water	0.00	0.00
No	Use Grey Water	0.00	
No	Install low-flow bathroom faucet	32.00	
No	Install low-flow Kitchen faucet	18.00	
No	Install low-flow Toilet	20.00	

No	Install low-flow Shower	20.00	
No	Turf Reduction	0.00	
No	Use Water Efficient Irrigation Systems	6.10	
No	Water Efficient Landscape	0.00	0.00

Solid Waste Mitigation

Mitigation Measures	Input Value
Institute Recycling and Composting Services Percent Reduction in Waste Disposed	75.00

SSF Station Specific Plan EIR - Unreduced

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	511.78	1000sqft	7.00	511,780.00	0
Office Park	268.80	1000sqft	5.00	268,800.00	0
Research & Development	1,185.05	1000sqft	28.00	1,185,049.00	0
Industrial Park	21.25	1000sqft	9.00	21,250.00	0
Apartments Mid Rise	1,435.00	Dwelling Unit	35.00	1,435,000.00	4319

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2030
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	307	**CH4 Intensity (lb/MWhr)**	0.014	**N2O Intensity (lb/MWhr)**	0.003

1.3 User Entered Comments & Non-Default Data

Project Characteristics - GHG Emissions from Growth to appropriately account for emissions

Land Use - 105 Acres. Population (based on 3.01 persons per household), Lot Acerage based on AQ modeling

Construction Phase - No Construction

Off-road Equipment - no construction

Trips and VMT - no construction

Vehicle Trips - ITE Trip Rates (No project specific traffic reductions)

Woodstoves - Defaults

Energy Use - Based on Project Specific Data

Water And Wastewater - Based on project specific total water usage

Solid Waste - Based on Project Specific Information

Mobile Land Use Mitigation - Reductions from the "Land Use" section are built into the project specific trip rates

Area Mitigation -

Energy Mitigation -

Water Mitigation -

Waste Mitigation - State Requirement by 2020

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	250.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	250.00
tblConstructionPhase	NumDays	110.00	0.00
tblEnergyUse	LightingElect	741.44	1,162.58
tblEnergyUse	LightingElect	4.07	3.99
tblEnergyUse	LightingElect	4.07	2.77
tblEnergyUse	LightingElect	3.95	4.48
tblEnergyUse	LightingElect	3.43	5.37
tblEnergyUse	NT24E	2,561.86	4,016.99

tblEnergyUse	NT24E	4.80	4.70
tblEnergyUse	NT24E	4.80	3.26
tblEnergyUse	NT24E	4.81	5.45
tblEnergyUse	NT24E	3.36	5.26
tblEnergyUse	NT24NG	1,662.00	9,280.44
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.01	1.78
tblEnergyUse	NT24NG	1.17	2.14
tblEnergyUse	NT24NG	6.90	6.62
tblEnergyUse	T24E	312.05	489.30
tblEnergyUse	T24E	5.01	4.91
tblEnergyUse	T24E	5.01	9.27
tblEnergyUse	T24E	5.22	3.63
tblEnergyUse	T24E	1.48	2.32
tblEnergyUse	T24NG	7,191.67	40,157.57
tblEnergyUse	T24NG	19.28	34.01
tblEnergyUse	T24NG	19.28	33.97
tblEnergyUse	T24NG	18.35	33.58
tblEnergyUse	T24NG	18.78	18.03
tblLandUse	LandUseSquareFeet	1,185,050.00	1,185,049.00
tblLandUse	LotAcreage	11.75	7.00
tblLandUse	LotAcreage	6.17	5.00
tblLandUse	LotAcreage	27.21	28.00
tblLandUse	LotAcreage	0.49	9.00
tblLandUse	LotAcreage	37.76	35.00
tblLandUse	Population	4,104.00	4,319.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.014

tblProjectCharacteristics	CO2IntensityFactor	641.35	307
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.003
tblProjectCharacteristics	OperationalYear	2014	2030
tblSolidWaste	SolidWasteGenerationRate	660.10	3,202.88
tblSolidWaste	SolidWasteGenerationRate	475.96	2,914.16
tblSolidWaste	SolidWasteGenerationRate	26.35	55.12
tblSolidWaste	SolidWasteGenerationRate	249.98	1,530.63
tblSolidWaste	SolidWasteGenerationRate	90.06	2,162.63
tblTripsAndVMT	WorkerTripNumber	334.00	0.00
tblVehicleEF	HHD	9.5200e-003	9.8940e-003
tblVehicleEF	HHD	2.16	1.04
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tblVehicleEF	HHD	4.8130e-003	0.06
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tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.03	0.04
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tblVehicleEF	HHD	5.6200e-004	4.9300e-004
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tblVehicleEF	HHD	5.2100e-004	4.5800e-004
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tblVehicleEF	HHD	0.56	0.41
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tblVehicleEF	HHD	0.03	0.04
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tblVehicleEF	HHD	8.5250e-003	8.7810e-003
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tblVehicleEF	HHD	0.07	0.07
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tblVehicleEF	HHD	8.5250e-003	8.7810e-003
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tblVehicleEF	HHD	5.2100e-004	4.5800e-004
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tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.02	0.02
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tblVehicleEF	LDA	0.07	0.07
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tblVehicleEF	LDA	0.06	0.07
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tblVehicleEF	LDA	0.16	0.16

tblVehicleEF	LDA	0.05	0.05
tblVehicleEF	LDA	3.5410e-003	3.6910e-003
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tblVehicleEF	LDA	0.16	0.16
tblVehicleEF	LDA	0.05	0.05
tblVehicleEF	LDA	7.2340e-003	7.6880e-003
tblVehicleEF	LDA	3.6810e-003	3.8050e-003
tblVehicleEF	LDA	0.53	0.55
tblVehicleEF	LDA	1.27	1.34
tblVehicleEF	LDA	201.19	205.07
tblVehicleEF	LDA	45.14	45.07
tblVehicleEF	LDA	0.58	0.54
tblVehicleEF	LDA	0.06	0.07
tblVehicleEF	LDA	0.06	0.07
tblVehicleEF	LDA	1.9570e-003	2.0540e-003
tblVehicleEF	LDA	5.0170e-003	5.0330e-003
tblVehicleEF	LDA	1.8150e-003	1.9060e-003
tblVehicleEF	LDA	4.6550e-003	4.6700e-003
tblVehicleEF	LDA	9.2420e-003	7.5200e-003
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	8.0130e-003	8.6730e-003
tblVehicleEF	LDA	9.0960e-003	9.6940e-003
tblVehicleEF	LDA	0.21	0.21
tblVehicleEF	LDA	0.08	0.08

tblVehicleEF	LDA	3.3150e-003	3.3830e-003
tblVehicleEF	LDA	7.6000e-004	7.6100e-004
tblVehicleEF	LDA	9.2420e-003	7.5200e-003
tblVehicleEF	LDA	0.06	0.06
tblVehicleEF	LDA	8.0130e-003	8.6730e-003
tblVehicleEF	LDA	0.02	0.02
tblVehicleEF	LDA	0.21	0.21
tblVehicleEF	LDA	0.08	0.08
tblVehicleEF	LDT1	0.01	0.01
tblVehicleEF	LDT1	7.1200e-003	7.6180e-003
tblVehicleEF	LDT1	0.95	0.93
tblVehicleEF	LDT1	1.93	2.03
tblVehicleEF	LDT1	252.76	254.57
tblVehicleEF	LDT1	56.08	55.75
tblVehicleEF	LDT1	0.06	0.06
tblVehicleEF	LDT1	0.10	0.10
tblVehicleEF	LDT1	0.11	0.11
tblVehicleEF	LDT1	2.2190e-003	2.3220e-003
tblVehicleEF	LDT1	4.7250e-003	4.8560e-003
tblVehicleEF	LDT1	2.0590e-003	2.1540e-003
tblVehicleEF	LDT1	4.3840e-003	4.5050e-003
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.15	0.16
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.52	0.54
tblVehicleEF	LDT1	0.13	0.14
tblVehicleEF	LDT1	3.8640e-003	3.9590e-003

tblVehicleEF	LDT1	8.9000e-004	8.9100e-004
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.15	0.16
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.52	0.54
tblVehicleEF	LDT1	0.13	0.14
tblVehicleEF	LDT1	0.01	0.01
tblVehicleEF	LDT1	7.1200e-003	7.6180e-003
tblVehicleEF	LDT1	1.07	1.09
tblVehicleEF	LDT1	1.34	1.34
tblVehicleEF	LDT1	268.02	274.46
tblVehicleEF	LDT1	56.08	55.75
tblVehicleEF	LDT1	0.06	0.06
tblVehicleEF	LDT1	0.09	0.09
tblVehicleEF	LDT1	0.09	0.10
tblVehicleEF	LDT1	2.2190e-003	2.3220e-003
tblVehicleEF	LDT1	4.7250e-003	4.8560e-003
tblVehicleEF	LDT1	2.0590e-003	2.1540e-003
tblVehicleEF	LDT1	4.3840e-003	4.5050e-003
tblVehicleEF	LDT1	0.13	0.15
tblVehicleEF	LDT1	0.16	0.18
tblVehicleEF	LDT1	0.09	0.12
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.47	0.49
tblVehicleEF	LDT1	0.10	0.10
tblVehicleEF	LDT1	4.1000e-003	4.2720e-003
tblVehicleEF	LDT1	0.13	0.15

tblVehicleEF	LDT1	0.16	0.18
tblVehicleEF	LDT1	0.09	0.12
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.47	0.49
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.01	0.01
tblVehicleEF	LDT1	7.1200e-003	7.6180e-003
tblVehicleEF	LDT1	0.95	0.93
tblVehicleEF	LDT1	2.31	2.49
tblVehicleEF	LDT1	251.83	252.58
tblVehicleEF	LDT1	56.08	55.75
tblVehicleEF	LDT1	0.06	0.06
tblVehicleEF	LDT1	0.11	0.11
tblVehicleEF	LDT1	0.11	0.12
tblVehicleEF	LDT1	2.2190e-003	2.3220e-003
tblVehicleEF	LDT1	4.7250e-003	4.8560e-003
tblVehicleEF	LDT1	2.0590e-003	2.1540e-003
tblVehicleEF	LDT1	4.3840e-003	4.5050e-003
tblVehicleEF	LDT1	0.03	0.02
tblVehicleEF	LDT1	0.16	0.17
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.64	0.66
tblVehicleEF	LDT1	0.15	0.16
tblVehicleEF	LDT1	3.8500e-003	3.9280e-003
tblVehicleEF	LDT1	8.9700e-004	8.9900e-004
tblVehicleEF	LDT1	0.03	0.02
tblVehicleEF	LDT1	0.16	0.17

tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.64	0.66
tblVehicleEF	LDT1	0.16	0.17
tblVehicleEF	LDT2	9.4620e-003	9.7140e-003
tblVehicleEF	LDT2	4.9380e-003	5.0320e-003
tblVehicleEF	LDT2	0.69	0.69
tblVehicleEF	LDT2	1.40	1.42
tblVehicleEF	LDT2	314.74	320.82
tblVehicleEF	LDT2	70.23	70.17
tblVehicleEF	LDT2	0.17	0.17
tblVehicleEF	LDT2	0.08	0.08
tblVehicleEF	LDT2	0.09	0.09
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
tblVehicleEF	LDT2	4.8650e-003	4.8810e-003
tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
tblVehicleEF	LDT2	4.5140e-003	4.5290e-003
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.10	0.11
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.37	0.36
tblVehicleEF	LDT2	0.09	0.09
tblVehicleEF	LDT2	4.5270e-003	4.6380e-003
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.10	0.11
tblVehicleEF	LDT2	0.04	0.04
tblVehicleEF	LDT2	0.02	0.02

tblVehicleEF	LDT2	0.37	0.36
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	9.4620e-003	9.7140e-003
tblVehicleEF	LDT2	4.9380e-003	5.0320e-003
tblVehicleEF	LDT2	0.79	0.81
tblVehicleEF	LDT2	0.97	0.93
tblVehicleEF	LDT2	334.04	346.27
tblVehicleEF	LDT2	70.23	70.17
tblVehicleEF	LDT2	0.17	0.17
tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	0.08	0.08
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
tblVehicleEF	LDT2	4.8650e-003	4.8810e-003
tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
tblVehicleEF	LDT2	4.5140e-003	4.5290e-003
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.07	0.09
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.33	0.34
tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	4.8060e-003	5.0080e-003
tblVehicleEF	LDT2	1.0250e-003	1.0240e-003
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.07	0.09
tblVehicleEF	LDT2	0.02	0.03
tblVehicleEF	LDT2	0.33	0.34

tblVehicleEF	LDT2	0.07	0.07
tblVehicleEF	LDT2	9.4620e-003	9.7140e-003
tblVehicleEF	LDT2	4.9380e-003	5.0320e-003
tblVehicleEF	LDT2	0.69	0.68
tblVehicleEF	LDT2	1.67	1.74
tblVehicleEF	LDT2	313.55	318.27
tblVehicleEF	LDT2	70.23	70.17
tblVehicleEF	LDT2	0.17	0.17
tblVehicleEF	LDT2	0.09	0.09
tblVehicleEF	LDT2	0.10	0.10
tblVehicleEF	LDT2	1.8990e-003	1.9850e-003
tblVehicleEF	LDT2	4.8650e-003	4.8810e-003
tblVehicleEF	LDT2	1.7620e-003	1.8420e-003
tblVehicleEF	LDT2	4.5140e-003	4.5290e-003
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.44	0.44
tblVehicleEF	LDT2	0.10	0.11
tblVehicleEF	LDT2	4.5100e-003	4.6020e-003
tblVehicleEF	LDT2	1.0370e-003	1.0380e-003
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.11	0.11
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.44	0.44
tblVehicleEF	LDT2	0.11	0.11

tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17
tblVehicleEF	LHD1	0.62	0.63
tblVehicleEF	LHD1	3.27	3.11
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.48	0.53
tblVehicleEF	LHD1	1.10	1.06
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003
tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	1.4760e-003	1.5500e-003
tblVehicleEF	LHD1	0.07	0.06
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.1090e-003	1.0580e-003
tblVehicleEF	LHD1	0.05	0.06

tblVehicleEF	LHD1	0.39	0.36
tblVehicleEF	LHD1	0.25	0.24
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003
tblVehicleEF	LHD1	5.2800e-004	5.0500e-004
tblVehicleEF	LHD1	1.4760e-003	1.5500e-003
tblVehicleEF	LHD1	0.07	0.06
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.1090e-003	1.0580e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.39	0.36
tblVehicleEF	LHD1	0.27	0.25
tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17
tblVehicleEF	LHD1	0.63	0.65
tblVehicleEF	LHD1	2.29	2.13
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.45	0.50
tblVehicleEF	LHD1	1.03	0.98
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003

tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	3.4290e-003	3.6990e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.8130e-003	2.1850e-003
tblVehicleEF	LHD1	0.05	0.06
tblVehicleEF	LHD1	0.37	0.35
tblVehicleEF	LHD1	0.21	0.19
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003
tblVehicleEF	LHD1	5.1100e-004	4.8800e-004
tblVehicleEF	LHD1	3.4290e-003	3.6990e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	1.8130e-003	2.1850e-003
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.37	0.35
tblVehicleEF	LHD1	0.22	0.21
tblVehicleEF	LHD1	1.2200e-003	1.1840e-003
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.18	0.17

tblVehicleEF	LHD1	0.61	0.62
tblVehicleEF	LHD1	4.07	3.96
tblVehicleEF	LHD1	7.70	7.80
tblVehicleEF	LHD1	774.66	759.31
tblVehicleEF	LHD1	42.29	40.45
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	0.49	0.54
tblVehicleEF	LHD1	1.16	1.12
tblVehicleEF	LHD1	4.6900e-004	5.4400e-004
tblVehicleEF	LHD1	0.05	0.05
tblVehicleEF	LHD1	8.9840e-003	9.1350e-003
tblVehicleEF	LHD1	7.5940e-003	8.6010e-003
tblVehicleEF	LHD1	4.5000e-004	4.2100e-004
tblVehicleEF	LHD1	4.3100e-004	5.0100e-004
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	2.2460e-003	2.2840e-003
tblVehicleEF	LHD1	6.9920e-003	7.9180e-003
tblVehicleEF	LHD1	4.1700e-004	3.9100e-004
tblVehicleEF	LHD1	9.5100e-004	7.2100e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	5.0300e-004	5.4000e-004
tblVehicleEF	LHD1	0.05	0.06
tblVehicleEF	LHD1	0.44	0.41
tblVehicleEF	LHD1	0.29	0.28
tblVehicleEF	LHD1	8.8000e-005	8.9000e-005
tblVehicleEF	LHD1	8.5430e-003	8.3640e-003

tblVehicleEF	LHD1	5.4200e-004	5.2000e-004
tblVehicleEF	LHD1	9.5100e-004	7.2100e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.03	0.03
tblVehicleEF	LHD1	5.0300e-004	5.4000e-004
tblVehicleEF	LHD1	0.07	0.07
tblVehicleEF	LHD1	0.44	0.41
tblVehicleEF	LHD1	0.31	0.30
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.57	0.59
tblVehicleEF	LHD2	2.03	1.86
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003
tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.67	0.73
tblVehicleEF	LHD2	0.70	0.63
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03

tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	6.2800e-004	5.6700e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.19	0.17
tblVehicleEF	LHD2	0.14	0.13
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.6700e-004	3.3600e-004
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	6.2800e-004	5.6700e-004
tblVehicleEF	LHD2	0.07	0.08
tblVehicleEF	LHD2	0.19	0.17
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.58	0.60
tblVehicleEF	LHD2	1.42	1.27
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003

tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.64	0.70
tblVehicleEF	LHD2	0.65	0.59
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	1.8260e-003	1.8790e-003
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.0180e-003	1.1610e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.18	0.17
tblVehicleEF	LHD2	0.11	0.10
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.5700e-004	3.2600e-004
tblVehicleEF	LHD2	1.8260e-003	1.8790e-003
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.0180e-003	1.1610e-003
tblVehicleEF	LHD2	0.07	0.08

tblVehicleEF	LHD2	0.18	0.17
tblVehicleEF	LHD2	0.12	0.11
tblVehicleEF	LHD2	9.8000e-004	9.3100e-004
tblVehicleEF	LHD2	7.8110e-003	7.5250e-003
tblVehicleEF	LHD2	7.9360e-003	7.1610e-003
tblVehicleEF	LHD2	0.15	0.14
tblVehicleEF	LHD2	0.57	0.59
tblVehicleEF	LHD2	2.53	2.37
tblVehicleEF	LHD2	8.43	8.58
tblVehicleEF	LHD2	675.45	656.32
tblVehicleEF	LHD2	29.85	27.28
tblVehicleEF	LHD2	4.1670e-003	4.5970e-003
tblVehicleEF	LHD2	0.09	0.10
tblVehicleEF	LHD2	0.68	0.74
tblVehicleEF	LHD2	0.73	0.67
tblVehicleEF	LHD2	1.0050e-003	1.1100e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	9.9600e-003	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	2.0200e-004	1.8500e-004
tblVehicleEF	LHD2	9.2500e-004	1.0210e-003
tblVehicleEF	LHD2	0.03	0.03
tblVehicleEF	LHD2	2.4900e-003	2.5370e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	1.8800e-004	1.7200e-004
tblVehicleEF	LHD2	5.2900e-004	3.8400e-004
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02

tblVehicleEF	LHD2	2.8800e-004	2.9200e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.21	0.19
tblVehicleEF	LHD2	0.16	0.15
tblVehicleEF	LHD2	9.4000e-005	9.5000e-005
tblVehicleEF	LHD2	7.3830e-003	7.1600e-003
tblVehicleEF	LHD2	3.7600e-004	3.4400e-004
tblVehicleEF	LHD2	5.2900e-004	3.8400e-004
tblVehicleEF	LHD2	0.04	0.03
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	2.8800e-004	2.9200e-004
tblVehicleEF	LHD2	0.07	0.08
tblVehicleEF	LHD2	0.21	0.19
tblVehicleEF	LHD2	0.17	0.16
tblVehicleEF	MCY	23.41	23.81
tblVehicleEF	MCY	11.42	11.30
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.23	1.22
tblVehicleEF	MCY	0.32	0.32
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	0.53	0.59
tblVehicleEF	MCY	0.35	0.35
tblVehicleEF	MCY	0.30	0.34
tblVehicleEF	MCY	2.60	2.64
tblVehicleEF	MCY	1.17	1.17

tblVehicleEF	MCY	2.23	2.21
tblVehicleEF	MCY	2.1150e-003	2.1420e-003
tblVehicleEF	MCY	6.5500e-004	6.5300e-004
tblVehicleEF	MCY	0.53	0.59
tblVehicleEF	MCY	0.35	0.35
tblVehicleEF	MCY	0.30	0.34
tblVehicleEF	MCY	2.85	2.89
tblVehicleEF	MCY	1.17	1.17
tblVehicleEF	MCY	2.39	2.37
tblVehicleEF	MCY	21.78	22.45
tblVehicleEF	MCY	9.06	8.85
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.08	1.07
tblVehicleEF	MCY	0.29	0.29
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	1.60	1.80
tblVehicleEF	MCY	0.44	0.51
tblVehicleEF	MCY	0.78	1.10
tblVehicleEF	MCY	2.50	2.55
tblVehicleEF	MCY	1.03	1.06
tblVehicleEF	MCY	1.82	1.78
tblVehicleEF	MCY	2.0860e-003	2.1180e-003
tblVehicleEF	MCY	6.0500e-004	6.0000e-004
tblVehicleEF	MCY	1.60	1.80
tblVehicleEF	MCY	0.44	0.51

tblVehicleEF	MCY	0.78	1.10
tblVehicleEF	MCY	2.75	2.79
tblVehicleEF	MCY	1.03	1.06
tblVehicleEF	MCY	1.95	1.91
tblVehicleEF	MCY	25.23	25.90
tblVehicleEF	MCY	13.37	13.51
tblVehicleEF	MCY	149.92	151.72
tblVehicleEF	MCY	36.48	36.49
tblVehicleEF	MCY	6.8010e-003	5.6890e-003
tblVehicleEF	MCY	1.31	1.31
tblVehicleEF	MCY	0.34	0.34
tblVehicleEF	MCY	2.4900e-004	2.5400e-004
tblVehicleEF	MCY	2.1600e-004	2.2000e-004
tblVehicleEF	MCY	0.22	0.14
tblVehicleEF	MCY	0.41	0.40
tblVehicleEF	MCY	0.09	0.10
tblVehicleEF	MCY	2.68	2.74
tblVehicleEF	MCY	1.48	1.48
tblVehicleEF	MCY	2.55	2.58
tblVehicleEF	MCY	2.1460e-003	2.1780e-003
tblVehicleEF	MCY	6.9600e-004	6.9900e-004
tblVehicleEF	MCY	0.22	0.14
tblVehicleEF	MCY	0.41	0.40
tblVehicleEF	MCY	0.09	0.10
tblVehicleEF	MCY	2.94	3.00
tblVehicleEF	MCY	1.48	1.48
tblVehicleEF	MCY	2.74	2.77
tblVehicleEF	MDV	0.01	0.01

tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	1.03	1.07
tblVehicleEF	MDV	2.69	2.74
tblVehicleEF	MDV	416.43	427.07
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.13	0.14
tblVehicleEF	MDV	0.21	0.21
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.06	0.07
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	0.07	0.08
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.56	0.58
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	5.7930e-003	5.9340e-003
tblVehicleEF	MDV	1.3310e-003	1.3320e-003
tblVehicleEF	MDV	0.06	0.07
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	0.07	0.08
tblVehicleEF	MDV	0.03	0.04
tblVehicleEF	MDV	0.56	0.58
tblVehicleEF	MDV	0.20	0.21
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	0.01	0.01

tblVehicleEF	MDV	1.17	1.26
tblVehicleEF	MDV	1.86	1.81
tblVehicleEF	MDV	441.90	460.68
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.12	0.12
tblVehicleEF	MDV	0.18	0.19
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.14	0.16
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	0.12	0.15
tblVehicleEF	MDV	0.02	0.03
tblVehicleEF	MDV	0.51	0.54
tblVehicleEF	MDV	0.15	0.15
tblVehicleEF	MDV	6.1490e-003	6.4040e-003
tblVehicleEF	MDV	1.3170e-003	1.3150e-003
tblVehicleEF	MDV	0.14	0.16
tblVehicleEF	MDV	0.19	0.20
tblVehicleEF	MDV	0.12	0.15
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.51	0.54
tblVehicleEF	MDV	0.16	0.16
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	0.01	0.01
tblVehicleEF	MDV	1.03	1.06

tblVehicleEF	MDV	3.21	3.36
tblVehicleEF	MDV	414.87	423.71
tblVehicleEF	MDV	93.78	93.84
tblVehicleEF	MDV	0.11	0.11
tblVehicleEF	MDV	0.14	0.15
tblVehicleEF	MDV	0.22	0.23
tblVehicleEF	MDV	1.9120e-003	2.0130e-003
tblVehicleEF	MDV	4.5040e-003	4.5260e-003
tblVehicleEF	MDV	1.7740e-003	1.8680e-003
tblVehicleEF	MDV	4.1790e-003	4.1990e-003
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.19	0.19
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.67	0.70
tblVehicleEF	MDV	0.22	0.23
tblVehicleEF	MDV	5.7710e-003	5.8870e-003
tblVehicleEF	MDV	1.3410e-003	1.3420e-003
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.19	0.19
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.03	0.04
tblVehicleEF	MDV	0.67	0.70
tblVehicleEF	MDV	0.24	0.25
tblVehicleEF	MH	0.34	0.34
tblVehicleEF	MH	4.75	4.94
tblVehicleEF	MH	681.67	666.32
tblVehicleEF	MH	27.72	28.78

tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.87	0.75
tblVehicleEF	MH	0.56	0.58
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.36	0.41
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.20	0.20
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.65	0.71
tblVehicleEF	MH	0.25	0.26
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	3.9000e-004	4.0500e-004
tblVehicleEF	MH	0.36	0.41
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.20	0.20
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.65	0.71
tblVehicleEF	MH	0.26	0.27
tblVehicleEF	MH	0.35	0.35
tblVehicleEF	MH	3.30	3.37
tblVehicleEF	MH	681.67	666.32

tblVehicleEF	MH	27.72	28.78
tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.83	0.71
tblVehicleEF	MH	0.52	0.54
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.79	0.95
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.33	0.42
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.62	0.69
tblVehicleEF	MH	0.20	0.21
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	3.6600e-004	3.7900e-004
tblVehicleEF	MH	0.79	0.95
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.33	0.42
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.62	0.69
tblVehicleEF	MH	0.21	0.22
tblVehicleEF	MH	0.34	0.34
tblVehicleEF	MH	5.91	6.31

tblVehicleEF	MH	681.67	666.32
tblVehicleEF	MH	27.72	28.78
tblVehicleEF	MH	9.6000e-004	1.3660e-003
tblVehicleEF	MH	0.89	0.77
tblVehicleEF	MH	0.58	0.61
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	8.6030e-003	8.4750e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.2700e-004	2.4500e-004
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	2.1510e-003	2.1190e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	2.1100e-004	2.2700e-004
tblVehicleEF	MH	0.25	0.20
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.08	0.11
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	0.71	0.78
tblVehicleEF	MH	0.28	0.30
tblVehicleEF	MH	7.4860e-003	7.3330e-003
tblVehicleEF	MH	4.0900e-004	4.2800e-004
tblVehicleEF	MH	0.25	0.20
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.08	0.11
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.71	0.78
tblVehicleEF	MH	0.30	0.32
tblVehicleEF	MHD	4.6090e-003	4.8160e-003

tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	11.12	10.36
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.94	0.97
tblVehicleEF	MHD	1.22	1.11
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	1.1590e-003	1.3660e-003
tblVehicleEF	MHD	0.07	0.07
tblVehicleEF	MHD	8.8500e-004	9.3000e-004
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.38	0.39
tblVehicleEF	MHD	0.64	0.59
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	7.4200e-004	7.2800e-004
tblVehicleEF	MHD	1.1590e-003	1.3660e-003
tblVehicleEF	MHD	0.07	0.07
tblVehicleEF	MHD	8.8500e-004	9.3000e-004
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.38	0.39

tblVehicleEF	MHD	0.68	0.63
tblVehicleEF	MHD	4.6090e-003	4.8160e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	7.76	7.12
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.90	0.93
tblVehicleEF	MHD	1.13	1.03
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	2.7270e-003	3.3120e-003
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	1.4790e-003	1.9650e-003
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.36	0.37
tblVehicleEF	MHD	0.52	0.48
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	6.8500e-004	6.7400e-004
tblVehicleEF	MHD	2.7270e-003	3.3120e-003
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	1.4790e-003	1.9650e-003

tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.36	0.37
tblVehicleEF	MHD	0.55	0.51
tblVehicleEF	MHD	4.6090e-003	4.8160e-003
tblVehicleEF	MHD	0.43	0.42
tblVehicleEF	MHD	13.78	13.18
tblVehicleEF	MHD	990.41	1,007.48
tblVehicleEF	MHD	49.32	49.32
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.96	0.98
tblVehicleEF	MHD	1.28	1.17
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	6.3100e-004	6.6000e-004
tblVehicleEF	MHD	0.05	0.05
tblVehicleEF	MHD	2.8590e-003	2.8980e-003
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.8500e-004	6.1200e-004
tblVehicleEF	MHD	7.4400e-004	6.2200e-004
tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	3.9400e-004	4.6400e-004
tblVehicleEF	MHD	0.10	0.11
tblVehicleEF	MHD	0.43	0.44
tblVehicleEF	MHD	0.73	0.68
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	7.8600e-004	7.7500e-004
tblVehicleEF	MHD	7.4400e-004	6.2200e-004

tblVehicleEF	MHD	0.07	0.08
tblVehicleEF	MHD	3.9400e-004	4.6400e-004
tblVehicleEF	MHD	0.12	0.12
tblVehicleEF	MHD	0.43	0.44
tblVehicleEF	MHD	0.77	0.73
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.64	0.62
tblVehicleEF	OBUS	7.33	7.25
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	32.73	32.73
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.19	1.09
tblVehicleEF	OBUS	0.98	0.94
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	5.8400e-004	6.6800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	3.5100e-004	3.5400e-004
tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.28	0.29
tblVehicleEF	OBUS	0.45	0.42
tblVehicleEF	OBUS	0.01	0.01

tblVehicleEF	OBUS	4.9200e-004	4.9000e-004
tblVehicleEF	OBUS	5.8400e-004	6.6800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	3.5100e-004	3.5400e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.28	0.29
tblVehicleEF	OBUS	0.48	0.45
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.65	0.63
tblVehicleEF	OBUS	5.11	4.95
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.14	1.04
tblVehicleEF	OBUS	0.91	0.87
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	1.2860e-003	1.5560e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	5.7500e-004	7.3200e-004
tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.27	0.28
tblVehicleEF	OBUS	0.36	0.34

tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	4.5500e-004	4.5200e-004
tblVehicleEF	OBUS	1.2860e-003	1.5560e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	5.7500e-004	7.3200e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.27	0.28
tblVehicleEF	OBUS	0.39	0.37
tblVehicleEF	OBUS	3.3980e-003	3.0340e-003
tblVehicleEF	OBUS	0.64	0.62
tblVehicleEF	OBUS	9.14	9.26
tblVehicleEF	OBUS	1,108.44	1,054.99
tblVehicleEF	OBUS	2.8700e-003	1.8780e-003
tblVehicleEF	OBUS	1.21	1.11
tblVehicleEF	OBUS	1.03	0.99
tblVehicleEF	OBUS	0.10	0.10
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	3.1300e-004	3.4000e-004
tblVehicleEF	OBUS	0.04	0.04
tblVehicleEF	OBUS	2.7200e-003	2.6430e-003
tblVehicleEF	OBUS	0.04	0.03
tblVehicleEF	OBUS	2.9000e-004	3.1600e-004
tblVehicleEF	OBUS	4.1300e-004	3.3800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	1.4200e-004	1.9000e-004
tblVehicleEF	OBUS	0.13	0.12
tblVehicleEF	OBUS	0.31	0.32

tblVehicleEF	OBUS	0.51	0.49
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	5.2300e-004	5.2400e-004
tblVehicleEF	OBUS	4.1300e-004	3.3800e-004
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	1.4200e-004	1.9000e-004
tblVehicleEF	OBUS	0.15	0.14
tblVehicleEF	OBUS	0.31	0.32
tblVehicleEF	OBUS	0.54	0.53
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.39	2.30
tblVehicleEF	SBUS	27.83	21.92
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	115.30	115.30
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.71	4.02
tblVehicleEF	SBUS	2.57	2.17
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.20	0.20
tblVehicleEF	SBUS	9.1610e-003	8.7240e-003

tblVehicleEF	SBUS	0.39	0.26
tblVehicleEF	SBUS	1.67	2.92
tblVehicleEF	SBUS	1.82	1.33
tblVehicleEF	SBUS	9.8330e-003	0.01
tblVehicleEF	SBUS	1.7730e-003	1.6650e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.20	0.20
tblVehicleEF	SBUS	9.1610e-003	8.7240e-003
tblVehicleEF	SBUS	0.44	0.30
tblVehicleEF	SBUS	1.67	2.92
tblVehicleEF	SBUS	1.95	1.42
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.52	2.36
tblVehicleEF	SBUS	22.57	17.30
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.51	3.82
tblVehicleEF	SBUS	2.39	1.99
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.04	0.05
tblVehicleEF	SBUS	0.20	0.21

tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.40	0.26
tblVehicleEF	SBUS	1.46	2.57
tblVehicleEF	SBUS	1.61	1.16
tblVehicleEF	SBUS	9.8350e-003	0.01
tblVehicleEF	SBUS	1.6840e-003	1.5870e-003
tblVehicleEF	SBUS	0.04	0.05
tblVehicleEF	SBUS	0.20	0.21
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.45	0.30
tblVehicleEF	SBUS	1.46	2.57
tblVehicleEF	SBUS	1.72	1.23
tblVehicleEF	SBUS	5.4220e-003	6.6560e-003
tblVehicleEF	SBUS	4.30	2.25
tblVehicleEF	SBUS	32.27	25.92
tblVehicleEF	SBUS	904.73	958.63
tblVehicleEF	SBUS	2.0000e-004	1.7500e-004
tblVehicleEF	SBUS	3.81	4.11
tblVehicleEF	SBUS	2.70	2.30
tblVehicleEF	SBUS	0.38	0.46
tblVehicleEF	SBUS	9.9300e-003	0.01
tblVehicleEF	SBUS	0.03	0.03
tblVehicleEF	SBUS	3.1530e-003	2.5790e-003
tblVehicleEF	SBUS	0.16	0.20
tblVehicleEF	SBUS	2.4820e-003	2.5920e-003
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	2.9260e-003	2.3930e-003
tblVehicleEF	SBUS	0.01	8.3260e-003

tblVehicleEF	SBUS	0.22	0.22
tblVehicleEF	SBUS	3.3240e-003	4.3910e-003
tblVehicleEF	SBUS	0.38	0.26
tblVehicleEF	SBUS	2.07	3.59
tblVehicleEF	SBUS	1.99	1.47
tblVehicleEF	SBUS	9.8310e-003	0.01
tblVehicleEF	SBUS	1.8480e-003	1.7320e-003
tblVehicleEF	SBUS	0.01	8.3260e-003
tblVehicleEF	SBUS	0.22	0.22
tblVehicleEF	SBUS	3.3240e-003	4.3910e-003
tblVehicleEF	SBUS	0.43	0.30
tblVehicleEF	SBUS	2.07	3.59
tblVehicleEF	SBUS	2.12	1.57
tblVehicleEF	UBUS	2.87	2.40
tblVehicleEF	UBUS	4.95	4.33
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.72	9.03
tblVehicleEF	UBUS	0.70	0.63
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	1.2010e-003	1.3720e-003
tblVehicleEF	UBUS	0.03	0.03

tblVehicleEF	UBUS	7.0500e-004	6.8000e-004
tblVehicleEF	UBUS	0.52	0.40
tblVehicleEF	UBUS	0.27	0.34
tblVehicleEF	UBUS	0.37	0.34
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	2.1000e-004	1.8900e-004
tblVehicleEF	UBUS	1.2010e-003	1.3720e-003
tblVehicleEF	UBUS	0.03	0.03
tblVehicleEF	UBUS	7.0500e-004	6.8000e-004
tblVehicleEF	UBUS	0.59	0.45
tblVehicleEF	UBUS	0.27	0.34
tblVehicleEF	UBUS	0.39	0.36
tblVehicleEF	UBUS	2.90	2.43
tblVehicleEF	UBUS	3.83	3.27
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.28	8.65
tblVehicleEF	UBUS	0.65	0.59
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	2.9510e-003	3.4810e-003
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	1.2330e-003	1.4720e-003

tblVehicleEF	UBUS	0.52	0.40
tblVehicleEF	UBUS	0.24	0.31
tblVehicleEF	UBUS	0.32	0.29
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	1.9100e-004	1.7000e-004
tblVehicleEF	UBUS	2.9510e-003	3.4810e-003
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	1.2330e-003	1.4720e-003
tblVehicleEF	UBUS	0.59	0.46
tblVehicleEF	UBUS	0.24	0.31
tblVehicleEF	UBUS	0.34	0.31
tblVehicleEF	UBUS	2.85	2.38
tblVehicleEF	UBUS	5.84	5.23
tblVehicleEF	UBUS	2,077.65	2,014.22
tblVehicleEF	UBUS	10.86	9.91
tblVehicleEF	UBUS	3.5230e-003	3.4740e-003
tblVehicleEF	UBUS	10.88	9.18
tblVehicleEF	UBUS	0.74	0.67
tblVehicleEF	UBUS	0.78	0.78
tblVehicleEF	UBUS	0.21	0.17
tblVehicleEF	UBUS	1.2300e-004	1.2800e-004
tblVehicleEF	UBUS	0.33	0.34
tblVehicleEF	UBUS	0.19	0.16
tblVehicleEF	UBUS	1.1400e-004	1.1900e-004
tblVehicleEF	UBUS	7.7000e-004	5.2900e-004
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	2.8400e-004	3.3000e-004
tblVehicleEF	UBUS	0.52	0.40

tblVehicleEF	UBUS	0.34	0.43
tblVehicleEF	UBUS	0.41	0.38
tblVehicleEF	UBUS	0.02	0.02
tblVehicleEF	UBUS	2.2500e-004	2.0400e-004
tblVehicleEF	UBUS	7.7000e-004	5.2900e-004
tblVehicleEF	UBUS	0.03	0.04
tblVehicleEF	UBUS	2.8400e-004	3.3000e-004
tblVehicleEF	UBUS	0.59	0.45
tblVehicleEF	UBUS	0.34	0.43
tblVehicleEF	UBUS	0.43	0.40
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AerobicPercent	87.46	97.54
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	2.46
tblWater	IndoorWaterUseRate	93,496,026.77	24,528,000.00
tblWater	IndoorWaterUseRate	90,960,577.55	24,528,000.00
tblWater	IndoorWaterUseRate	4,914,062.50	24,528,000.00
tblWater	IndoorWaterUseRate	47,774,831.46	24,528,000.00
tblWater	IndoorWaterUseRate	582,681,912.13	24,528,000.00
tblWater	OutdoorWaterUseRate	58,943,147.31	27,253,333.00
tblWater	OutdoorWaterUseRate	55,750,031.40	27,253,333.00
tblWater	OutdoorWaterUseRate	29,281,348.31	27,253,333.00

tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00

2.0 Emissions Summary

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373
Energy	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	11,666.9066	11,666.9066	0.3503	0.1729	11,727.8519
Mobile	9.2175	22.1706	100.3638	0.3252	20.8266	0.5133	21.3399	5.6008	0.4734	6.0742	0.0000	21,756.3605	21,756.3605	0.5671	0.0000	21,768.2689
Waste						0.0000	0.0000		0.0000	0.0000	2,002.5911	0.0000	2,002.5911	118.3497	0.0000	4,487.9357
Water						0.0000	0.0000		0.0000	0.0000	43.3902	132.2575	175.6477	1.2517	0.0957	231.5862
Total	**26.7549**	**28.4189**	**116.3757**	**0.3650**	**20.8266**	**1.2841**	**22.1107**	**5.6008**	**1.2442**	**6.8450**	**2,069.4622**	**33,610.9085**	**35,680.3707**	**120.5791**	**0.2705**	**38,296.3800**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373
Energy	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	11,666.9066	11,666.9066	0.3503	0.1729	11,727.8519
Mobile	9.2175	22.1706	100.3638	0.3252	20.8266	0.5133	21.3399	5.6008	0.4734	6.0742	0.0000	21,756.3605	21,756.3605	0.5671	0.0000	21,768.2689
Waste						0.0000	0.0000		0.0000	0.0000	2,002.5911	0.0000	2,002.5911	118.3497	0.0000	4,487.9357
Water						0.0000	0.0000		0.0000	0.0000	43.3902	132.2575	175.6477	1.2513	0.0956	231.5519
Total	**26.7549**	**28.4189**	**116.3757**	**0.3650**	**20.8266**	**1.2841**	**22.1107**	**5.6008**	**1.2442**	**6.8450**	**2,069.4622**	**33,610.9085**	**35,680.3707**	**120.5787**	**0.2704**	**38,296.3457**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	1/1/2015	12/31/2014	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 2,905,875; Residential Outdoor: 968,625; Non-Residential Indoor: 2,980,319; Non-Residential Outdoor: 993,440 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	9.2175	22.1706	100.3638	0.3252	20.8266	0.5133	21.3399	5.6008	0.4734	6.0742	0.0000	21,756.3605	21,756.3605	0.5671	0.0000	21,768.2689
Unmitigated	9.2175	22.1706	100.3638	0.3252	20.8266	0.5133	21.3399	5.6008	0.4734	6.0742	0.0000	21,756.3605	21,756.3605	0.5671	0.0000	21,768.2689

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	9,456.65	10,274.60	8710.45	21,133,586	21,133,586
General Office Building	5,634.70	1,212.92	501.54	10,203,545	10,203,545
Industrial Park	147.90	52.91	15.51	302,606	302,606
Office Park	3,069.70	440.83	204.29	5,726,274	5,726,274
Research & Development	9,610.76	2,251.60	1315.41	18,482,063	18,482,063
Total	27,919.70	14,232.86	10,747.20	55,848,074	55,848,074

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Office Park	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Research & Development	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.537592	0.061793	0.165057	0.108770	0.030585	0.004597	0.020545	0.058479	0.001878	0.003474	0.005689	0.000175	0.001366

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
NaturalGas Mitigated	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	6,875.0105	6,875.0105	0.1318	0.1260	6,916.8507
NaturalGas Unmitigated	0.6947	6.1067	3.7747	0.0379		0.4800	0.4800		0.4800	0.4800	0.0000	6,875.0105	6,875.0105	0.1318	0.1260	6,916.8507
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4,791.8961	4,791.8961	0.2185	0.0468	4,811.0012
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4,791.8961	4,791.8961	0.2185	0.0468	4,811.0012

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	7.09435e+007	0.3825	3.2690	1.3911	0.0209		0.2643	0.2643		0.2643	0.2643	0.0000	3,785.8177	3,785.8177	0.0726	0.0694	3,808.8576
General Office Building	1.83166e+007	0.0988	0.8979	0.7542	5.3900e-003		0.0682	0.0682		0.0682	0.0682	0.0000	977.4439	977.4439	0.0187	0.0179	983.3924
Industrial Park	759688	4.1000e-003	0.0372	0.0313	2.2000e-004		2.8300e-003	2.8300e-003		2.8300e-003	2.8300e-003	0.0000	40.5398	40.5398	7.8000e-004	7.4000e-004	40.7865
Office Park	9.60154e+006	0.0518	0.4707	0.3954	2.8200e-003		0.0358	0.0358		0.0358	0.0358	0.0000	512.3745	512.3745	9.8200e-003	9.3900e-003	515.4928
Research & Development	2.92115e+007	0.1575	1.4319	1.2028	8.5900e-003		0.1088	0.1088		0.1088	0.1088	0.0000	1,558.8346	1,558.8346	0.0299	0.0286	1,568.3214
Total		**0.6947**	**6.1067**	**3.7747**	**0.0379**		**0.4800**	**0.4800**		**0.4800**	**0.4800**	**0.0000**	**6,875.0105**	**6,875.0105**	**0.1318**	**0.1260**	**6,916.8507**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	7.09435e+007	0.3825	3.2690	1.3911	0.0209		0.2643	0.2643		0.2643	0.2643	0.0000	3,785.8177	3,785.8177	0.0726	0.0694	3,808.8576
General Office Building	1.83166e+007	0.0988	0.8979	0.7542	5.3900e-003		0.0682	0.0682		0.0682	0.0682	0.0000	977.4439	977.4439	0.0187	0.0179	983.3924
Industrial Park	759688	4.1000e-003	0.0372	0.0313	2.2000e-004		2.8300e-003	2.8300e-003		2.8300e-003	2.8300e-003	0.0000	40.5398	40.5398	7.8000e-004	7.4000e-004	40.7865
Office Park	9.60154e+006	0.0518	0.4707	0.3954	2.8200e-003		0.0358	0.0358		0.0358	0.0358	0.0000	512.3745	512.3745	9.8200e-003	9.3900e-003	515.4928
Research & Development	2.92115e+007	0.1575	1.4319	1.2028	8.5900e-003		0.1088	0.1088		0.1088	0.1088	0.0000	1,558.8346	1,558.8346	0.0299	0.0286	1,568.3214
Total		**0.6947**	**6.1067**	**3.7747**	**0.0379**		**0.4800**	**0.4800**		**0.4800**	**0.4800**	**0.0000**	**6,875.0105**	**6,875.0105**	**0.1318**	**0.1260**	**6,916.8507**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	8.13483e+006	1,132.7981	0.0517	0.0111	1,137.3145
General Office Building	6.96021e+006	969.2289	0.0442	9.4700e-003	973.0931
Industrial Park	325125	45.2746	2.0600e-003	4.4000e-004	45.4551
Office Park	3.64493e+006	507.5666	0.0232	4.9600e-003	509.5903
Research & Development	1.53464e+007	2,137.0279	0.0975	0.0209	2,145.5482
Total		**4,791.8961**	**0.2185**	**0.0468**	**4,811.0012**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	8.13483e+006	1,132.7981	0.0517	0.0111	1,137.3145
General Office Building	6.96021e+006	969.2289	0.0442	9.4700e-003	973.0931
Industrial Park	325125	45.2746	2.0600e-003	4.4000e-004	45.4551
Office Park	3.64493e+006	507.5666	0.0232	4.9600e-003	509.5903
Research & Development	1.53464e+007	2,137.0279	0.0975	0.0209	2,145.5482
Total		**4,791.8961**	**0.2185**	**0.0468**	**4,811.0012**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373
Unmitigated	16.8426	0.1416	12.2372	1.9300e-003		0.2908	0.2908		0.2908	0.2908	23.4809	55.3839	78.8648	0.0603	1.9600e-003	80.7373

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0462					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	13.3642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.1128	0.0189	1.5921	1.3700e-003		0.2317	0.2317		0.2317	0.2317	23.4809	37.9436	61.4245	0.0436	1.9600e-003	62.9468
Landscaping	0.3195	0.1227	10.6451	5.6000e-004		0.0592	0.0592		0.0592	0.0592	0.0000	17.4403	17.4403	0.0167	0.0000	17.7905
Total	**16.8426**	**0.1416**	**12.2372**	**1.9300e-003**		**0.2908**	**0.2908**		**0.2908**	**0.2908**	**23.4809**	**55.3839**	**78.8648**	**0.0603**	**1.9600e-003**	**80.7373**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0462					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	13.3642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.1128	0.0189	1.5921	1.3700e-003		0.2317	0.2317		0.2317	0.2317	23.4809	37.9436	61.4245	0.0436	1.9600e-003	62.9468
Landscaping	0.3195	0.1227	10.6451	5.6000e-004		0.0592	0.0592		0.0592	0.0592	0.0000	17.4403	17.4403	0.0167	0.0000	17.7905
Total	**16.8426**	**0.1416**	**12.2372**	**1.9300e-003**		**0.2908**	**0.2908**		**0.2908**	**0.2908**	**23.4809**	**55.3839**	**78.8648**	**0.0603**	**1.9600e-003**	**80.7373**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Unmitigated	175.6477	1.2517	0.0957	231.5862
Mitigated	175.6477	1.2513	0.0956	231.5519

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6516
General Office Building	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6516
Industrial Park	24.528 / 0	27.1598	0.2500	0.0191	38.3157
Office Park	24.528 / 27.2533	40.4427	0.2506	0.0192	51.6516
Research & Development	24.528 / 0	27.1598	0.2500	0.0191	38.3157
Total		**175.6477**	**1.2517**	**0.0956**	**231.5862**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	24.528 / 27.2533	40.4427	0.2505	0.0192	51.6447
General Office Building	24.528 / 27.2533	40.4427	0.2505	0.0192	51.6447
Industrial Park	24.528 / 0	27.1598	0.2499	0.0190	38.3089
Office Park	24.528 / 27.2533	40.4427	0.2505	0.0192	51.6447
Research & Development	24.528 / 0	27.1598	0.2499	0.0190	38.3089
Total		**175.6477**	**1.2513**	**0.0956**	**231.5519**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	2,002.5911	118.3497	0.0000	4,487.9357
Unmitigated	2,002.5911	118.3497	0.0000	4,487.9357

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	3202.88	650.1557	38.4231	0.0000	1,457.0408
General Office Building	2914.16	591.5481	34.9595	0.0000	1,325.6975
Industrial Park	55.12	11.1889	0.6612	0.0000	25.0750
Office Park	1530.63	310.7041	18.3621	0.0000	696.3078
Research & Development	2162.63	438.9944	25.9438	0.0000	983.8146
Total		**2,002.5911**	**118.3497**	**0.0000**	**4,487.9357**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	3202.88	650.1557	38.4231	0.0000	1,457.0408
General Office Building	2914.16	591.5481	34.9595	0.0000	1,325.6975
Industrial Park	55.12	11.1889	0.6612	0.0000	25.0750
Office Park	1530.63	310.7041	18.3621	0.0000	696.3078
Research & Development	2162.63	438.9944	25.9438	0.0000	983.8146
Total		**2,002.5911**	**118.3497**	**0.0000**	**4,487.9357**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Appendix D Noise Data

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 27545
Project Name: SSF Specific Plan EIR

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Linscott, Law, and Greenspan, December 2008
Community Noise Descriptor: L_{dn}: ____ CNEL: X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

"-" = contour is located within the roadway right-of-way.
Distance is from the centerline of the roadway segment to the receptor location.

Analysis Condition Roadway, Segment	Lanes	Median Width	ADT Volume	Design (mph)	Alpha Factor	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	**CNEL at 50 Feet**	Distance from Centerline of Roadway: Distance to Contour 70 CNEL	65 CNEL	60 CNEL	55 CNEL
Miller Avenue Between Airport Blvd and Linden Avenue												
Existing	2	0	6,440	25	0.5	2.0%	1.0%	**59.4**	-	-	46	99
Existing Plus Project (KWBL & RWBL)	2	0	9,420	25	0.5	2.0%	1.0%	**61.1**	-	-	59	127
E. Grand Avenue between the I-101 and Dubuque Ave												
Existing	4	20	20,890	35	0.5	3.0%	1.0%	**68.5**	-	86	184	397
Existing Plus Project (KWBL)	4	20	29,000	35	0.5	3.0%	1.0%	**69.9**	-	107	230	495
Existing Plus Project (RWBL)	4	20	22,480	35	0.5	3.0%	1.0%	**68.8**	-	90	194	417
Baden Avenue between Airport Blvd. and Linden Ave.												
Existing	2	0	14,410	25	0.5	2.0%	1.0%	**62.9**	-	36	78	169
Existing Plus Project (KWBL)	2	0	19,420	25	0.5	2.0%	1.0%	**64.2**	-	44	96	206
Existing Plus Project (RWBL)	2	0	19,340	25	0.5	2.0%	1.0%	**64.2**	-	44	95	206
South Airport Boulevard between Airport Blvd./Produce Ave. and Gateway Blvd.												
Existing	4	0	20,030	30	0.5	2.0%	2.0%	**67.6**	-	75	162	348
Existing Plus Project (KWBL)	4	0	33,600	30	0.5	2.0%	2.0%	**69.9**	49	106	228	492
Existing Plus Project (RWBL)	4	0	40,120	30	0.5	2.0%	2.0%	**70.7**	55	119	257	553
Linden Avenue between Grande Ave. and Baden Ave.												
Existing	2	0	8,920	25	0.5	2.0%	1.0%	**60.8**	-	-	57	123
Existing Plus Project (KWBL)	2	0	9,670	25	0.5	2.0%	1.0%	**61.2**	-	-	60	130
Existing Plus Project (RWBL)	2	0	10,990	25	0.5	2.0%	1.0%	**61.8**	-	-	65	141
Airport Boulevard North of Baden.												
Existing	6	0	13,950	35	0.5	5.0%	3.0%	**69.2**	-	95	205	441
Existing Plus Project (KWBL)	6	0	13,950	35	0.5	5.0%	3.0%	**69.2**	-	95	205	441
Existing Plus Project (RWBL)	6	0	17,150	35	0.5	5.0%	3.0%	**70.1**	-	109	235	506
Airport Boulevard between Baden ave. and San Mateo Ave./So. Airport Blvd.												
Existing	6	0	21,660	35	0.5	5.0%	3.0%	**71.1**	59	127	275	591
Existing Plus Project (KWBL)	6	0	26,560	35	0.5	5.0%	3.0%	**72.0**	68	146	314	678
Existing Plus Project (RWBL)	6	0	18,410	35	0.5	5.0%	3.0%	**70.4**	-	114	246	531
Gateway Boulevard between E. Grand Ave. and So. Airport Blvd./Mitchell Ave.												
Existing	4	12	13,510	35	0.5	2.0%	2.0%	**66.8**	-	66	141	304
Existing Plus Project (KWBL)	4	12	20,240	35	0.5	2.0%	2.0%	**68.5**	-	86	185	399
Existing Plus Project (RWBL)	4	12	26,760	35	0.5	2.0%	2.0%	**69.7**	-	103	223	480
Industrial Way South of Grand Ave.												
Existing	2	0	6,520	25	0.5	2.0%	1.0%	**59.5**	-	-	46	100
Existing Plus Project (KWBL & RWBL)	2	0	8,380	25	0.5	2.0%	1.0%	**60.6**	-	-	55	118
Produce Avenue south of San Mateo Ave./So. Airport Blvd.												
Existing	3	0	25,020	35	0.5	2.0%	2.0%	**68.8**	41	89	193	415
Existing Plus Project (KWBL)	3	0	31,600	35	0.5	2.0%	2.0%	**69.8**	48	104	225	485
Existing Plus Project (RWBL)	3	0	29,970	35	0.5	2.0%	2.0%	**69.6**	47	101	217	468
101 Freeway												
380 Junction to Produce	8	20	220,000	65	0.5	3.6%	1.3%	**87.5**	876	1,887	4,064	8,757
Produce to Grand	8	20	212,000	65	0.5	3.6%	1.3%	**87.3**	854	1,841	3,965	8,543
Grand to Oyster Point	8	20	218,000	65	0.5	3.6%	1.3%	**87.4**	870	1,875	4,040	8,703

Appendix E Traffic Data

Appendix A

Traffic Counts

South San Francisco Caltrain Station Area Plan EIR

April 2014

SF12-0610

FEHR PEERS

MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

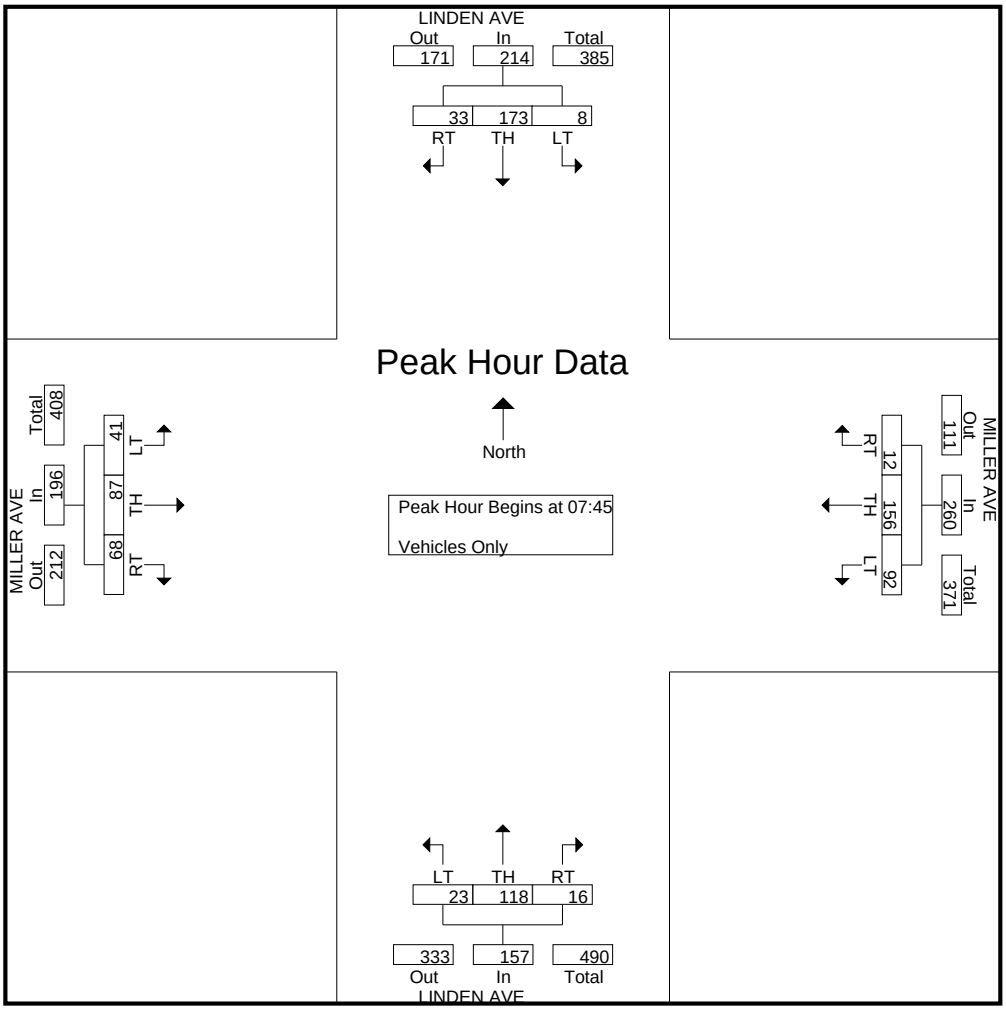
CITY OF SOUTH SAN FRANCISCO

File Name : linden-miller-a2
Site Code : 1
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	LINDEN AVE Southbound				MILLER AVE Westbound				LINDEN AVE Northbound				MILLER AVE Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	5	32	1	38	1	27	15	43	2	11	1	14	11	11	4	26	121
07:15	6	45	2	53	5	26	15	46	0	15	1	16	16	16	6	38	153
07:30	4	38	3	45	4	32	22	58	0	18	1	19	17	13	10	40	162
07:45	7	44	2	53	6	48	23	77	5	19	8	32	20	21	16	57	219
Total	22	159	8	189	16	133	75	224	7	63	11	81	64	61	36	161	655
08:00	12	43	3	58	3	39	19	61	5	36	3	44	18	29	7	54	217
08:15	10	36	0	46	3	35	27	65	2	32	7	41	14	17	9	40	192
08:30	4	50	3	57	0	34	23	57	4	31	5	40	16	20	9	45	199
08:45	5	49	1	55	4	33	29	66	3	28	5	36	14	8	3	25	182
Total	31	178	7	216	10	141	98	249	14	127	20	161	62	74	28	164	790
Grand Total	53	337	15	405	26	274	173	473	21	190	31	242	126	135	64	325	1445
Apprch %	13.1	83.2	3.7		5.5	57.9	36.6		8.7	78.5	12.8		38.8	41.5	19.7		
Total %	3.7	23.3	1	28	1.8	19	12	32.7	1.5	13.1	2.1	16.7	8.7	9.3	4.4	22.5	

	LINDEN AVE Southbound				MILLER AVE Westbound				LINDEN AVE Northbound				MILLER AVE Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	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	7	44	2	53	**6**	**48**	23	**77**	**5**	19	**8**	32	**20**	21	**16**	**57**	**219**
08:00	**12**	43	**3**	**58**	3	39	19	61	5	**36**	3	**44**	18	**29**	7	54	217
08:15	10	36	0	46	3	35	**27**	65	2	32	7	41	14	17	9	40	192
08:30	4	**50**	3	57	0	34	23	57	4	31	5	40	16	20	9	45	199
Total Volume	33	173	8	214	12	156	92	260	16	118	23	157	68	87	41	196	827
% App. Total	15.4	80.8	3.7		4.6	60	35.4		10.2	75.2	14.6		34.7	44.4	20.9		
PHF	.688	.865	.667	.922	.500	.813	.852	.844	.800	.819	.719	.892	.850	.750	.641	.860	.944



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

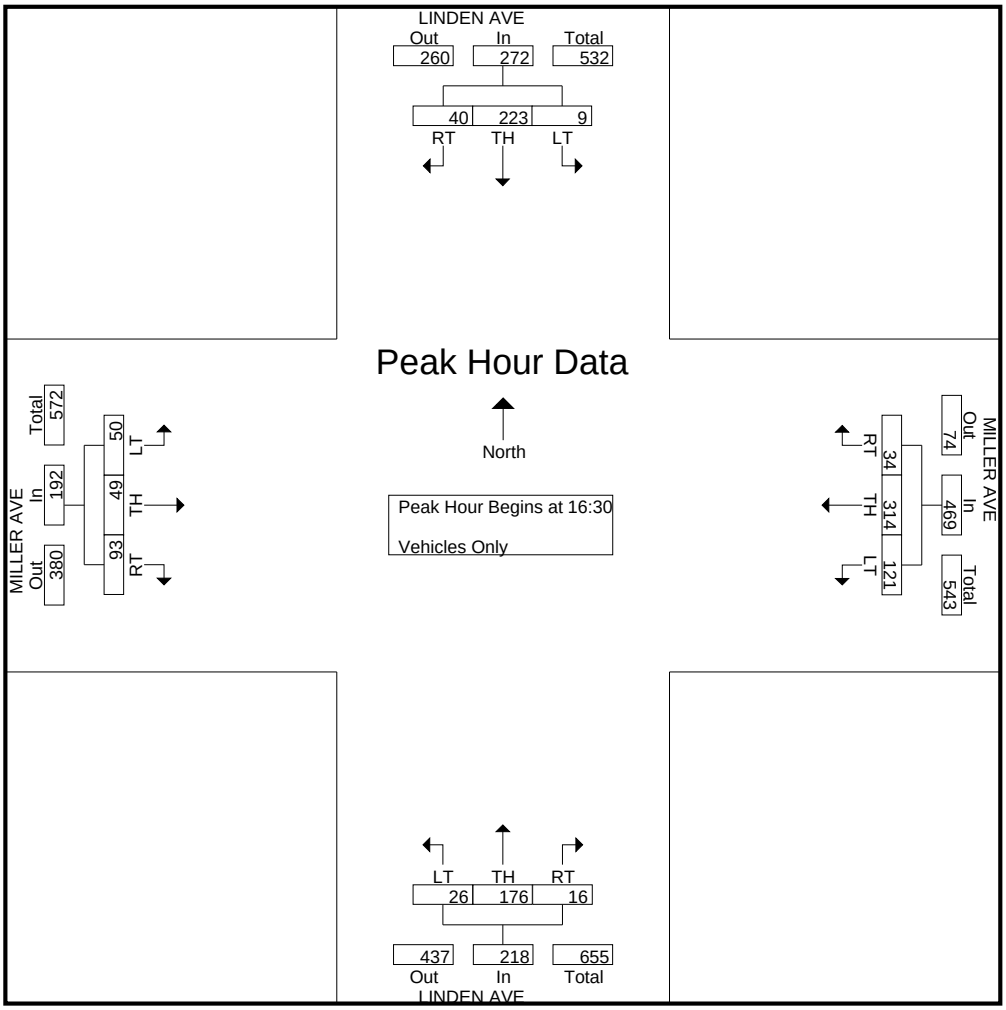
CITY OF SOUTH SAN FRANCISCO

File Name : linden-miller-p2
Site Code : 1
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	LINDEN AVE Southbound				MILLER AVE Westbound				LINDEN AVE Northbound				MILLER AVE Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	9	47	5	61	14	64	22	100	6	46	6	58	20	16	12	48	267
16:15	10	47	3	60	4	71	31	106	3	29	4	36	12	10	17	39	241
16:30	8	57	3	68	7	62	41	110	2	44	6	52	27	9	12	48	278
16:45	10	57	2	69	11	81	30	122	3	45	9	57	21	16	7	44	292
Total	37	208	13	258	36	278	124	438	14	164	25	203	80	51	48	179	1078
17:00	10	52	1	63	9	87	26	122	1	49	5	55	23	11	16	50	290
17:15	12	57	3	72	7	84	24	115	10	38	6	54	22	13	15	50	291
17:30	9	52	3	64	9	78	33	120	3	42	6	51	22	11	9	42	277
17:45	7	38	1	46	12	74	17	103	11	42	7	60	14	9	14	37	246
Total	38	199	8	245	37	323	100	460	25	171	24	220	81	44	54	179	1104
Grand Total	75	407	21	503	73	601	224	898	39	335	49	423	161	95	102	358	2182
Apprch %	14.9	80.9	4.2		8.1	66.9	24.9		9.2	79.2	11.6		45	26.5	28.5		
Total %	3.4	18.7	1	23.1	3.3	27.5	10.3	41.2	1.8	15.4	2.2	19.4	7.4	4.4	4.7	16.4	

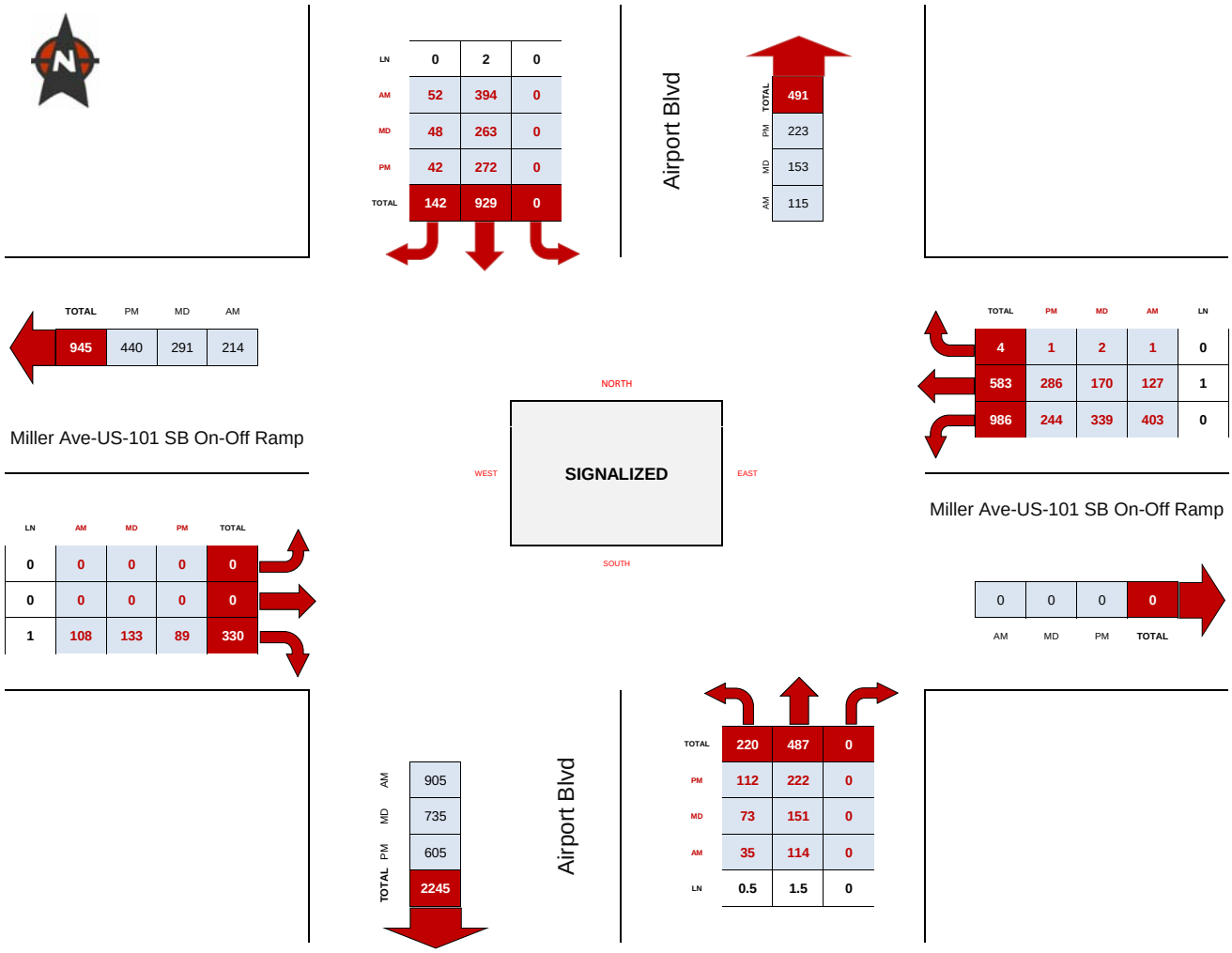
	LINDEN AVE Southbound				MILLER AVE Westbound				LINDEN AVE Northbound				MILLER AVE Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:30																	
16:30	8	**57**	**3**	68	7	62	**41**	110	2	44	6	52	**27**	9	12	48	278
16:45	10	57	2	69	**11**	81	30	**122**	3	45	**9**	**57**	21	**16**	7	44	**292**
17:00	10	52	1	63	9	**87**	26	122	1	**49**	5	55	23	11	**16**	**50**	290
17:15	**12**	57	3	**72**	7	84	24	115	**10**	38	6	54	22	13	15	50	291
Total Volume	40	223	9	272	34	314	121	469	16	176	26	218	93	49	50	192	1151
% App. Total	14.7	82	3.3		7.2	67	25.8		7.3	80.7	11.9		48.4	25.5	26		
PHF	.833	.978	.750	.944	.773	.902	.738	.961	.400	.898	.722	.956	.861	.766	.781	.960	.985



PEAK HOUR ITM SUMMARY

#015 Airport Blvd & Miller Ave-US-101 SB On-Off Ramp

LOCATION #:	015	QTD PRJ #:	080198	AM PEAK:	730 AM
NORTH / SOUTH:	Airport Blvd	DATE:	Thursday, May 22, 2008	MD PEAK:	1145 AM
EAST / WEST:	Miller Ave-US-101 SB On-Off Ramp	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	500 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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11040 Santa Monica Blvd, Suite 207, Los Angeles, CA 90025
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MARKS TRAFFIC DATA

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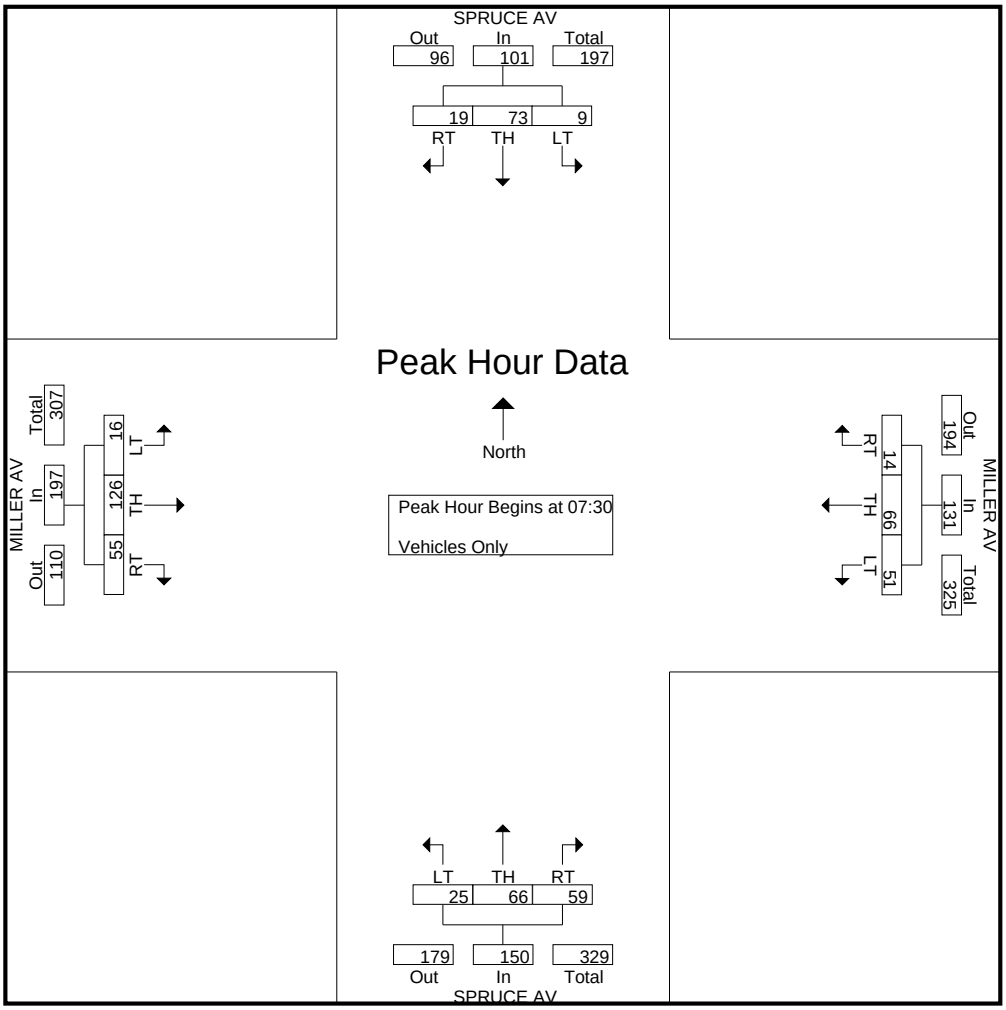
CITY OF SOUTH SAN FRANCISCO

File Name : spruce-miller-a
Site Code : 5
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	SPRUCE AV Southbound				MILLER AV Westbound				SPRUCE AV Northbound				MILLER AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	1	12	2	15	0	9	6	15	11	4	1	16	6	18	3	27	73
07:15	3	15	3	21	5	9	2	16	10	5	1	16	3	23	6	32	85
07:30	4	20	2	26	2	22	13	37	12	12	5	29	6	36	1	43	135
07:45	10	20	6	36	2	8	12	22	14	14	7	35	28	39	8	75	168
Total	18	67	13	98	9	48	33	90	47	35	14	96	43	116	18	177	461
08:00	2	14	0	16	4	15	15	34	18	21	11	50	13	30	4	47	147
08:15	3	19	1	23	6	21	11	38	15	19	2	36	8	21	3	32	129
08:30	4	16	2	22	5	22	9	36	9	20	2	31	3	36	1	40	129
08:45	2	10	3	15	5	14	6	25	13	20	1	34	6	17	8	31	105
Total	11	59	6	76	20	72	41	133	55	80	16	151	30	104	16	150	510
Grand Total	29	126	19	174	29	120	74	223	102	115	30	247	73	220	34	327	971
Apprch %	16.7	72.4	10.9		13	53.8	33.2		41.3	46.6	12.1		22.3	67.3	10.4		
Total %	3	13	2	17.9	3	12.4	7.6	23	10.5	11.8	3.1	25.4	7.5	22.7	3.5	33.7	

	SPRUCE AV Southbound				MILLER AV Westbound				SPRUCE AV Northbound				MILLER AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	4	**20**	2	26	2	**22**	13	37	12	12	5	29	6	36	1	43	135
07:45	**10**	20	**6**	**36**	2	8	12	22	14	14	7	35	**28**	**39**	**8**	**75**	**168**
08:00	2	14	0	16	4	15	**15**	34	**18**	**21**	**11**	**50**	13	30	4	47	147
08:15	3	19	1	23	**6**	21	11	**38**	15	19	2	36	8	21	3	32	129
Total Volume	19	73	9	101	14	66	51	131	59	66	25	150	55	126	16	197	579
% App. Total	18.8	72.3	8.9		10.7	50.4	38.9		39.3	44	16.7		27.9	64	8.1		
PHF	.475	.913	.375	.701	.583	.750	.850	.862	.819	.786	.568	.750	.491	.808	.500	.657	.862



MARKS TRAFFIC DATA

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916.806.0250

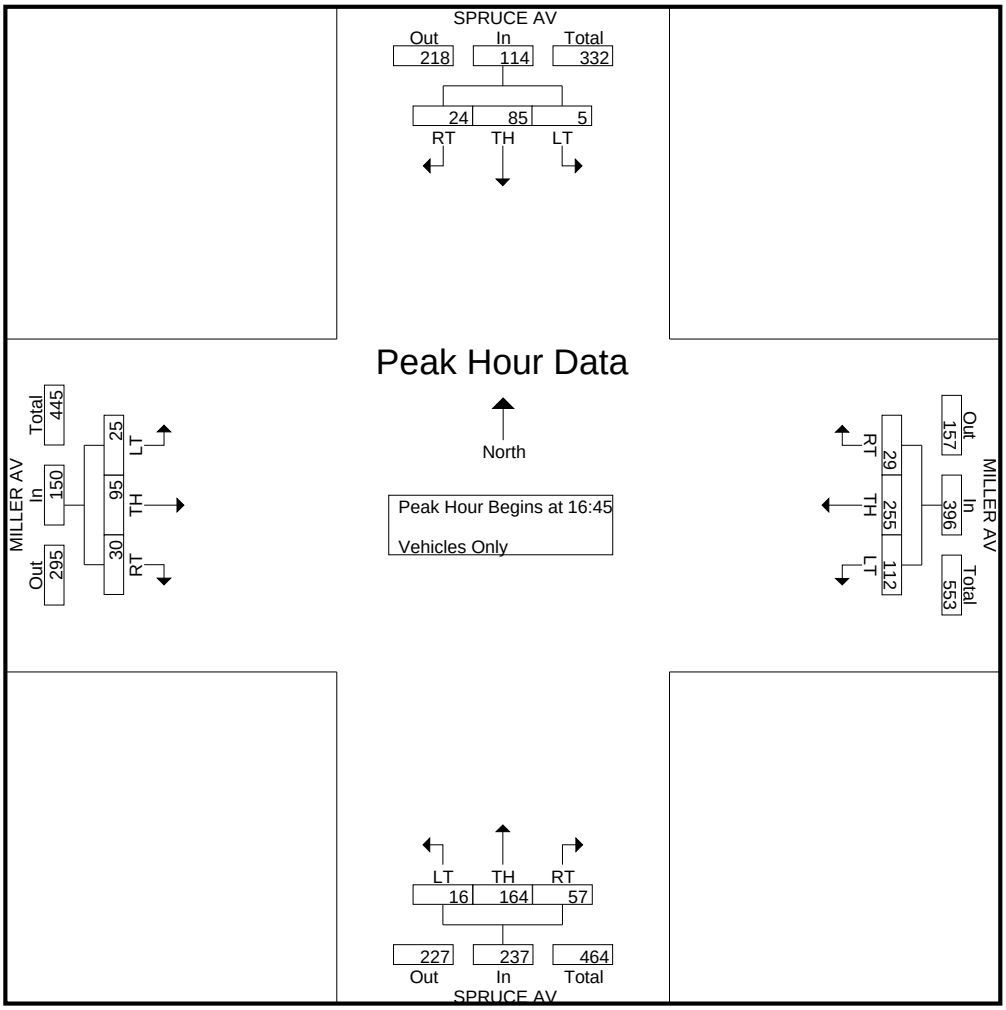
CITY OF SOUTH SAN FRANCISCO

File Name : spruce-miller-p
Site Code : 5
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	SPRUCE AV Southbound				MILLER AV Westbound				SPRUCE AV Northbound				MILLER AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	4	14	1	19	2	37	17	56	13	38	4	55	9	13	6	28	158
16:15	10	27	1	38	7	48	29	84	14	26	5	45	5	25	2	32	199
16:30	5	17	2	24	5	37	26	68	12	34	5	51	4	16	7	27	170
16:45	5	17	2	24	7	47	23	77	16	38	1	55	9	31	4	44	200
Total	24	75	6	105	21	169	95	285	55	136	15	206	27	85	19	131	727
17:00	8	19	1	28	9	73	27	109	15	37	4	56	12	25	6	43	236
17:15	6	27	1	34	5	70	27	102	13	51	10	74	5	18	11	34	244
17:30	5	22	1	28	8	65	35	108	13	38	1	52	4	21	4	29	217
17:45	2	20	1	23	4	45	25	74	19	26	3	48	7	26	3	36	181
Total	21	88	4	113	26	253	114	393	60	152	18	230	28	90	24	142	878
Grand Total	45	163	10	218	47	422	209	678	115	288	33	436	55	175	43	273	1605
Apprch %	20.6	74.8	4.6		6.9	62.2	30.8		26.4	66.1	7.6		20.1	64.1	15.8		
Total %	2.8	10.2	0.6	13.6	2.9	26.3	13	42.2	7.2	17.9	2.1	27.2	3.4	10.9	2.7	17	

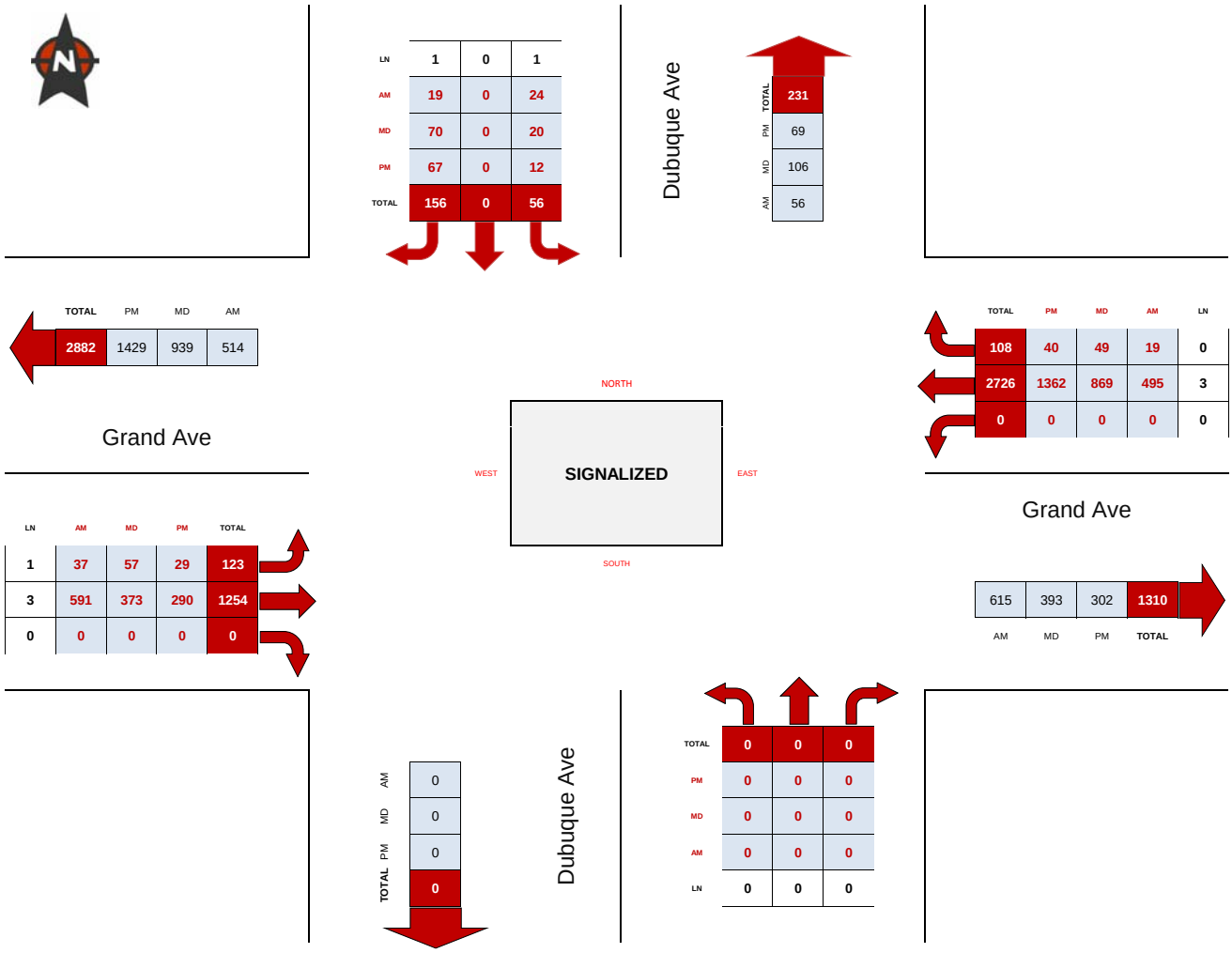
	SPRUCE AV Southbound				MILLER AV Westbound				SPRUCE AV Northbound				MILLER AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:45																	
16:45	5	17	**2**	24	7	47	23	77	**16**	38	1	55	9	**31**	4	**44**	200
17:00	**8**	19	1	28	**9**	**73**	27	**109**	15	37	4	56	**12**	25	6	43	236
17:15	6	**27**	1	**34**	5	70	27	102	13	**51**	**10**	**74**	5	18	**11**	34	**244**
17:30	5	22	1	28	8	65	**35**	108	13	38	1	52	4	21	4	29	217
Total Volume	24	85	5	114	29	255	112	396	57	164	16	237	30	95	25	150	897
% App. Total	21.1	74.6	4.4		7.3	64.4	28.3		24.1	69.2	6.8		20	63.3	16.7		
PHF	.750	.787	.625	.838	.806	.873	.800	.908	.891	.804	.400	.801	.625	.766	.568	.852	.919



PEAK HOUR ITM SUMMARY

#020 Dubuque Ave & Grand Ave

LOCATION #:	020	QTD PRJ #:	080198	AM PEAK:	800 AM
NORTH / SOUTH:	Dubuque Ave	DATE:	Thursday, May 22, 2008	MD PEAK:	1145 AM
EAST / WEST:	Grand Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	500 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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PEAK HOUR ITM SUMMARY

#021 Grand Ave & East Grand Ave

LOCATION #:	021	QTD PRJ #:	080198	AM PEAK:	800 AM
NORTH / SOUTH:	Grand Ave	DATE:	Thursday, May 22, 2008	MD PEAK:	1145 AM
EAST / WEST:	East Grand Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	445 PM

LN			
AM	0	0	0
MD	0	0	0
PM	0	0	0
TOTAL	0	0	0

TOTAL	0
PM	0
MD	0
AM	0

TOTAL	PM	MD	AM
2869	1399	940	530

Grand Ave

TOTAL	PM	MD	AM	LN
0	0	0	0	0
2120	1109	705	306	3
63	24	27	12	1

NORTH

WEST — SIGNALIZED — EAST

SOUTH

East Grand Ave

LN	AM	MD	PM	TOTAL
0	0	0	0	0
3	652	351	231	1234
0	22	56	45	123

AM	MD	PM	TOTAL
1416	659	443	2518

AM	34
MD	83
PM	69
TOTAL	186

East Grand Ave

TOTAL	749	0	1284
PM	290	0	212
MD	235	0	308
AM	224	0	764
LN	1	0	1

AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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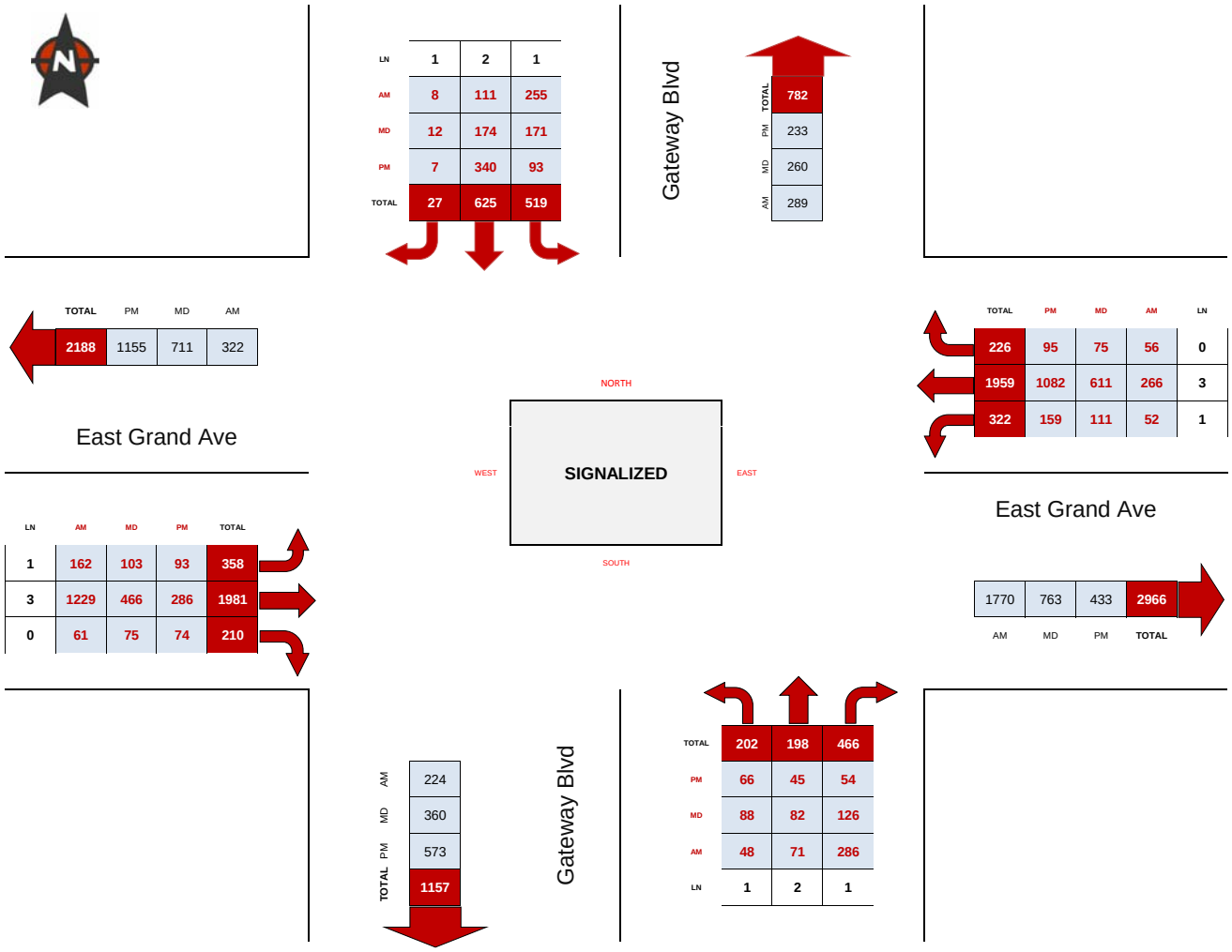
PEAK HOUR ITM SUMMARY

#022 Gateway Blvd & East Grand Ave

LOCATION #:	022	QTD PRJ #:	080198	AM PEAK:	800 AM
NORTH / SOUTH:	Gateway Blvd	DATE:	Thursday, May 22, 2008	MD PEAK:	1145 AM
EAST / WEST:	East Grand Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	445 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

QUALITY TRAFFIC DATA, LLC
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MARKS TRAFFIC DATA

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916.806.0250

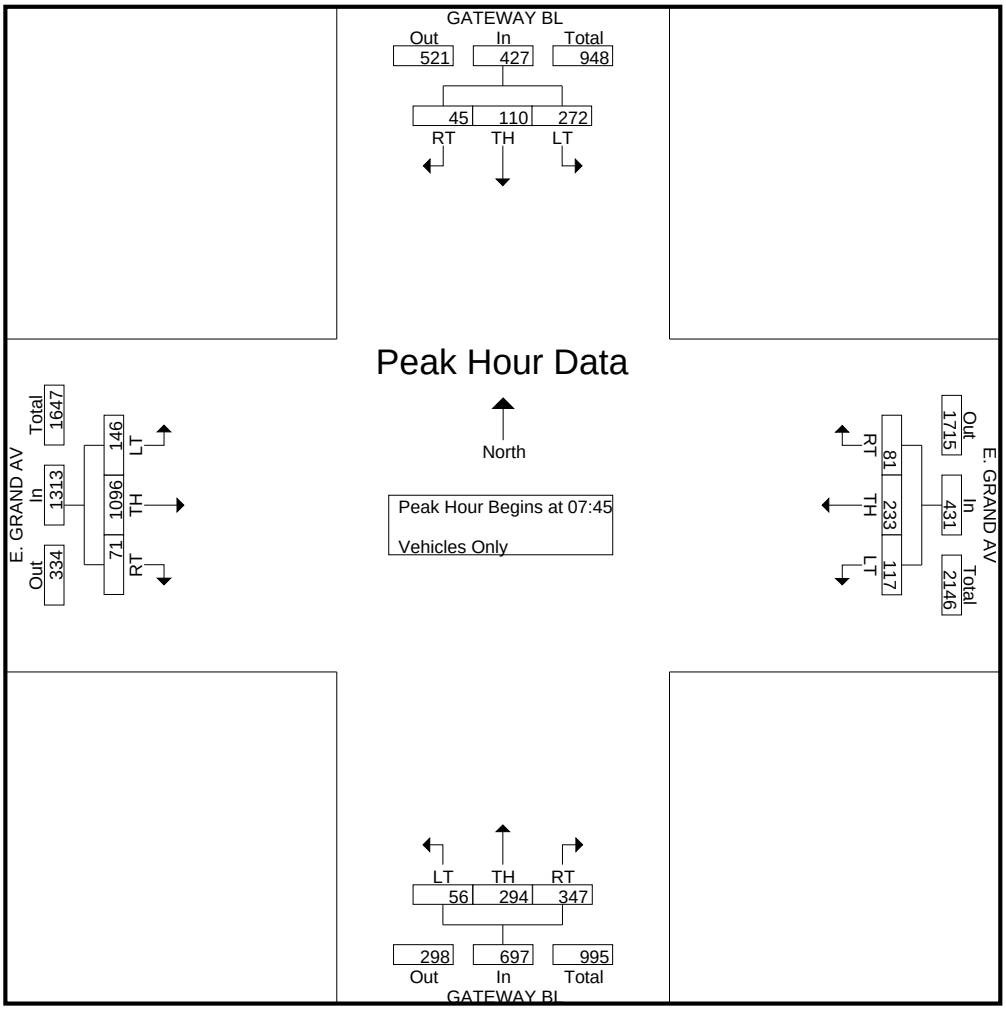
CITY OF SOUTH SAN FRANCISCO

File Name : gateway-grand-a
Site Code : 2
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	GATEWAY BL Southbound				E. GRAND AV Westbound				GATEWAY BL Northbound				E. GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	16	17	49	82	20	43	18	81	38	17	10	65	20	252	26	298	526
07:15	10	18	58	86	16	30	26	72	64	26	13	103	12	182	38	232	493
07:30	6	25	51	82	22	54	28	104	87	60	25	172	22	203	31	256	614
07:45	7	34	78	119	11	51	30	92	84	107	21	212	17	263	45	325	748
Total	39	94	236	369	69	178	102	349	273	210	69	552	71	900	140	1111	2381
08:00	12	21	66	99	22	58	34	114	76	74	12	162	25	282	34	341	716
08:15	11	24	57	92	24	53	31	108	89	57	14	160	9	265	33	307	667
08:30	15	31	71	117	24	71	22	117	98	56	9	163	20	286	34	340	737
08:45	11	35	71	117	18	82	36	136	83	43	15	141	25	300	19	344	738
Total	49	111	265	425	88	264	123	475	346	230	50	626	79	1133	120	1332	2858
Grand Total	88	205	501	794	157	442	225	824	619	440	119	1178	150	2033	260	2443	5239
Apprch %	11.1	25.8	63.1		19.1	53.6	27.3		52.5	37.4	10.1		6.1	83.2	10.6		
Total %	1.7	3.9	9.6	15.2	3	8.4	4.3	15.7	11.8	8.4	2.3	22.5	2.9	38.8	5	46.6	

	GATEWAY BL Southbound				E. GRAND AV Westbound				GATEWAY BL Northbound				E. GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	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	7	**34**	**78**	**119**	11	51	30	92	84	**107**	**21**	**212**	17	263	**45**	325	**748**
08:00	12	21	66	99	22	58	**34**	114	76	74	12	162	**25**	282	34	**341**	716
08:15	11	24	57	92	**24**	53	31	108	89	57	14	160	9	265	33	307	667
08:30	**15**	31	71	117	24	**71**	22	**117**	**98**	56	9	163	20	**286**	34	340	737
Total Volume	45	110	272	427	81	233	117	431	347	294	56	697	71	1096	146	1313	2868
% App. Total	10.5	25.8	63.7		18.8	54.1	27.1		49.8	42.2	8		5.4	83.5	11.1		
PHF	.750	.809	.872	.897	.844	.820	.860	.921	.885	.687	.667	.822	.710	.958	.811	.963	.959



MARKS TRAFFIC DATA

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916.806.0250

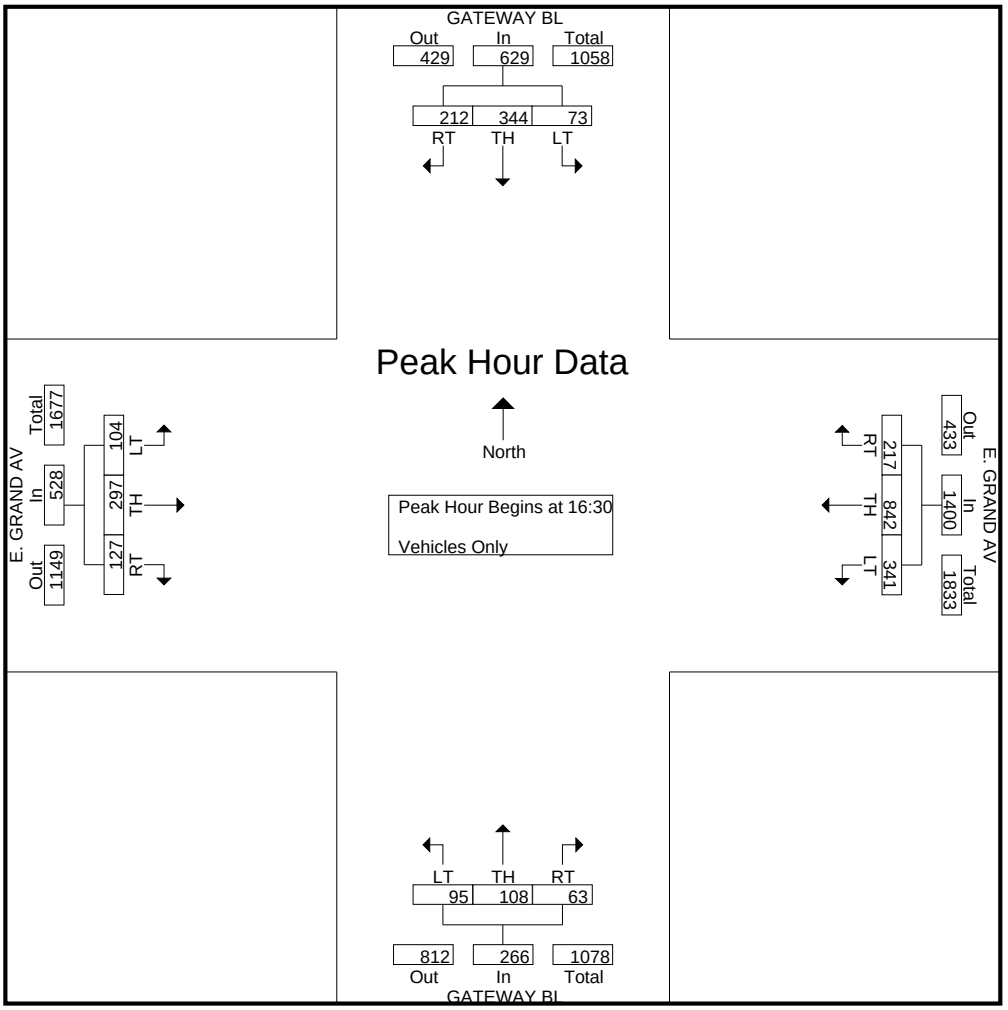
CITY OF SOUTH SAN FRANCISCO

File Name : gateway-grand-p
Site Code : 2
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	GATEWAY BL Southbound				E. GRAND AV Westbound				GATEWAY BL Northbound				E. GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	49	79	37	165	46	203	91	340	20	23	11	54	24	68	18	110	669
16:15	40	67	30	137	54	193	84	331	14	32	17	63	20	74	21	115	646
16:30	54	81	19	154	58	215	97	370	19	16	22	57	26	63	29	118	699
16:45	39	70	19	128	58	186	77	321	12	36	21	69	46	80	30	156	674
Total	182	297	105	584	216	797	349	1362	65	107	71	243	116	285	98	499	2688
17:00	67	106	27	200	47	226	82	355	15	14	23	52	27	86	28	141	748
17:15	52	87	8	147	54	215	85	354	17	42	29	88	28	68	17	113	702
17:30	43	70	17	130	37	185	68	290	20	37	27	84	19	55	26	100	604
17:45	32	58	7	97	32	149	84	265	27	56	38	121	26	79	24	129	612
Total	194	321	59	574	170	775	319	1264	79	149	117	345	100	288	95	483	2666
Grand Total	376	618	164	1158	386	1572	668	2626	144	256	188	588	216	573	193	982	5354
Apprch %	32.5	53.4	14.2		14.7	59.9	25.4		24.5	43.5	32		22	58.4	19.7		
Total %	7	11.5	3.1	21.6	7.2	29.4	12.5	49	2.7	4.8	3.5	11	4	10.7	3.6	18.3	

	GATEWAY BL Southbound				E. GRAND AV Westbound				GATEWAY BL Northbound				E. GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:30																	
16:30	54	81	19	154	**58**	215	**97**	**370**	**19**	16	22	57	26	63	29	118	699
16:45	39	70	19	128	58	186	77	321	12	36	21	69	**46**	80	**30**	**156**	674
17:00	**67**	**106**	**27**	**200**	47	**226**	82	355	15	14	23	52	27	**86**	28	141	**748**
17:15	52	87	8	147	54	215	85	354	17	**42**	**29**	**88**	28	68	17	113	702
Total Volume	212	344	73	629	217	842	341	1400	63	108	95	266	127	297	104	528	2823
% App. Total	33.7	54.7	11.6		15.5	60.1	24.4		23.7	40.6	35.7		24.1	56.2	19.7		
PHF	.791	.811	.676	.786	.935	.931	.879	.946	.829	.643	.819	.756	.690	.863	.867	.846	.944



MARKS TRAFFIC DATA

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916.806.0250

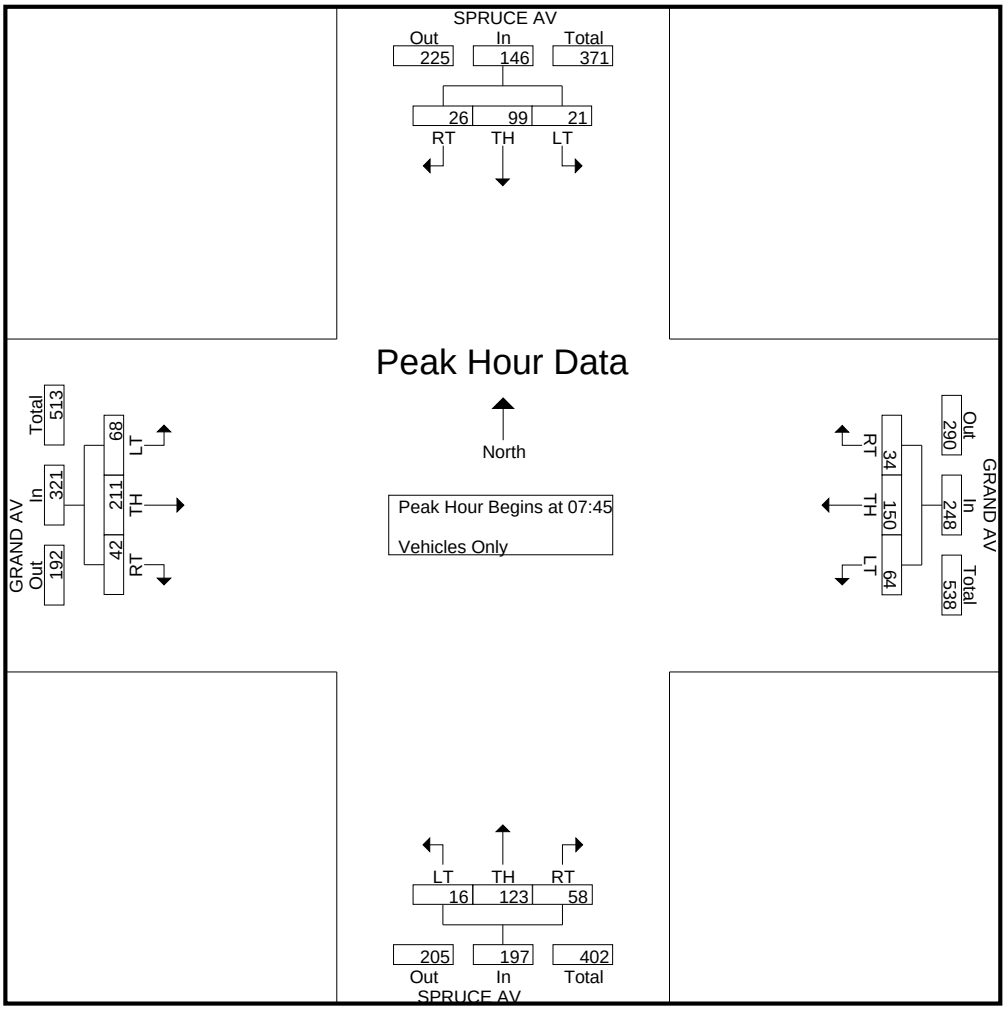
CITY OF SOUTH SAN FRANCISCO

File Name : spruce-grand-a
Site Code : 4
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	SPRUCE AV Southbound				GRAND AV Westbound				SPRUCE AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	6	15	8	29	3	11	7	21	18	10	3	31	9	42	2	53	134
07:15	1	18	3	22	1	15	2	18	11	11	9	31	17	52	7	76	147
07:30	4	21	6	31	5	22	8	35	9	19	3	31	10	65	11	86	183
07:45	6	24	7	37	13	50	20	83	12	42	4	58	10	54	40	104	282
Total	17	78	24	119	22	98	37	157	50	82	19	151	46	213	60	319	746
08:00	8	22	4	34	12	41	14	67	10	38	5	53	8	59	11	78	232
08:15	8	25	6	39	8	33	19	60	14	19	1	34	11	43	9	63	196
08:30	4	28	4	36	1	26	11	38	22	24	6	52	13	55	8	76	202
08:45	0	18	4	22	4	28	8	40	13	26	9	48	13	57	8	78	188
Total	20	93	18	131	25	128	52	205	59	107	21	187	45	214	36	295	818
Grand Total	37	171	42	250	47	226	89	362	109	189	40	338	91	427	96	614	1564
Apprch %	14.8	68.4	16.8		13	62.4	24.6		32.2	55.9	11.8		14.8	69.5	15.6		
Total %	2.4	10.9	2.7	16	3	14.5	5.7	23.1	7	12.1	2.6	21.6	5.8	27.3	6.1	39.3	

	SPRUCE AV Southbound				GRAND AV Westbound				SPRUCE AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	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	6	24	**7**	37	**13**	**50**	**20**	**83**	12	**42**	4	**58**	10	54	**40**	**104**	**282**
08:00	**8**	22	4	34	12	41	14	67	10	38	5	53	8	**59**	11	78	232
08:15	8	25	6	**39**	8	33	19	60	14	19	1	34	11	43	9	63	196
08:30	4	**28**	4	36	1	26	11	38	**22**	24	**6**	52	**13**	55	8	76	202
Total Volume	26	99	21	146	34	150	64	248	58	123	16	197	42	211	68	321	912
% App. Total	17.8	67.8	14.4		13.7	60.5	25.8		29.4	62.4	8.1		13.1	65.7	21.2		
PHF	.813	.884	.750	.936	.654	.750	.800	.747	.659	.732	.667	.849	.808	.894	.425	.772	.809



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

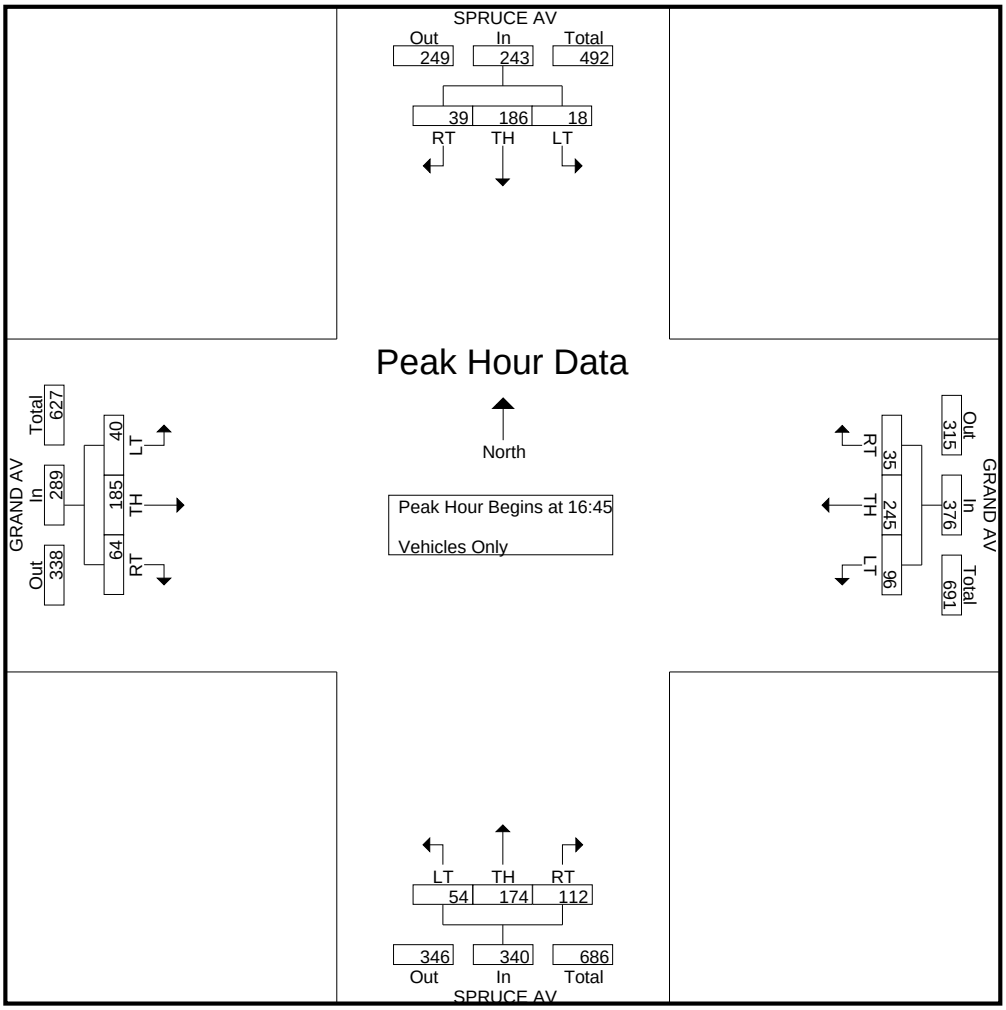
CITY OF SOUTH SAN FRANCISCO

File Name : spruce-grand-p
Site Code : 4
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	SPRUCE AV Southbound				GRAND AV Westbound				SPRUCE AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	9	34	3	46	7	51	17	75	23	41	10	74	10	39	6	55	250
16:15	9	48	5	62	7	47	21	75	16	31	8	55	15	38	8	61	253
16:30	5	47	4	56	4	42	21	67	21	35	16	72	8	47	9	64	259
16:45	8	38	6	52	5	62	15	82	28	44	16	88	16	48	9	73	295
Total	31	167	18	216	23	202	74	299	88	151	50	289	49	172	32	253	1057
17:00	9	48	1	58	14	55	30	99	24	39	7	70	15	46	6	67	294
17:15	7	48	7	62	7	64	26	97	36	53	16	105	24	43	14	81	345
17:30	15	52	4	71	9	64	25	98	24	38	15	77	9	48	11	68	314
17:45	8	43	3	54	6	66	21	93	16	36	9	61	10	39	8	57	265
Total	39	191	15	245	36	249	102	387	100	166	47	313	58	176	39	273	1218
Grand Total	70	358	33	461	59	451	176	686	188	317	97	602	107	348	71	526	2275
Apprch %	15.2	77.7	7.2		8.6	65.7	25.7		31.2	52.7	16.1		20.3	66.2	13.5		
Total %	3.1	15.7	1.5	20.3	2.6	19.8	7.7	30.2	8.3	13.9	4.3	26.5	4.7	15.3	3.1	23.1	

	SPRUCE AV Southbound				GRAND AV Westbound				SPRUCE AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:45																	
16:45	8	38	6	52	5	62	15	82	28	44	**16**	88	16	**48**	9	73	295
17:00	9	48	1	58	**14**	55	**30**	**99**	24	39	7	70	15	46	6	67	294
17:15	7	48	**7**	62	7	**64**	26	97	**36**	**53**	16	**105**	**24**	43	**14**	**81**	**345**
17:30	**15**	**52**	4	**71**	9	64	25	98	24	38	15	77	9	48	11	68	314
Total Volume	39	186	18	243	35	245	96	376	112	174	54	340	64	185	40	289	1248
% App. Total	16	76.5	7.4		9.3	65.2	25.5		32.9	51.2	15.9		22.1	64	13.8		
PHF	.650	.894	.643	.856	.625	.957	.800	.949	.778	.821	.844	.810	.667	.964	.714	.892	.904



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

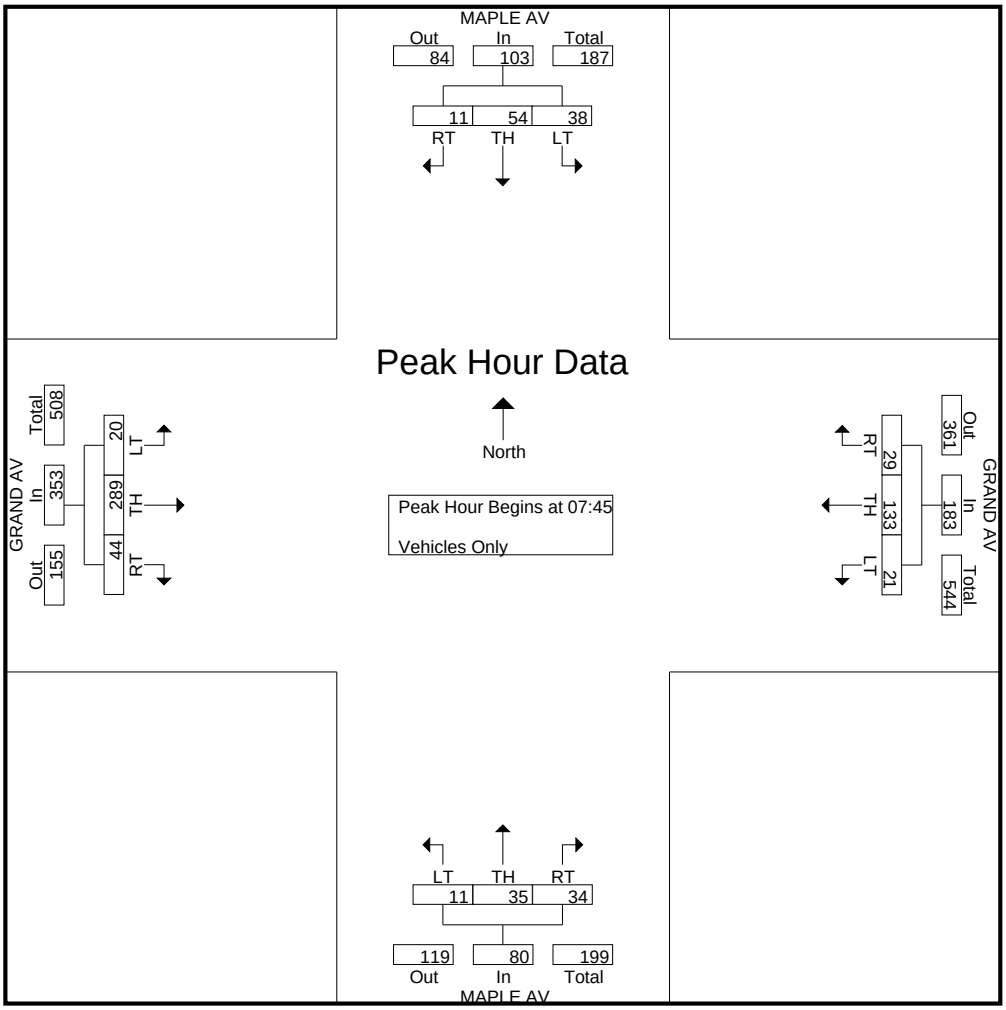
CITY OF SOUTH SAN FRANCISCO

File Name : maple-grand-a
Site Code : 2
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	MAPLE AV Southbound				GRAND AV Westbound				MAPLE AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	3	12	13	28	3	17	0	20	10	3	1	14	2	61	1	64	126
07:15	2	10	7	19	4	25	4	33	16	6	3	25	2	70	2	74	151
07:30	2	9	7	18	8	33	6	47	6	7	1	14	9	78	1	88	167
07:45	3	12	12	27	9	39	6	54	9	10	3	22	10	71	7	88	191
Total	10	43	39	92	24	114	16	154	41	26	8	75	23	280	11	314	635
08:00	4	18	4	26	6	30	4	40	8	5	3	16	18	74	7	99	181
08:15	3	12	6	21	6	29	7	42	7	13	2	22	10	74	2	86	171
08:30	1	12	16	29	8	35	4	47	10	7	3	20	6	70	4	80	176
08:45	4	16	8	28	12	37	3	52	9	11	0	20	8	62	5	75	175
Total	12	58	34	104	32	131	18	181	34	36	8	78	42	280	18	340	703
Grand Total	22	101	73	196	56	245	34	335	75	62	16	153	65	560	29	654	1338
Apprch %	11.2	51.5	37.2		16.7	73.1	10.1		49	40.5	10.5		9.9	85.6	4.4		
Total %	1.6	7.5	5.5	14.6	4.2	18.3	2.5	25	5.6	4.6	1.2	11.4	4.9	41.9	2.2	48.9	

	MAPLE AV Southbound				GRAND AV Westbound				MAPLE AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	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	3	12	12	27	**9**	**39**	6	**54**	9	10	**3**	**22**	10	71	**7**	88	**191**
08:00	**4**	**18**	4	26	6	30	4	40	8	5	3	16	**18**	**74**	7	**99**	181
08:15	3	12	6	21	6	29	**7**	42	7	**13**	2	22	10	74	2	86	171
08:30	1	12	**16**	**29**	8	35	4	47	**10**	7	3	20	6	70	4	80	176
Total Volume	11	54	38	103	29	133	21	183	34	35	11	80	44	289	20	353	719
% App. Total	10.7	52.4	36.9		15.8	72.7	11.5		42.5	43.8	13.8		12.5	81.9	5.7		
PHF	.688	.750	.594	.888	.806	.853	.750	.847	.850	.673	.917	.909	.611	.976	.714	.891	.941



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

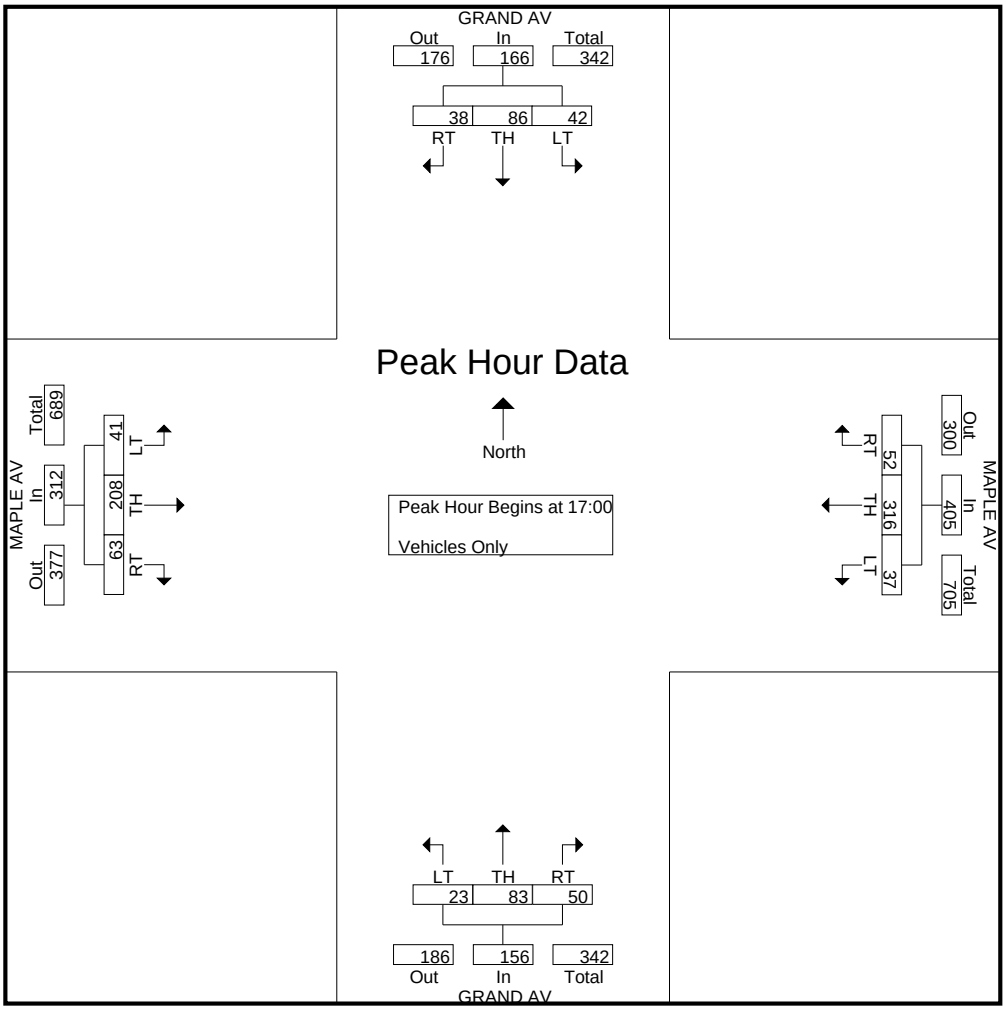
CITY OF SOUTH SAN FRANCISCO

File Name : maple-grand-p
Site Code : 2
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	GRAND AV Southbound				MAPLE AV Westbound				GRAND AV Northbound				MAPLE AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	12	17	7	36	16	56	6	78	10	23	9	42	18	58	4	80	236
16:15	10	36	4	50	15	60	15	90	8	11	2	21	10	50	1	61	222
16:30	7	23	4	34	10	61	10	81	11	23	4	38	17	63	6	86	239
16:45	6	21	7	34	12	59	7	78	6	24	6	36	21	56	8	85	233
Total	35	97	22	154	53	236	38	327	35	81	21	137	66	227	19	312	930
17:00	4	33	12	49	8	89	10	107	10	21	8	39	16	56	8	80	275
17:15	11	21	8	40	14	79	7	100	15	22	4	41	13	52	14	79	260
17:30	9	15	13	37	18	76	10	104	14	17	9	40	20	57	12	89	270
17:45	14	17	9	40	12	72	10	94	11	23	2	36	14	43	7	64	234
Total	38	86	42	166	52	316	37	405	50	83	23	156	63	208	41	312	1039
Grand Total	73	183	64	320	105	552	75	732	85	164	44	293	129	435	60	624	1969
Apprch %	22.8	57.2	20		14.3	75.4	10.2		29	56	15		20.7	69.7	9.6		
Total %	3.7	9.3	3.3	16.3	5.3	28	3.8	37.2	4.3	8.3	2.2	14.9	6.6	22.1	3	31.7	

	GRAND AV Southbound				MAPLE AV Westbound				GRAND AV Northbound				MAPLE AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	4	**33**	12	**49**	8	**89**	**10**	**107**	10	21	8	39	16	56	8	80	**275**
17:15	11	21	8	40	14	79	7	100	**15**	22	4	**41**	13	52	**14**	79	260
17:30	9	15	**13**	37	**18**	76	10	104	14	17	**9**	40	**20**	**57**	12	**89**	270
17:45	**14**	17	9	40	12	72	10	94	11	**23**	2	36	14	43	7	64	234
Total Volume	38	86	42	166	52	316	37	405	50	83	23	156	63	208	41	312	1039
% App. Total	22.9	51.8	25.3		12.8	78	9.1		32.1	53.2	14.7		20.2	66.7	13.1		
PHF	.679	.652	.808	.847	.722	.888	.925	.946	.833	.902	.639	.951	.788	.912	.732	.876	.945



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

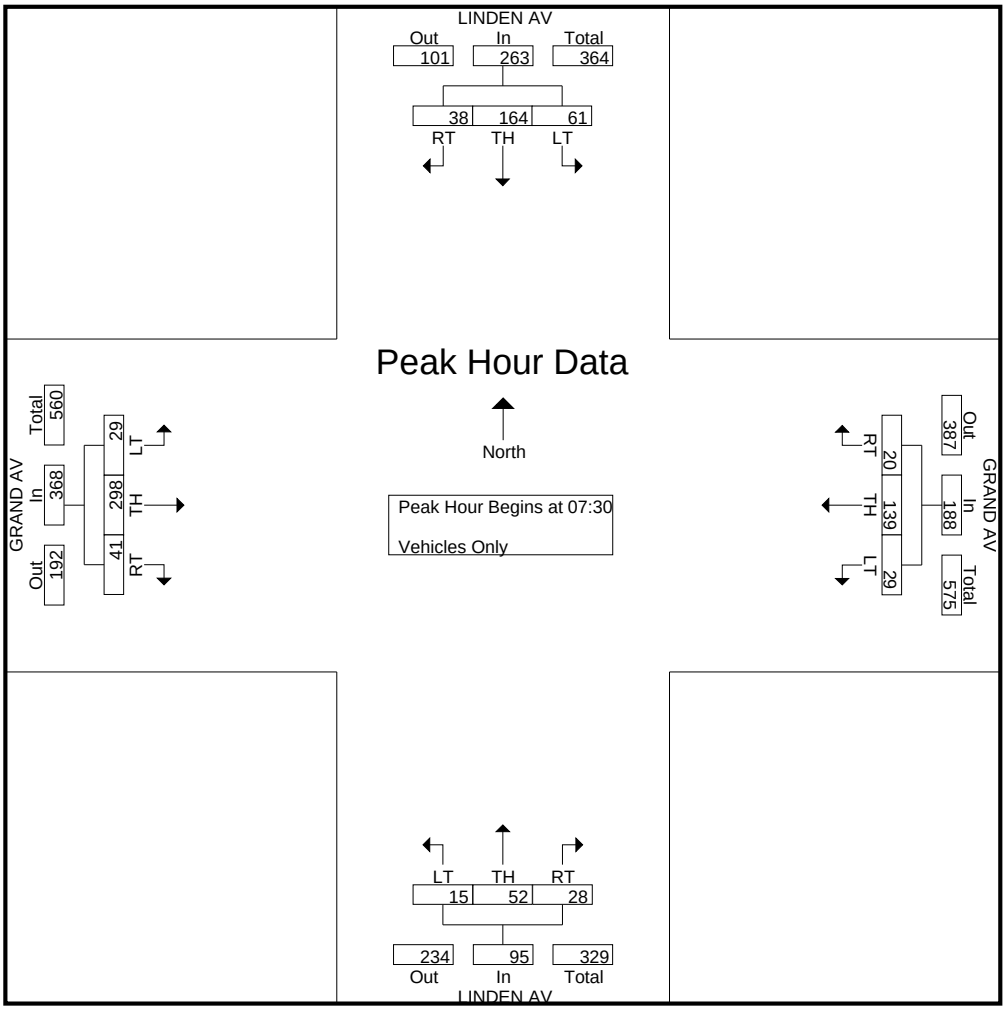
CITY OF SOUTH SAN FRANCISCO

File Name : linden-grand-a
Site Code : 3
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	LINDEN AV Southbound				GRAND AV Westbound				LINDEN AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	5	32	10	47	7	13	9	29	7	10	2	19	4	73	6	83	178
07:15	10	39	18	67	6	24	4	34	9	9	2	20	8	74	6	88	209
07:30	15	47	18	80	6	32	7	45	7	8	2	17	9	84	9	102	244
07:45	7	49	15	71	7	42	7	56	5	18	3	26	16	72	6	94	247
Total	37	167	61	265	26	111	27	164	28	45	9	82	37	303	27	367	878
08:00	10	36	11	57	3	28	8	39	7	16	6	29	5	79	3	87	212
08:15	6	32	17	55	4	37	7	48	9	10	4	23	11	63	11	85	211
08:30	10	42	16	68	10	36	5	51	6	12	3	21	13	70	9	92	232
08:45	11	40	11	62	14	40	13	67	6	15	11	32	15	55	10	80	241
Total	37	150	55	242	31	141	33	205	28	53	24	105	44	267	33	344	896
Grand Total	74	317	116	507	57	252	60	369	56	98	33	187	81	570	60	711	1774
Apprch %	14.6	62.5	22.9		15.4	68.3	16.3		29.9	52.4	17.6		11.4	80.2	8.4		
Total %	4.2	17.9	6.5	28.6	3.2	14.2	3.4	20.8	3.2	5.5	1.9	10.5	4.6	32.1	3.4	40.1	

	LINDEN AV Southbound				GRAND AV Westbound				LINDEN AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	**15**	47	**18**	**80**	6	32	7	45	7	8	2	17	9	**84**	9	**102**	244
07:45	7	**49**	15	71	**7**	**42**	7	**56**	5	**18**	3	26	**16**	72	6	94	**247**
08:00	10	36	11	57	3	28	**8**	39	7	16	**6**	**29**	5	79	3	87	212
08:15	6	32	17	55	4	37	7	48	**9**	10	4	23	11	63	**11**	85	211
Total Volume	38	164	61	263	20	139	29	188	28	52	15	95	41	298	29	368	914
% App. Total	14.4	62.4	23.2		10.6	73.9	15.4		29.5	54.7	15.8		11.1	81	7.9		
PHF	.633	.837	.847	.822	.714	.827	.906	.839	.778	.722	.625	.819	.641	.887	.659	.902	.925



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

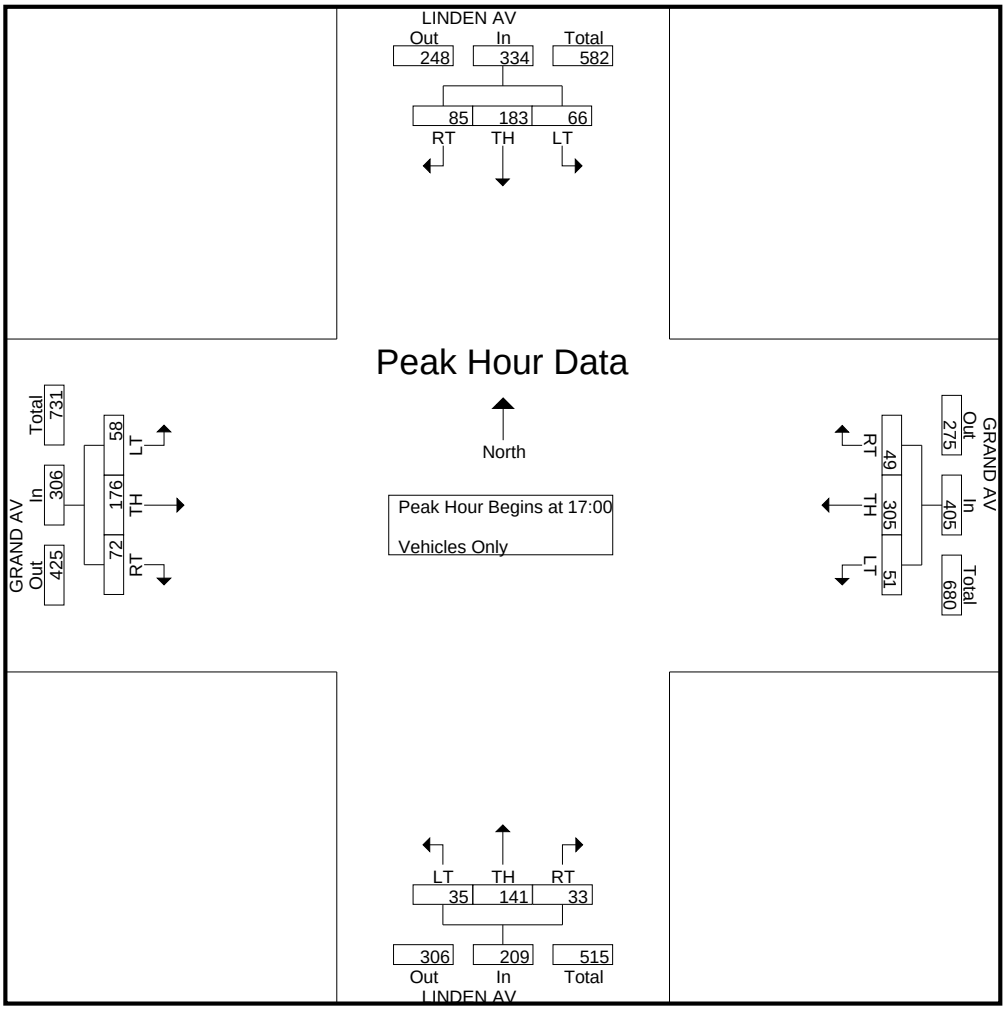
CITY OF SOUTH SAN FRANCISCO

File Name : linden-grand-p
Site Code : 3
Start Date : 6/6/2013
Page No : 1

Groups Printed- Vehicles Only

	LINDEN AV Southbound				GRAND AV Westbound				LINDEN AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	23	44	7	74	10	70	11	91	9	25	8	42	18	43	19	80	287
16:15	20	47	15	82	6	72	13	91	5	31	4	40	12	38	11	61	274
16:30	17	47	11	75	20	52	25	97	8	45	4	57	16	41	22	79	308
16:45	18	51	18	87	9	60	14	83	9	36	10	55	11	46	9	66	291
Total	78	189	51	318	45	254	63	362	31	137	26	194	57	168	61	286	1160
17:00	14	35	14	63	16	87	10	113	8	31	8	47	17	46	16	79	302
17:15	26	41	15	82	14	71	17	102	11	38	10	59	23	42	17	82	325
17:30	22	56	13	91	11	80	12	103	7	41	8	56	14	53	14	81	331
17:45	23	51	24	98	8	67	12	87	7	31	9	47	18	35	11	64	296
Total	85	183	66	334	49	305	51	405	33	141	35	209	72	176	58	306	1254
Grand Total	163	372	117	652	94	559	114	767	64	278	61	403	129	344	119	592	2414
Apprch %	25	57.1	17.9		12.3	72.9	14.9		15.9	69	15.1		21.8	58.1	20.1		
Total %	6.8	15.4	4.8	27	3.9	23.2	4.7	31.8	2.7	11.5	2.5	16.7	5.3	14.3	4.9	24.5	

	LINDEN AV Southbound				GRAND AV Westbound				LINDEN AV Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	14	35	14	63	**16**	**87**	10	**113**	8	31	8	47	17	46	16	79	302
17:15	**26**	41	15	82	14	71	**17**	102	**11**	38	**10**	**59**	**23**	42	**17**	**82**	325
17:30	22	**56**	13	91	11	80	12	103	7	**41**	8	56	14	**53**	14	81	**331**
17:45	23	51	**24**	**98**	8	67	12	87	7	31	9	47	18	35	11	64	296
Total Volume	85	183	66	334	49	305	51	405	33	141	35	209	72	176	58	306	1254
% App. Total	25.4	54.8	19.8		12.1	75.3	12.6		15.8	67.5	16.7		23.5	57.5	19		
PHF	.817	.817	.688	.852	.766	.876	.750	.896	.750	.860	.875	.886	.783	.830	.853	.933	.947



MARKS TRAFFIC DATA

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916.806.0250

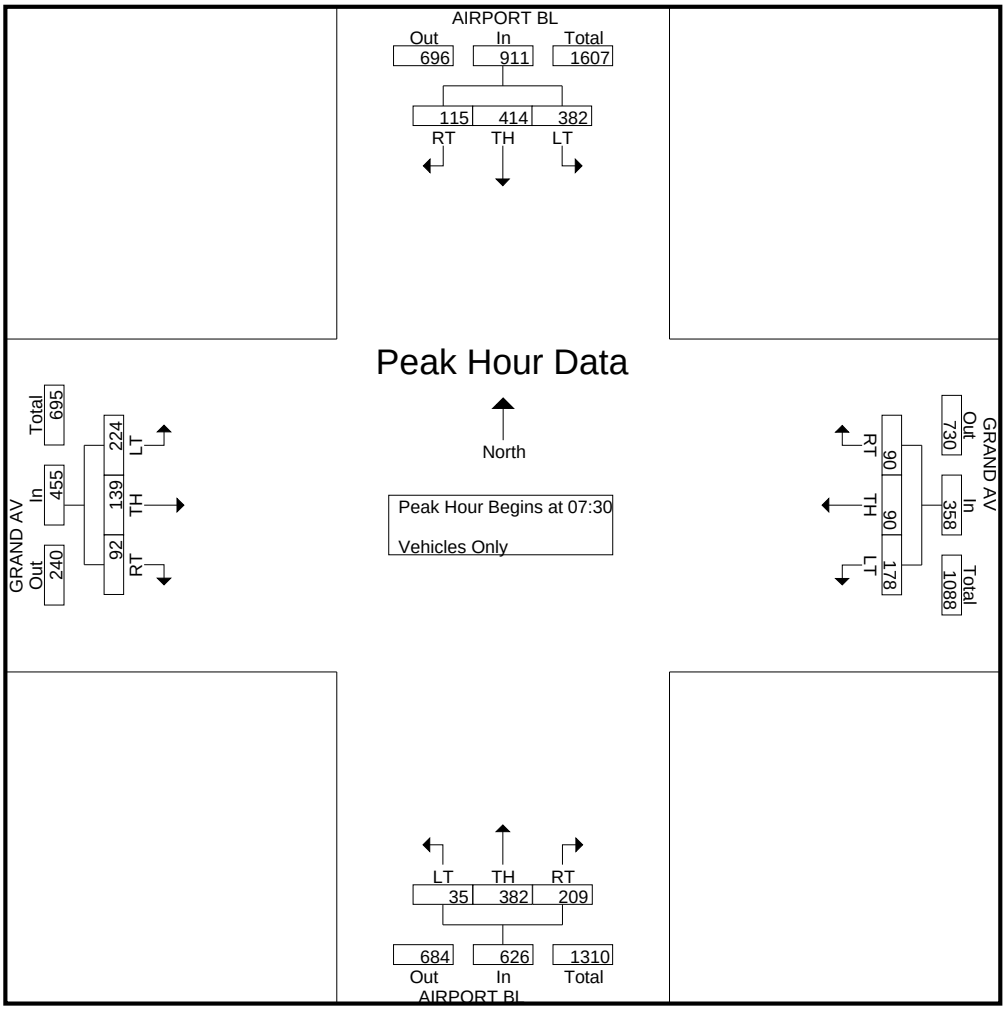
CITY OF SOUTH SAN FRANCISCO

File Name : airport-grand-a
Site Code : 3
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	AIRPORT BL Southbound				GRAND AV Westbound				AIRPORT BL Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	17	70	47	134	18	19	28	65	20	78	5	103	10	27	55	92	394
07:15	27	90	55	172	15	9	38	62	32	91	9	132	17	25	80	122	488
07:30	26	96	80	202	30	22	46	98	44	117	8	169	16	37	65	118	587
07:45	34	101	102	237	21	19	41	81	51	98	7	156	26	36	57	119	593
Total	104	357	284	745	84	69	153	306	147	384	29	560	69	125	257	451	2062
08:00	31	106	101	238	27	29	47	103	60	80	9	149	20	32	64	116	606
08:15	24	111	99	234	12	20	44	76	54	87	11	152	30	34	38	102	564
08:30	28	87	103	218	13	18	41	72	41	77	9	127	27	39	40	106	523
08:45	28	95	121	244	15	20	51	86	63	84	10	157	20	39	37	96	583
Total	111	399	424	934	67	87	183	337	218	328	39	585	97	144	179	420	2276
Grand Total	215	756	708	1679	151	156	336	643	365	712	68	1145	166	269	436	871	4338
Apprch %	12.8	45	42.2		23.5	24.3	52.3		31.9	62.2	5.9		19.1	30.9	50.1		
Total %	5	17.4	16.3	38.7	3.5	3.6	7.7	14.8	8.4	16.4	1.6	26.4	3.8	6.2	10.1	20.1	

	AIRPORT BL Southbound				GRAND AV Westbound				AIRPORT BL Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	26	96	80	202	**30**	22	46	98	44	**117**	8	**169**	16	**37**	**65**	118	587
07:45	**34**	101	**102**	237	21	19	41	81	51	98	7	156	26	36	57	**119**	593
08:00	31	106	101	**238**	27	**29**	**47**	**103**	**60**	80	9	149	20	32	64	116	**606**
08:15	24	**111**	99	234	12	20	44	76	54	87	**11**	152	**30**	34	38	102	564
Total Volume	115	414	382	911	90	90	178	358	209	382	35	626	92	139	224	455	2350
% App. Total	12.6	45.4	41.9		25.1	25.1	49.7		33.4	61	5.6		20.2	30.5	49.2		
PHF	.846	.932	.936	.957	.750	.776	.947	.869	.871	.816	.795	.926	.767	.939	.862	.956	.969



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

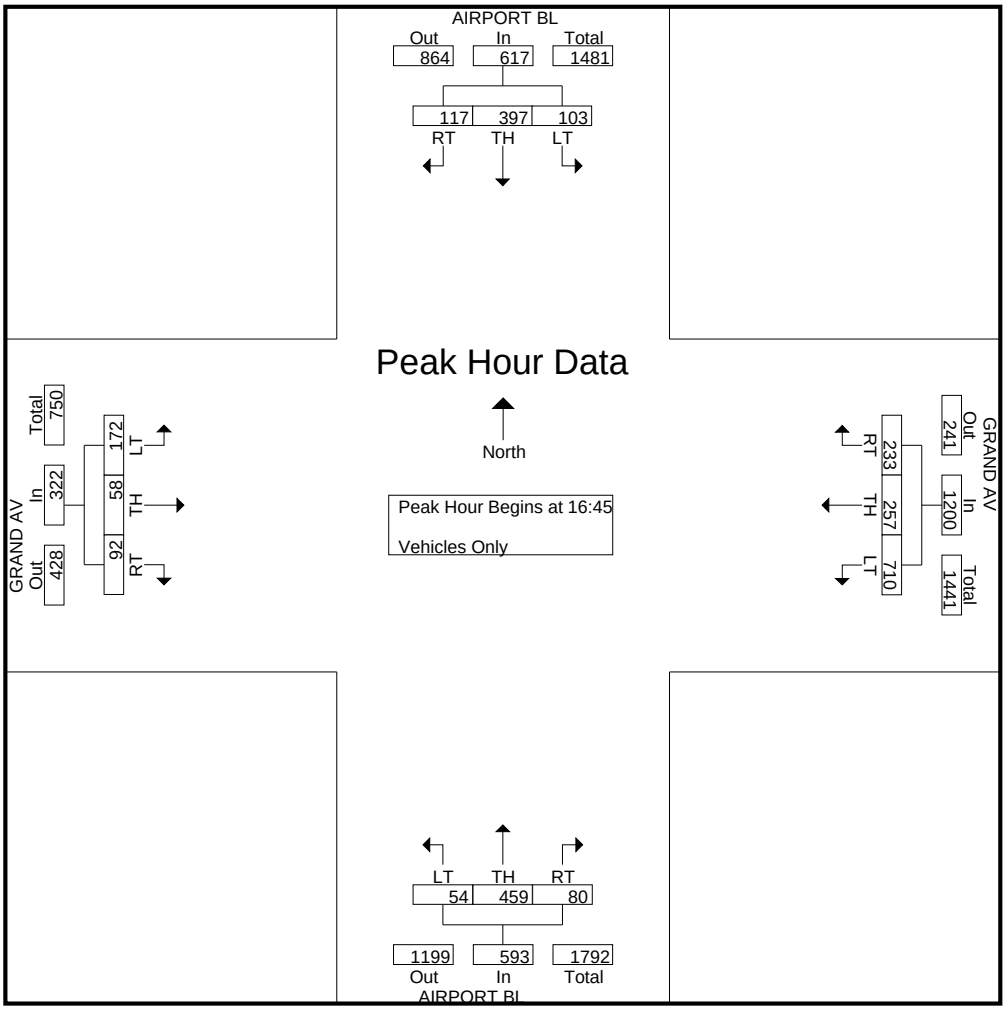
CITY OF SOUTH SAN FRANCISCO

File Name : airport-grand-p
Site Code : 3
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	AIRPORT BL Southbound				GRAND AV Westbound				AIRPORT BL Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	21	82	28	131	40	49	164	253	11	93	8	112	36	15	41	92	588
16:15	21	99	24	144	38	68	177	283	17	108	13	138	14	9	33	56	621
16:30	29	87	33	149	49	62	174	285	17	108	20	145	34	13	32	79	658
16:45	26	109	27	162	54	70	166	290	14	99	9	122	19	21	40	80	654
Total	97	377	112	586	181	249	681	1111	59	408	50	517	103	58	146	307	2521
17:00	34	108	27	169	61	67	184	312	19	103	6	128	25	6	33	64	673
17:15	35	85	21	141	66	64	203	333	18	129	25	172	22	19	50	91	737
17:30	22	95	28	145	52	56	157	265	29	128	14	171	26	12	49	87	668
17:45	33	98	29	160	37	49	129	215	27	140	18	185	23	27	38	88	648
Total	124	386	105	615	216	236	673	1125	93	500	63	656	96	64	170	330	2726
Grand Total	221	763	217	1201	397	485	1354	2236	152	908	113	1173	199	122	316	637	5247
Apprch %	18.4	63.5	18.1		17.8	21.7	60.6		13	77.4	9.6		31.2	19.2	49.6		
Total %	4.2	14.5	4.1	22.9	7.6	9.2	25.8	42.6	2.9	17.3	2.2	22.4	3.8	2.3	6	12.1	

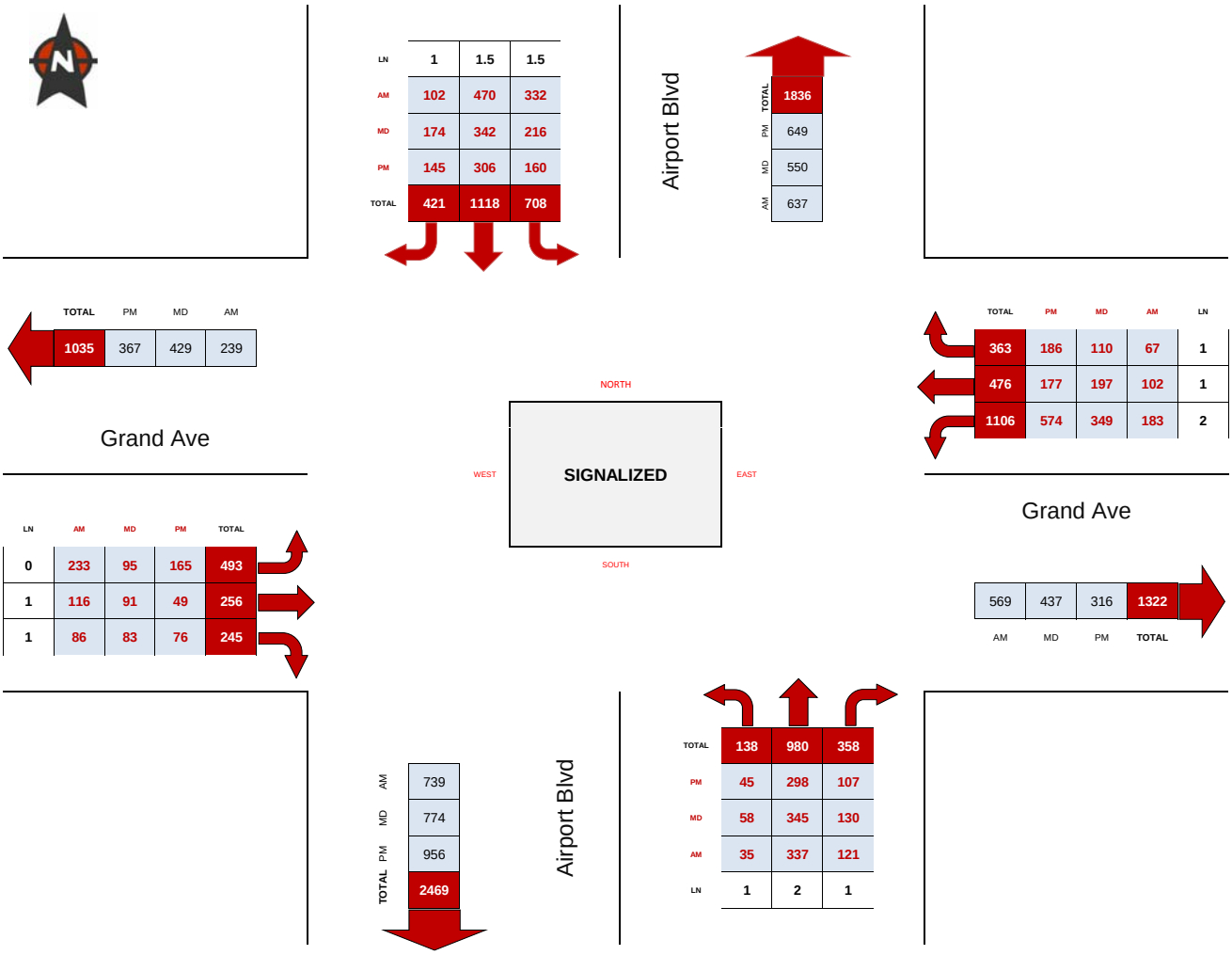
	AIRPORT BL Southbound				GRAND AV Westbound				AIRPORT BL Northbound				GRAND AV Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:45																	
16:45	26	**109**	27	162	54	**70**	166	290	14	99	9	122	19	**21**	40	80	654
17:00	34	108	27	**169**	61	67	184	312	19	103	6	128	25	6	33	64	673
17:15	**35**	85	21	141	**66**	64	**203**	**333**	18	**129**	**25**	**172**	22	19	**50**	**91**	**737**
17:30	22	95	**28**	145	52	56	157	265	**29**	128	14	171	**26**	12	49	87	668
Total Volume	117	397	103	617	233	257	710	1200	80	459	54	593	92	58	172	322	2732
% App. Total	19	64.3	16.7		19.4	21.4	59.2		13.5	77.4	9.1		28.6	18	53.4		
PHF	.836	.911	.920	.913	.883	.918	.874	.901	.690	.890	.540	.862	.885	.690	.860	.885	.927



PEAK HOUR ITM SUMMARY

#014 Airport Blvd & Grand Ave

LOCATION #:	014	QTD PRJ #:	080198	AM PEAK:	730 AM
NORTH / SOUTH:	Airport Blvd	DATE:	Thursday, May 22, 2008	MD PEAK:	1200 PM
EAST / WEST:	Grand Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	500 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

QUALITY TRAFFIC DATA, LLC
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PEAK HOUR ITM SUMMARY

#003 101 NB off ramp / Indust. Way & East Grand Avenue

LOCATION #:	003	QTD PRJ #:	090119	AM PEAK:	800 AM
NORTH / SOUTH:	101 NB off ramp / Indust. Way	DATE:	Wednesday, June 03, 2009	MD PEAK:	
EAST / WEST:	East Grand Avenue	VICINITY:	South San Francisco, CA	PM PEAK:	500 PM

101 NB off ramp / Indust. Way

LN	0	0	0
AM	0	0	0
MD	0	0	0
PM	0	0	0
TOTAL	0	0	0

TOTAL	644
PM	74
MD	0
AM	570

TOTAL	PM	MD	AM
0	0	0	0

East Grand Avenue

TOTAL	PM	MD	AM	LN
23	9	0	14	1
0	0	0	0	0
0	0	0	0	0

NORTH

WEST — **1-WAY YIELD (WB)** — EAST

SOUTH

LN	AM	MD	PM	TOTAL
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

East Grand Avenue

AM	MD	PM	TOTAL
1062	0	471	1533

101 NB off ramp / Indust. Way

AM	0
MD	0
PM	0
TOTAL	0

TOTAL	0	621	1533
PM	0	65	471
MD	0	0	0
AM	0	556	1062
LN	0	1.5	0.5

AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	-	TO	-	PM COUNT	4:00 PM	TO	6:00 PM

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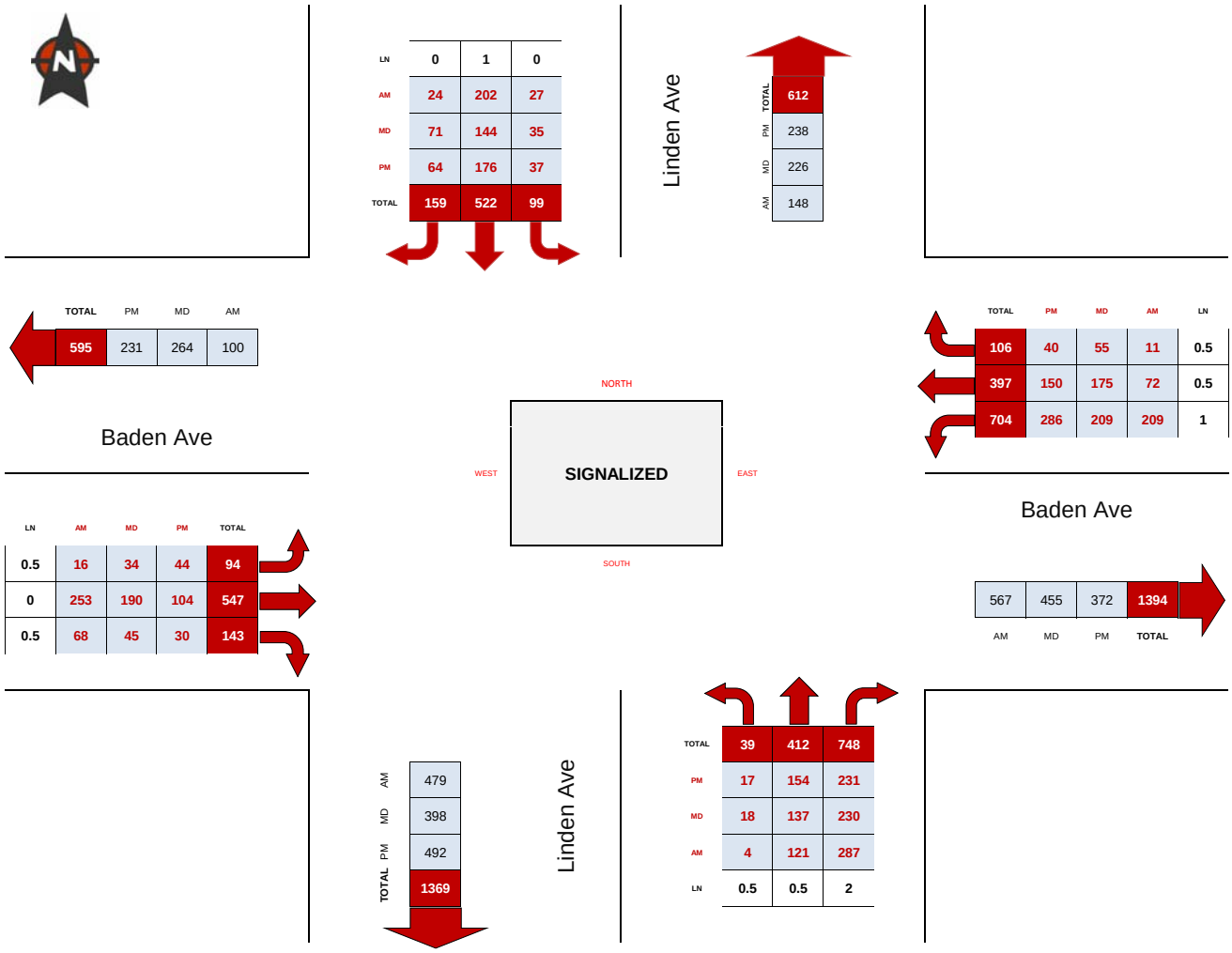
PEAK HOUR ITM SUMMARY

#012 Linden Ave & Baden Ave

LOCATION #:	012	QTD PRJ #:	080198	AM PEAK:	745 AM
NORTH / SOUTH:	Linden Ave	DATE:	Thursday, May 22, 2008	MD PEAK:	1200 PM
EAST / WEST:	Baden Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	430 PM



LN	AM	MD	PM	TOTAL
0	1	0		
24	202	27		
71	144	35		
64	176	37		
159	522	99		

	AM	MD	PM	TOTAL
	148	226	238	612

TOTAL	PM	MD	AM
595	231	264	100

TOTAL	PM	MD	AM	LN
106	40	55	11	0.5
397	150	175	72	0.5
704	286	209	209	1

LN	AM	MD	PM	TOTAL
0.5	16	34	44	94
0	253	190	104	547
0.5	68	45	30	143

AM	MD	PM	TOTAL
567	455	372	1394

	AM	MD	PM	TOTAL
TOTAL	39	412	748	
PM	17	154	231	
MD	18	137	230	
AM	4	121	287	
LN	0.5	0.5	2	

	AM	MD	PM	TOTAL
	479	398	492	1369

AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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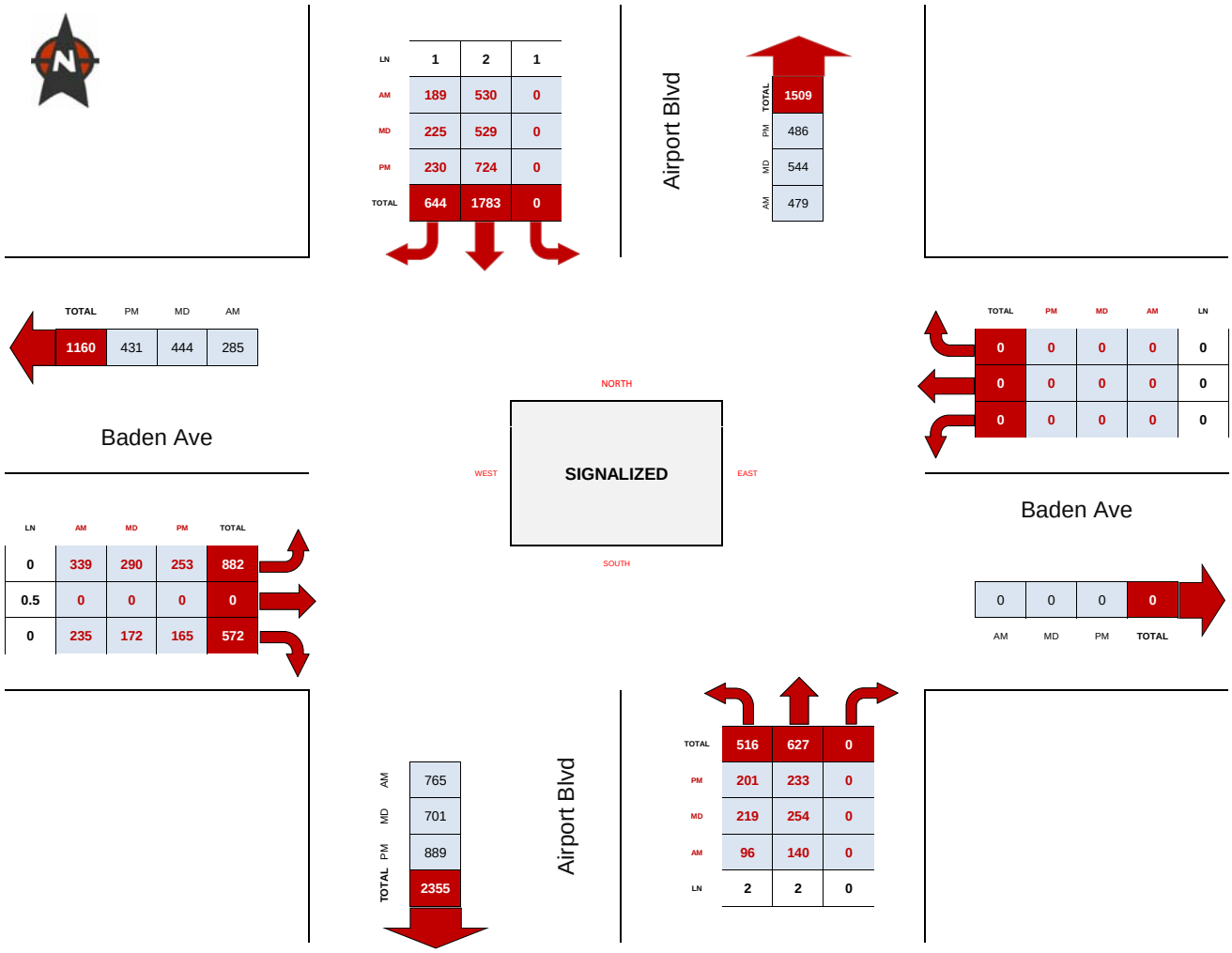
PEAK HOUR ITM SUMMARY

#013 Airport Blvd & Baden Ave

LOCATION #:	013	QTD PRJ #:	080198	AM PEAK:	730 AM
NORTH / SOUTH:	Airport Blvd	DATE:	Thursday, May 22, 2008	MD PEAK:	1200 PM
EAST / WEST:	Baden Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	500 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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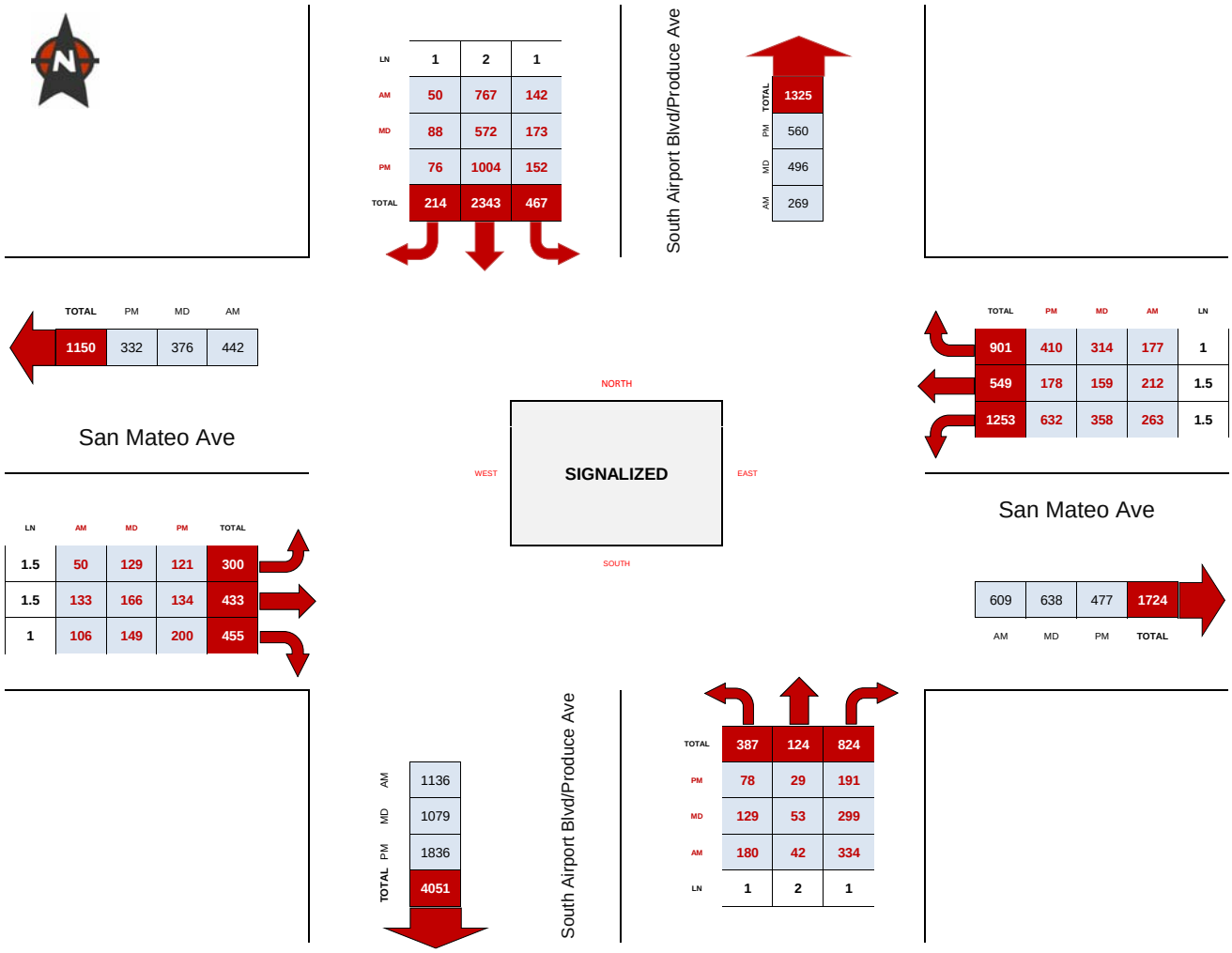
PEAK HOUR ITM SUMMARY

#016 South Airport Blvd/Produce Ave & San Mateo Ave

LOCATION #:	016	QTD PRJ #:	080198	AM PEAK:	745 AM
NORTH / SOUTH:	South Airport Blvd/Produce Ave	DATE:	Wednesday, May 21, 2008	MD PEAK:	1145 AM
EAST / WEST:	San Mateo Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	445 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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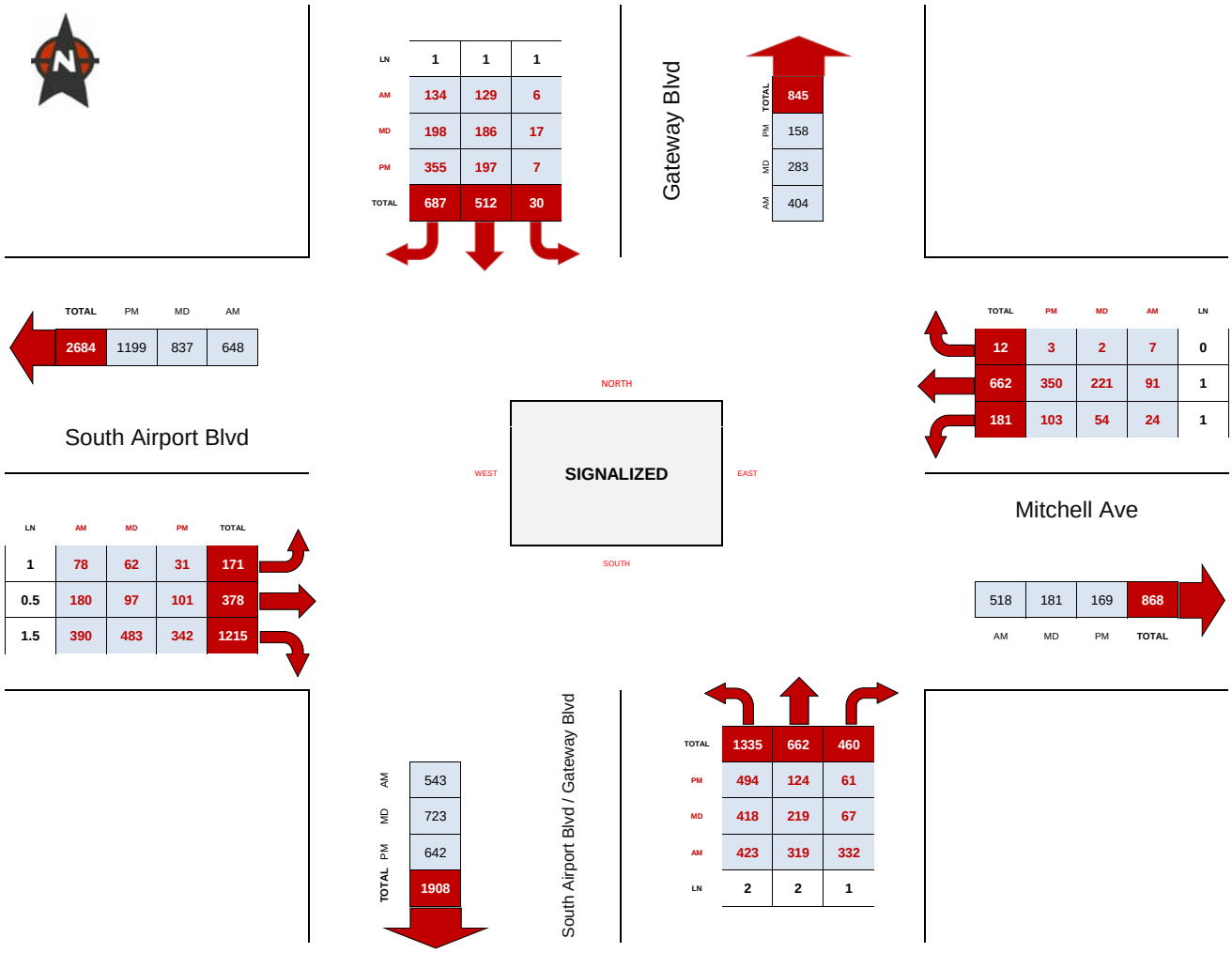
PEAK HOUR ITM SUMMARY

#017 South Airport Blvd / Gateway Blvd & South Airport Blvd / Mitchell Ave

LOCATION #:	017	QTD PRJ #:	080198	AM PEAK:	800 AM
NORTH / SOUTH:	South Airport Blvd / Gateway Blvd	DATE:	Wednesday, May 21, 2008	MD PEAK:	1145 AM
EAST / WEST:	South Airport Blvd / Mitchell Ave	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	430 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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MARKS TRAFFIC DATA

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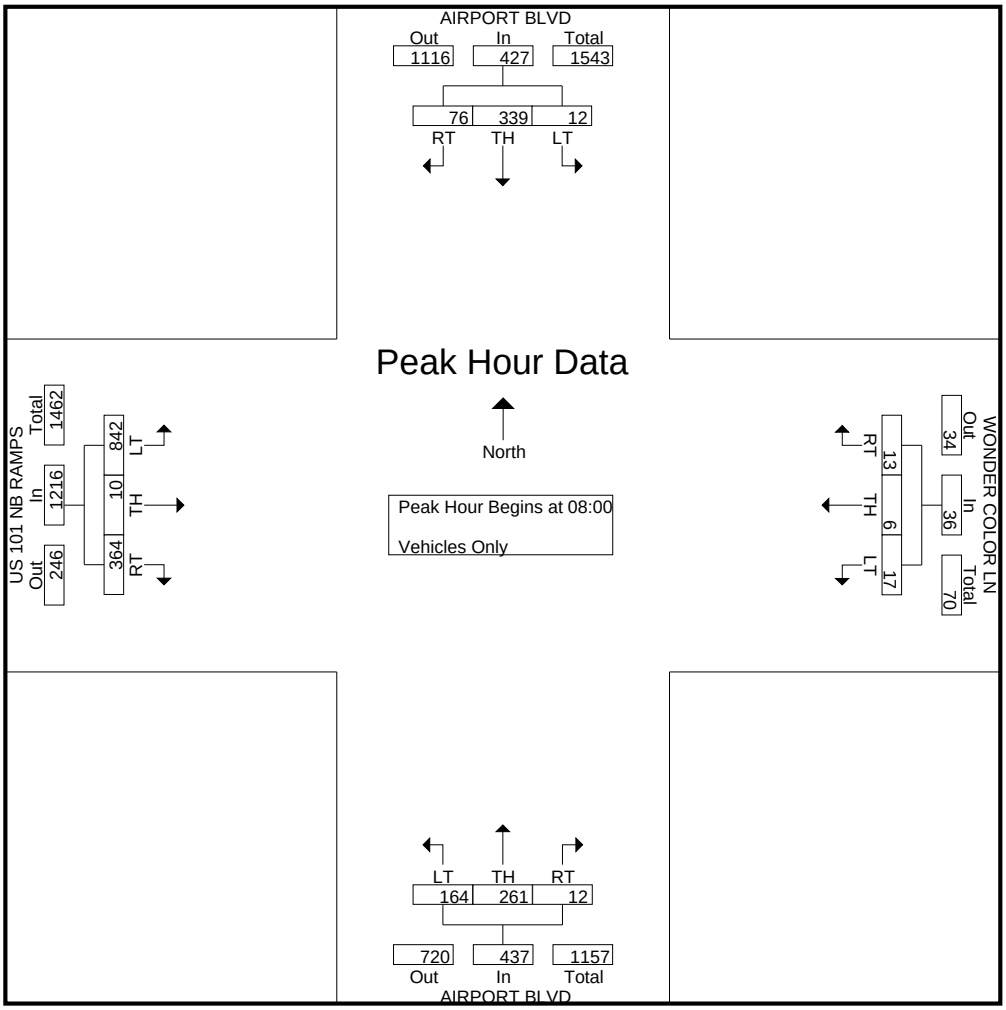
CITY OF SOUTH SAN FRANCISCO

File Name : airport-wonder color-a
Site Code : 4
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	AIRPORT BLVD Southbound				WONDER COLOR LN Westbound				AIRPORT BLVD Northbound				US 101 NB RAMPS Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	Int. Total
07:00	19	54	3	76	1	1	2	4	3	30	26	59	64	1	143	208	347
07:15	25	61	5	91	3	2	2	7	4	33	31	68	76	3	155	234	400
07:30	17	74	2	93	1	4	6	11	9	41	30	80	82	5	176	263	447
07:45	23	102	2	127	2	1	8	11	2	67	35	104	91	2	200	293	535
Total	84	291	12	387	7	8	18	33	18	171	122	311	313	11	674	998	1729
08:00	19	68	3	90	2	4	7	13	2	49	29	80	92	2	228	322	505
08:15	26	91	4	121	4	1	2	7	2	59	48	109	82	1	205	288	525
08:30	22	84	1	107	4	1	4	9	6	72	37	115	99	3	181	283	514
08:45	9	96	4	109	3	0	4	7	2	81	50	133	91	4	228	323	572
Total	76	339	12	427	13	6	17	36	12	261	164	437	364	10	842	1216	2116
Grand Total	160	630	24	814	20	14	35	69	30	432	286	748	677	21	1516	2214	3845
Apprch %	19.7	77.4	2.9		29	20.3	50.7		4	57.8	38.2		30.6	0.9	68.5		
Total %	4.2	16.4	0.6	21.2	0.5	0.4	0.9	1.8	0.8	11.2	7.4	19.5	17.6	0.5	39.4	57.6	

	AIRPORT BLVD Southbound				WONDER COLOR LN Westbound				AIRPORT BLVD Northbound				US 101 NB RAMPS Eastbound				
Start Time	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	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	19	68	3	90	2	**4**	**7**	**13**	2	49	29	80	92	2	**228**	322	505
08:15	**26**	91	**4**	**121**	**4**	1	2	7	2	59	48	109	82	1	205	288	525
08:30	22	84	1	107	4	1	4	9	**6**	72	37	115	**99**	3	181	283	514
08:45	9	**96**	4	109	3	0	4	7	2	**81**	**50**	**133**	91	**4**	228	**323**	**572**
Total Volume	76	339	12	427	13	6	17	36	12	261	164	437	364	10	842	1216	2116
% App. Total	17.8	79.4	2.8		36.1	16.7	47.2		2.7	59.7	37.5		29.9	0.8	69.2		
PHF	.731	.883	.750	.882	.813	.375	.607	.692	.500	.806	.820	.821	.919	.625	.923	.941	.925



MARKS TRAFFIC DATA

mietekm@comcast.net
916.806.0250

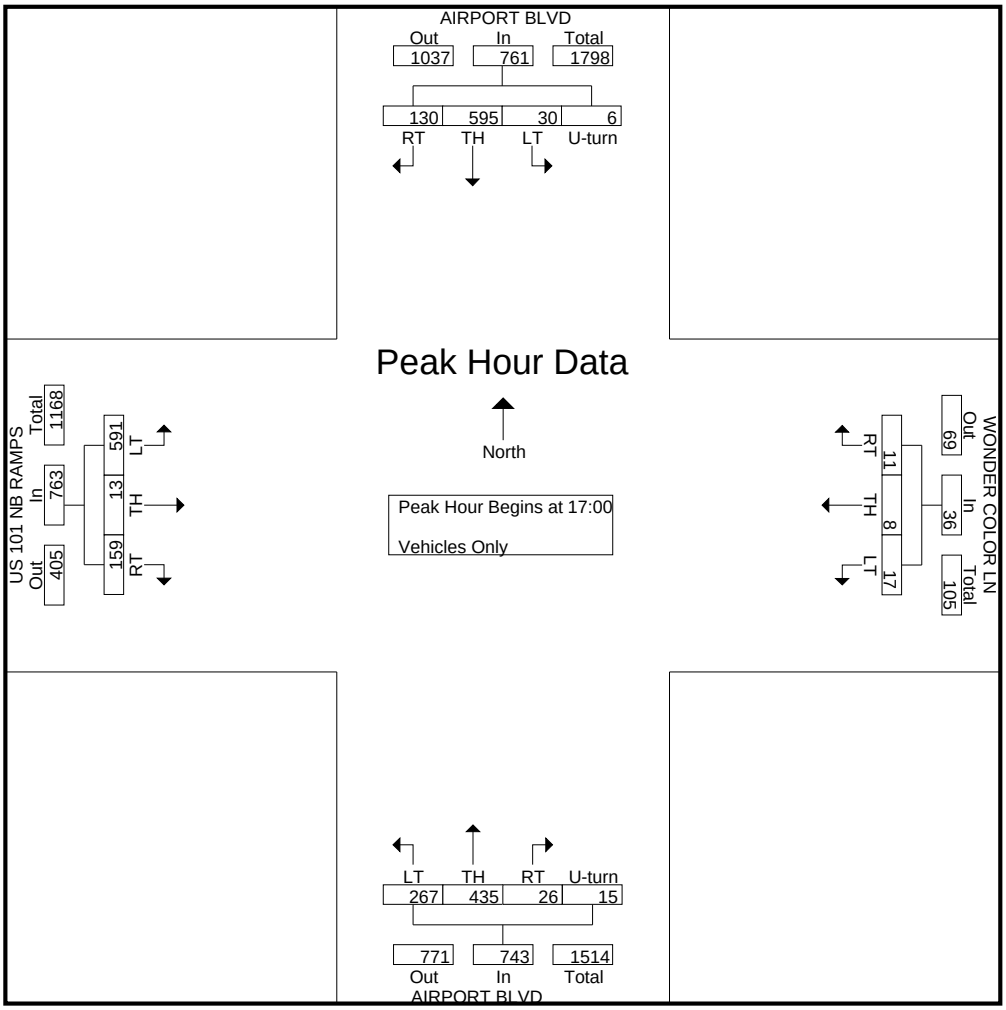
CITY OF SOUTH SAN FRANCISCO

File Name : airport-wonder color-p
Site Code : 4
Start Date : 10/10/2013
Page No : 1

Groups Printed- Vehicles Only

	AIRPORT BLVD Southbound					WONDER COLOR LN Westbound				AIRPORT BLVD Northbound					US 101 NB RAMPS Eastbound				
Start Time	RT	TH	LT	U-turn	App. Total	RT	TH	LT	App. Total	RT	TH	LT	U-turn	App. Total	RT	TH	LT	App. Total	Int. Total
16:00	24	112	4	2	142	4	3	3	10	3	63	65	8	139	51	8	131	190	481
16:15	42	163	7	0	212	7	10	18	35	2	61	51	9	123	38	4	98	140	510
16:30	27	162	6	1	196	10	5	19	34	3	81	77	6	167	43	4	101	148	545
16:45	42	139	9	1	191	2	4	6	12	3	74	88	8	173	40	7	114	161	537
Total	135	576	26	4	741	23	22	46	91	11	279	281	31	602	172	23	444	639	2073
17:00	48	159	8	0	215	0	0	6	6	6	80	69	4	159	40	5	130	175	555
17:15	47	160	8	1	216	4	1	2	7	11	75	61	3	150	42	2	178	222	595
17:30	19	167	7	2	195	5	6	4	15	3	136	69	2	210	36	5	149	190	610
17:45	16	109	7	3	135	2	1	5	8	6	144	68	6	224	41	1	134	176	543
Total	130	595	30	6	761	11	8	17	36	26	435	267	15	743	159	13	591	763	2303
Grand Total	265	1171	56	10	1502	34	30	63	127	37	714	548	46	1345	331	36	1035	1402	4376
Apprch %	17.6	78	3.7	0.7		26.8	23.6	49.6		2.8	53.1	40.7	3.4		23.6	2.6	73.8		
Total %	6.1	26.8	1.3	0.2	34.3	0.8	0.7	1.4	2.9	0.8	16.3	12.5	1.1	30.7	7.6	0.8	23.7	32	

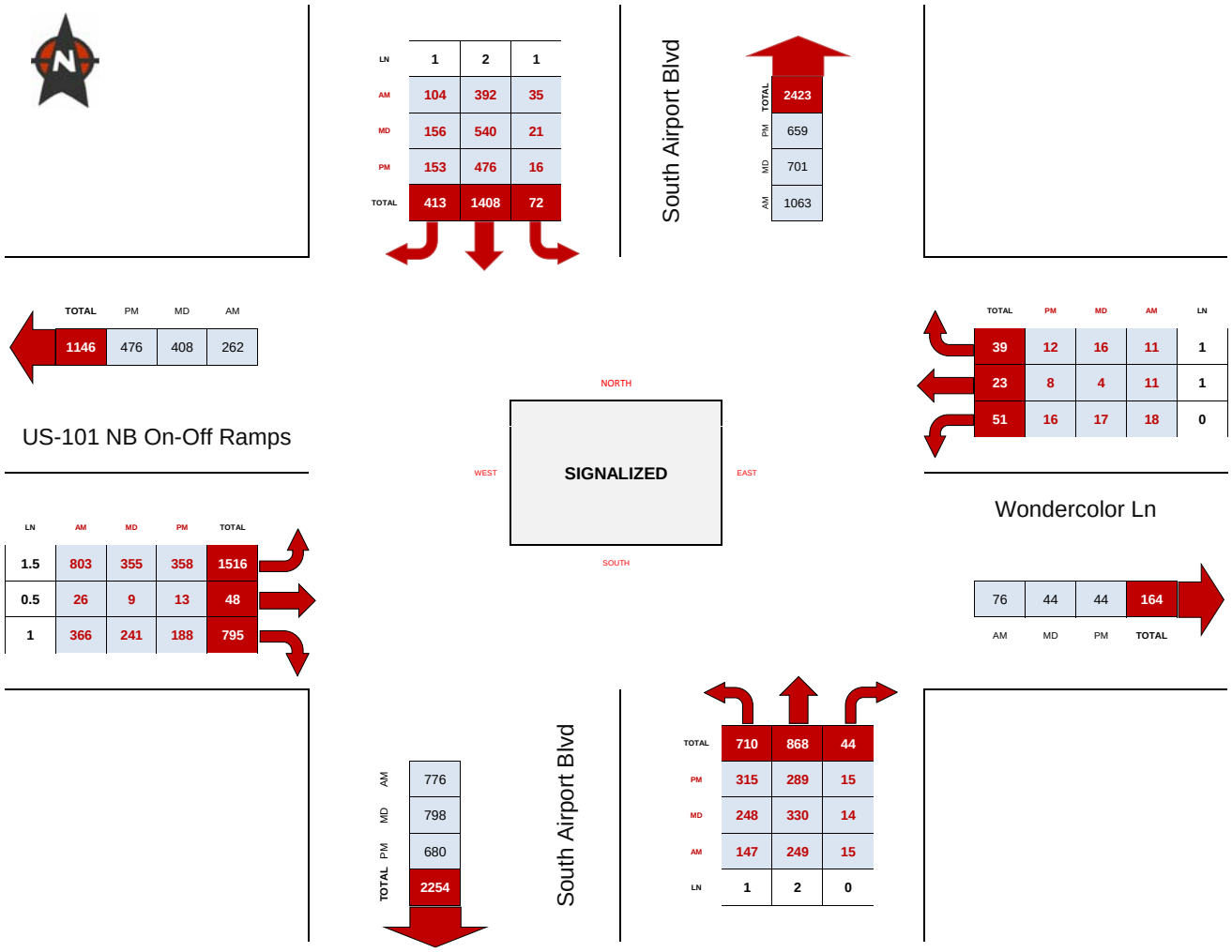
	AIRPORT BLVD Southbound					WONDER COLOR LN Westbound				AIRPORT BLVD Northbound					US 101 NB RAMPS Eastbound				
Start Time	RT	TH	LT	U-turn	App. Total	RT	TH	LT	App. Total	RT	TH	LT	U-turn	App. Total	RT	TH	LT	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 17:00																			
17:00	**48**	159	**8**	0	215	0	0	**6**	6	6	80	**69**	4	159	40	**5**	130	175	555
17:15	47	160	8	1	**216**	4	1	2	7	**11**	75	61	3	150	**42**	2	**178**	**222**	595
17:30	19	**167**	7	2	195	**5**	**6**	4	**15**	3	136	69	2	210	36	5	149	190	**610**
17:45	16	109	7	**3**	135	2	1	5	8	6	**144**	68	**6**	**224**	41	1	134	176	543
Total Volume	130	595	30	6	761	11	8	17	36	26	435	267	15	743	159	13	591	763	2303
% App. Total	17.1	78.2	3.9	0.8		30.6	22.2	47.2		3.5	58.5	35.9	2		20.8	1.7	77.5		
PHF	.677	.891	.938	.500	.881	.550	.333	.708	.600	.591	.755	.967	.625	.829	.946	.650	.830	.859	.944



PEAK HOUR ITM SUMMARY

#018 South Airport Blvd & Wndrclr Ln / 101 NB Ramps

LOCATION #:	018	QTD PRJ #:	080198	AM PEAK:	745 AM
NORTH / SOUTH:	South Airport Blvd	DATE:	Wednesday, May 21, 2008	MD PEAK:	1200 PM
EAST / WEST:	Wndrclr Ln / 101 NB Ramps	VICINITY:	S. SAN FRANCISCO, CA	PM PEAK:	445 PM



AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	11:00 AM	TO	1:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

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Phone: 310-341-0019 Fax: 310-807-9247 Info@QualityTrafficData.com

Appendix B

Level of Service Worksheets

Intersection Queuing, Intersection LOS, and Freeway Analysis

South San Francisco Caltrain Station Area Plan EIR

April 2014

SF12-0610

FEHR PEERS

Existing AM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	137	72	264	13	167	228
v/c Ratio	0.31	0.15	0.62	0.03	0.41	0.45
Control Delay	19.7	5.9	26.2	9.2	19.4	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	5.9	26.2	9.2	19.4	20.2
Queue Length 50th (ft)	39	0	83	0	41	63
Queue Length 95th (ft)	80	25	152	11	103	119
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	436	488	429	445	410	507
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	0.31	0.15	0.62	0.03	0.41	0.45

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	87	68	92	156	12	23	118	16	8	173	33
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.99			0.98	
Flt Protected		0.98	1.00		0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1833	1583		1829	1583		1824			1821	
Flt Permitted		0.85	1.00		0.84	1.00		0.80			0.99	
Satd. Flow (perm)		1585	1583		1561	1583		1468			1804	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	93	72	98	166	13	24	126	17	9	184	35
RTOR Reduction (vph)	0	0	52	0	0	9	0	7	0	0	11	0
Lane Group Flow (vph)	0	137	20	0	264	4	0	160	0	0	217	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		436	435		429	435		404			496	
v/s Ratio Prot												
v/s Ratio Perm		0.09	0.01		c0.17	0.00		c0.11			c0.12	
v/c Ratio		0.31	0.05		0.62	0.01		0.40			0.44	
Uniform Delay, d1		17.3	16.0		19.0	15.8		17.7			17.9	
Progression Factor		1.00	1.00		1.00	1.00		0.94			1.00	
Incremental Delay, d2		1.9	0.2		6.5	0.0		2.9			2.8	
Delay (s)		19.1	16.2		25.5	15.8		19.6			20.7	
Level of Service		B	B		C	B		B			C	
Approach Delay (s)		18.1			25.0			19.6			20.7	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	123	298	306	170	507
v/c Ratio	0.55	0.34	0.34	0.34	0.74
Control Delay	48.7	16.4	16.3	27.2	43.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.7	16.4	16.3	27.2	43.1
Queue Length 50th (ft)	74	106	108	47	157
Queue Length 95th (ft)	124	213	217	m77	200
Internal Link Dist (ft)			385	131	284
Turn Bay Length (ft)					
Base Capacity (vph)	263	905	937	586	776
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	0.33	0.33	0.29	0.65

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	112	417	132	1	36	118	0	0	408	54
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	0.95	0.95			0.95			0.95	
Frpb, ped/bikes			1.00	1.00	1.00			1.00			0.99	
Flpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	
Frt			0.86	1.00	1.00			1.00			0.98	
Flt Protected			1.00	0.95	0.97			0.99			1.00	
Satd. Flow (prot)			1565	1633	1690			3488			3356	
Flt Permitted			1.00	0.95	0.97			0.99			1.00	
Satd. Flow (perm)			1565	1633	1690			3488			3356	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	123	458	145	1	40	130	0	0	448	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	123	298	306	0	0	170	0	0	497	0
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					
Protected Phases			1	6	6		1	1			4	
Permitted Phases												
Actuated Green, G (s)			14.2	53.7	53.7			14.2			20.1	
Effective Green, g (s)			14.2	53.7	53.7			14.2			20.1	
Actuated g/C Ratio			0.14	0.54	0.54			0.14			0.20	
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	
Lane Grp Cap (vph)			222	877	908			495			675	
v/s Ratio Prot			c0.08	c0.18	0.18			0.05			c0.15	
v/s Ratio Perm												
v/c Ratio			0.55	0.34	0.34			0.34			0.74	
Uniform Delay, d1			40.0	13.1	13.1			38.7			37.5	
Progression Factor			1.00	1.00	1.00			0.68			1.00	
Incremental Delay, d2			3.7	1.1	1.0			0.4			4.2	
Delay (s)			43.6	14.2	14.1			26.9			41.6	
Level of Service			D	B	B			C			D	
Approach Delay (s)		43.6			14.1			26.9			41.6	
Approach LOS		D			B			C			D	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	230	136	16	175	117
v/c Ratio	0.66	0.65	0.05	0.14	0.09
Control Delay	30.6	40.2	10.5	2.4	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	30.6	40.2	10.5	2.4	3.5
Queue Length 50th (ft)	77	55	0	8	10
Queue Length 95th (ft)	120	92	12	32	30
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	901	589	811	1229	1289
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	0.26	0.23	0.02	0.14	0.09

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	126	55	51	66	14	25	66	59	9	73	19
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.96			1.00	0.85		0.95			0.97	
Flt Protected		1.00			0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1785			1823	1583		1749			1808	
Flt Permitted		0.97			0.62	1.00		0.96			0.98	
Satd. Flow (perm)		1739			1162	1583		1686			1783	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	19	147	64	59	77	16	29	77	69	10	85	22
RTOR Reduction (vph)	0	33	0	0	0	13	0	15	0	0	6	0
Lane Group Flow (vph)	0	197	0	0	136	3	0	160	0	0	111	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		12.6			12.6	12.6		50.4			50.4	
Effective Green, g (s)		12.6			12.6	12.6		50.4			50.4	
Actuated g/C Ratio		0.18			0.18	0.18		0.72			0.72	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		313			209	285		1214			1284	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.12	0.00		c0.09			0.06	
v/c Ratio		0.63			0.65	0.01		0.13			0.09	
Uniform Delay, d1		26.5			26.7	23.6		3.0			2.9	
Progression Factor		1.00			1.00	1.00		0.74			1.00	
Incremental Delay, d2		3.0			5.4	0.0		0.2			0.1	
Delay (s)		29.6			32.1	23.6		2.4			3.1	
Level of Service		C			C	C		A			A	
Approach Delay (s)		29.6			31.2			2.4			3.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	70.0	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			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	40	679	572	69	21
v/c Ratio	0.32	0.16	0.15	0.46	0.14
Control Delay	41.0	2.5	2.0	52.9	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	2.5	2.0	52.9	18.4
Queue Length 50th (ft)	20	26	13	43	0
Queue Length 95th (ft)	m32	m49	31	84	22
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	223	4255	3691	309	288
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	0.18	0.16	0.15	0.22	0.07

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	38	652	513	36	66	20
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4675		1719	1488
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4675		1719	1488
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	40	679	534	38	69	21
RTOR Reduction (vph)	0	0	3	0	0	19
Lane Group Flow (vph)	40	679	569	0	69	2
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	4.8	84.5	75.7		7.5	7.5
Effective Green, g (s)	4.8	84.5	75.7		7.5	7.5
Actuated g/C Ratio	0.05	0.84	0.76		0.08	0.08
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)	83	4174	3539		129	112
v/s Ratio Prot	c0.02	c0.14	0.12		c0.04	
v/s Ratio Perm						0.00
v/c Ratio	0.48	0.16	0.16		0.53	0.01
Uniform Delay, d1	46.4	1.4	3.4		44.6	42.8
Progression Factor	0.82	1.52	0.50		1.00	1.00
Incremental Delay, d2	1.2	0.1	0.1		2.1	0.0
Delay (s)	39.3	2.2	1.8		46.7	42.8
Level of Service	D	A	A		D	D
Approach Delay (s)		4.2	1.8		45.8	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	726	16	320	234	799
v/c Ratio	0.54	0.15	0.22	0.24	0.78
Control Delay	24.0	24.8	16.4	10.7	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	24.8	16.4	10.7	16.8
Queue Length 50th (ft)	120	6	33	62	227
Queue Length 95th (ft)	150	16	41	122	#574
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2457	138	2923	993	1022
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	1	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.30	0.12	0.11	0.24	0.78

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	696	23	16	317	232	791
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		1.00	0.91	1.00	1.00
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	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4905		1719	4715	1641	1506
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4905		1719	4715	1641	1506
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	703	23	16	320	234	799
RTOR Reduction (vph)	5	0	0	0	0	111
Lane Group Flow (vph)	721	0	16	320	234	688
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	24.9		2.6	31.5	60.5	60.5
Effective Green, g (s)	24.9		2.6	31.5	60.5	60.5
Actuated g/C Ratio	0.25		0.03	0.32	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)	1221		45	1485	993	911
v/s Ratio Prot	c0.15		c0.01	0.07	0.14	
v/s Ratio Perm						c0.46
v/c Ratio	0.59		0.36	0.22	0.24	0.75
Uniform Delay, d1	33.1		47.9	25.2	9.1	14.4
Progression Factor	0.72		0.49	0.66	1.00	1.00
Incremental Delay, d2	2.1		1.7	0.3	0.0	3.2
Delay (s)	26.0		25.2	16.9	9.1	17.5
Level of Service	C		C	B	A	B
Approach Delay (s)	26.0			17.3	15.6	
Approach LOS	C			B	B	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	152	1216	122	327	58	667	283	162
v/c Ratio	0.25	0.69	0.77	0.58	0.18	0.85	0.85	0.21
Control Delay	19.0	21.9	70.8	30.3	28.8	33.1	65.3	28.3
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	22.2	70.8	30.3	28.8	33.1	65.3	28.3
Queue Length 50th (ft)	49	263	79	56	27	156	177	37
Queue Length 95th (ft)	m79	186	#168	82	66	192	#356	68
Internal Link Dist (ft)		284		599		325		294
Turn Bay Length (ft)	170		195		210		200	
Base Capacity (vph)	601	1773	168	1644	339	899	331	1170
Starvation Cap Reductn	0	133	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.74	0.73	0.20	0.17	0.74	0.85	0.14

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	1096	71	117	233	81	56	294	347	272	110	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, 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		1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	0.92		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)	1719	4884		1719	4566		1641	3116		1719	3314	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1719	4884		1719	4566		1641	3116		1719	3314	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	152	1142	74	122	243	84	58	306	361	283	115	47
RTOR Reduction (vph)	0	7	0	0	76	0	0	191	0	0	37	0
Lane Group Flow (vph)	152	1209	0	122	251	0	58	476	0	283	125	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	35.0	34.6		9.3	9.1		17.4	18.9		20.8	21.7	
Effective Green, g (s)	35.0	34.6		9.3	9.1		17.4	18.9		20.8	21.7	
Actuated g/C Ratio	0.35	0.35		0.09	0.09		0.17	0.19		0.21	0.22	
Clearance Time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	602	1690		160	416		286	589		358	719	
v/s Ratio Prot	0.09	c0.25		c0.07	0.05		0.04	c0.15		c0.16	0.04	
v/s Ratio Perm												
v/c Ratio	0.25	0.72		0.76	0.60		0.20	0.81		0.79	0.17	
Uniform Delay, d1	23.2	28.4		44.3	43.7		35.4	38.8		37.5	31.9	
Progression Factor	0.74	0.73		0.91	0.83		0.95	0.89		1.00	1.00	
Incremental Delay, d2	0.1	2.2		17.3	6.3		0.1	7.4		10.6	0.0	
Delay (s)	17.3	23.0		57.7	42.5		33.8	41.8		48.1	31.9	
Level of Service	B	C		E	D		C	D		D	C	
Approach Delay (s)		22.4			46.7			41.2			42.2	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	33.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	396	264	42	244	180
v/c Ratio	0.67	0.50	0.07	0.26	0.20
Control Delay	22.4	19.0	4.5	11.0	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	19.0	4.5	11.0	14.5
Queue Length 50th (ft)	134	86	1	46	62
Queue Length 95th (ft)	142	97	12	100	108
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	831	750	832	924	904
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	0.48	0.35	0.05	0.26	0.20

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	68	211	42	64	150	34	16	123	58	21	99	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	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.96			0.98	
Flt Protected		0.99			0.99	1.00		1.00			0.99	
Satd. Flow (prot)		1811			1835	1583		1781			1805	
Flt Permitted		0.88			0.78	1.00		0.97			0.95	
Satd. Flow (perm)		1602			1459	1583		1744			1719	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	84	260	52	79	185	42	20	152	72	26	122	32
RTOR Reduction (vph)	0	10	0	0	0	23	0	16	0	0	9	0
Lane Group Flow (vph)	0	386	0	0	264	19	0	228	0	0	171	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		25.6			25.6	25.6		36.4			36.4	
Effective Green, g (s)		25.6			25.6	25.6		36.4			36.4	
Actuated g/C Ratio		0.37			0.37	0.37		0.52			0.52	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		586			534	579		907			894	
v/s Ratio Prot												
v/s Ratio Perm		c0.24			0.18	0.01		c0.13			0.10	
v/c Ratio		0.66			0.49	0.03		0.25			0.19	
Uniform Delay, d1		18.5			17.2	14.2		9.3			9.0	
Progression Factor		1.00			1.00	1.00		1.00			1.33	
Incremental Delay, d2		3.0			1.0	0.0		0.7			0.5	
Delay (s)		21.5			18.2	14.3		9.9			12.3	
Level of Service		C			B	B		A			B	
Approach Delay (s)		21.5			17.6			9.9			12.3	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	328	47	163	31	109	85
v/c Ratio	0.34	0.05	0.17	0.04	0.20	0.14
Control Delay	9.2	3.1	5.7	1.8	14.1	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	3.1	5.7	1.8	14.1	10.0
Queue Length 50th (ft)	61	1	21	1	25	12
Queue Length 95th (ft)	106	13	39	m5	56	38
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	974	863	939	859	553	590
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	0.34	0.05	0.17	0.04	0.20	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	289	44	21	133	29	38	54	11	11	35	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	4.0		4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.99			0.94	
Flt Protected		1.00	1.00		0.99	1.00		0.98			0.99	
Satd. Flow (prot)		1857	1583		1850	1583		1802			1744	
Flt Permitted		0.98	1.00		0.94	1.00		0.89			0.97	
Satd. Flow (perm)		1828	1583		1760	1583		1638			1698	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	307	47	22	141	31	40	57	12	12	37	36
RTOR Reduction (vph)	0	0	19	0	0	14	0	7	0	0	24	0
Lane Group Flow (vph)	0	328	28	0	163	17	0	102	0	0	61	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		975	844		939	844		546			566	
v/s Ratio Prot												
v/s Ratio Perm		c0.18	0.02		0.09	0.01		c0.06			0.04	
v/c Ratio		0.34	0.03		0.17	0.02		0.19			0.11	
Uniform Delay, d1		8.0	6.7		7.2	6.6		14.2			13.8	
Progression Factor		1.00	1.00		0.72	0.58		1.00			1.00	
Incremental Delay, d2		0.9	0.1		0.4	0.0		0.8			0.4	
Delay (s)		8.9	6.7		5.5	3.9		15.0			14.2	
Level of Service		A	A		A	A		B			B	
Approach Delay (s)		8.6			5.3			15.0			14.2	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	351	44	180	22	102	283
v/c Ratio	0.45	0.06	0.24	0.03	0.14	0.38
Control Delay	10.8	4.2	11.9	4.9	8.3	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	4.2	11.9	4.9	8.3	13.7
Queue Length 50th (ft)	54	1	39	0	15	73
Queue Length 95th (ft)	84	7	76	10	39	143
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	781	702	738	698	749	736
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	0.45	0.06	0.24	0.03	0.14	0.38

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	298	41	29	139	20	15	52	28	61	164	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	4.0		4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.98	
Flt Protected		1.00	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1855	1583		1847	1583		1775			1805	
Flt Permitted		0.97	1.00		0.92	1.00		0.95			0.92	
Satd. Flow (perm)		1802	1583		1705	1583		1691			1674	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	31	320	44	31	149	22	16	56	30	66	176	41
RTOR Reduction (vph)	0	0	16	0	0	12	0	17	0	0	10	0
Lane Group Flow (vph)	0	351	28	0	180	10	0	85	0	0	273	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		781	686		739	686		733			725	
v/s Ratio Prot												
v/s Ratio Perm		c0.19	0.02		0.11	0.01		0.05			c0.16	
v/c Ratio		0.45	0.04		0.24	0.01		0.12			0.38	
Uniform Delay, d1		12.0	9.8		10.8	9.7		10.1			11.5	
Progression Factor		0.72	0.70		1.00	1.00		1.00			1.10	
Incremental Delay, d2		1.8	0.1		0.8	0.0		0.3			1.4	
Delay (s)		10.4	7.0		11.6	9.7		10.5			14.0	
Level of Service		B	A		B	A		B			B	
Approach Delay (s)		10.1			11.4			10.5			14.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.5	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	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	374	95	184	93	93	36	394	215	268	553	119
v/c Ratio	0.90	0.23	0.62	0.51	0.40	0.13	0.74	0.56	0.73	0.65	0.25
Control Delay	60.9	7.6	36.4	34.5	8.6	39.3	52.4	21.7	47.5	37.8	11.8
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	60.9	7.6	36.4	34.5	8.6	39.3	52.4	21.7	47.5	37.8	11.8
Queue Length 50th (ft)	218	0	31	31	1	23	136	80	195	198	15
Queue Length 95th (ft)	#392	38	49	56	7	m41	188	119	#334	229	m45
Internal Link Dist (ft)	585			161			328			103	
Turn Bay Length (ft)						150					
Base Capacity (vph)	440	428	327	199	248	315	631	443	368	848	476
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	0.85	0.22	0.56	0.47	0.38	0.11	0.62	0.49	0.73	0.65	0.25

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	224	139	92	178	90	90	35	382	209	382	414	115
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
Lane Util. Factor		1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.93	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (prot)		1595	1302	2717	1660	1386	1577	3154	1384	1232	2838	1315
Flt Permitted		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99	1.00
Satd. Flow (perm)		1595	1302	2717	1660	1386	1577	3154	1384	1232	2838	1315
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	231	143	95	184	93	93	36	394	215	394	427	119
RTOR Reduction (vph)	0	0	70	0	0	83	0	0	0	0	0	84
Lane Group Flow (vph)	0	374	25	184	93	10	36	394	215	268	553	35
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm	Split		pt+ov	Split		Perm
Protected Phases	8	8		7	7		6	6	6 7	2	2	
Permitted Phases			8			7						2
Actuated Green, G (s)		26.2	26.2	11.0	11.0	11.0	17.0	17.0	28.0	29.8	29.8	29.8
Effective Green, g (s)		26.2	26.2	11.0	11.0	11.0	17.0	17.0	28.0	29.8	29.8	29.8
Actuated g/C Ratio		0.26	0.26	0.11	0.11	0.11	0.17	0.17	0.28	0.30	0.30	0.30
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0	2.5	2.5		2.0	2.0	2.0
Lane Grp Cap (vph)		418	341	299	183	152	268	536	388	367	846	392
v/s Ratio Prot		c0.23		c0.07	0.06		0.02	c0.12	0.16	c0.22	0.19	
v/s Ratio Perm			0.02			0.01						0.03
v/c Ratio		0.89	0.07	0.62	0.51	0.07	0.13	0.74	0.55	0.73	0.65	0.09
Uniform Delay, d1		35.6	27.8	42.5	42.0	39.9	35.2	39.4	30.7	31.5	30.6	25.3
Progression Factor		1.00	1.00	0.64	0.59	0.40	1.12	1.13	1.07	1.05	1.05	1.81
Incremental Delay, d2		20.9	0.1	3.7	2.2	0.2	0.2	4.6	1.3	10.8	3.5	0.4
Delay (s)		56.5	27.8	30.9	26.8	16.2	39.8	49.2	34.2	43.8	35.6	46.2
Level of Service		E	C	C	C	B	D	D	C	D	D	D
Approach Delay (s)		50.7			26.2			43.7			39.3	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	14	576	1100	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	15	613	1170	0	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	1198	891			1783	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1198	891			1783	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	178	285			344	

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	15	409	1374
Volume Left	0	0	0
Volume Right	15	0	1170
cSH	285	1700	1700
Volume to Capacity	0.05	0.24	0.81
Queue Length 95th (ft)	4	0	0
Control Delay (s)	18.3	0.0	0.0
Lane LOS	C		
Approach Delay (s)	18.3	0.0	
Approach LOS	C		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	375	232	93	138	319	282
v/c Ratio	0.53	1.13	0.24	0.37	0.23	0.79
Control Delay	21.0	133.0	21.2	24.4	1.2	40.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	133.0	21.2	24.4	1.2	40.7
Queue Length 50th (ft)	63	~124	29	50	0	112
Queue Length 95th (ft)	111	#254	66	93	14	189
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	710	205	385	445	1480	428
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	1.13	0.24	0.31	0.22	0.66

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	262	70	216	75	11	4	125	297	28	209	25
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		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	
Frt		0.97		1.00	0.98			1.00	0.85		0.99	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		2710		1413	1451			1485	2224		1451	
Flt Permitted		0.71		0.53	1.00			0.99	1.00		0.96	
Satd. Flow (perm)		1936		787	1451			1475	2224		1405	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	18	282	75	232	81	12	4	134	319	30	225	27
RTOR Reduction (vph)	0	28	0	0	7	0	0	0	156	0	5	0
Lane Group Flow (vph)	0	347	0	232	86	0	0	138	163	0	277	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		25.7		19.0	19.0			18.3	40.8		18.3	
Effective Green, g (s)		25.7		19.0	19.0			18.3	37.3		18.3	
Actuated g/C Ratio		0.35		0.26	0.26			0.25	0.51		0.25	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		682		205	378			370	1136		352	
v/s Ratio Prot					0.06				0.07			
v/s Ratio Perm		c0.18		c0.29				0.09			c0.20	
v/c Ratio		0.51		1.13	0.23			0.37	0.14		0.79	
Uniform Delay, d1		18.7		27.0	21.2			22.6	9.4		25.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		2.7		102.8	0.1			0.2	0.0		10.2	
Delay (s)		21.4		129.8	21.3			22.8	9.4		35.7	
Level of Service		C		F	C			C	A		D	
Approach Delay (s)		21.4			98.7			13.5			35.7	
Approach LOS		C			F			B			D	

Intersection Summary			
HCM Average Control Delay	39.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	613	102	185	23	566	202
v/c Ratio	0.85	0.15	0.10	0.24	0.48	0.33
Control Delay	36.6	25.5	5.8	64.8	18.9	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.6	25.5	5.8	64.8	18.9	3.7
Queue Length 50th (ft)	138	29	14	16	95	19
Queue Length 95th (ft)	182	60	34	m25	117	8
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	976	735	1816	94	1326	671
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	0.63	0.14	0.10	0.24	0.43	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	351	243	99	179	22	549	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.94		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2579		2740	2825	1413	2825	1201
Flt Permitted	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2579		2740	2825	1413	2825	1201
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	362	251	102	185	23	566	202
RTOR Reduction (vph)	145	0	0	0	0	0	122
Lane Group Flow (vph)	468	0	102	185	23	566	80
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	22.4		25.5	61.9	3.1	39.5	39.5
Effective Green, g (s)	22.4		25.5	61.9	3.1	39.5	39.5
Actuated g/C Ratio	0.22		0.26	0.62	0.03	0.40	0.40
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	578		699	1749	44	1116	474
v/s Ratio Prot	c0.18		c0.04	0.07	0.02	c0.20	
v/s Ratio Perm							0.07
v/c Ratio	0.81		0.15	0.11	0.52	0.51	0.17
Uniform Delay, d1	36.8		28.8	7.8	47.7	22.9	19.6
Progression Factor	1.00		0.89	0.62	1.35	0.70	0.69
Incremental Delay, d2	7.8		0.0	0.1	4.4	1.4	0.7
Delay (s)	44.5		25.8	4.9	68.7	17.5	14.1
Level of Service	D		C	A	E	B	B
Approach Delay (s)	44.5			12.3		18.1	
Approach LOS	D			B		B	

Intersection Summary			
HCM Average Control Delay	26.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	48	185	111	162	335	185	188	392	148	687	53
v/c Ratio	0.34	0.56	0.45	0.61	0.56	0.42	0.72	0.75	0.18	0.53	0.08
Control Delay	47.7	49.3	14.0	49.4	43.3	14.4	55.2	17.2	11.3	21.6	6.1
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	47.7	49.3	14.0	49.4	43.3	14.4	55.2	17.2	11.3	21.6	6.1
Queue Length 50th (ft)	31	62	0	123	127	27	116	14	29	196	5
Queue Length 95th (ft)	69	97	49	196	164	100	177	56	m119	#359	m22
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	251	585	355	366	818	543	325	820	800	1291	632
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	0.19	0.32	0.31	0.44	0.41	0.34	0.58	0.48	0.18	0.53	0.08

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	178	110	272	220	183	186	43	346	147	680	52
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	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.91	0.91	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98		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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3248	1468	1416	3167	1568	1752	2658		1719	3312	1541
Flt Permitted	0.95	1.00	1.00	0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3248	1468	1416	3167	1568	1752	2658		1719	3312	1541
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	53	180	111	275	222	185	188	43	349	148	687	53
RTOR Reduction (vph)	0	0	100	0	0	150	0	323	0	0	0	32
Lane Group Flow (vph)	48	185	11	162	335	35	188	69	0	148	687	21
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	10.1	10.1	10.1	18.8	18.8	18.8	15.0	7.4		46.6	39.0	39.0
Effective Green, g (s)	10.1	10.1	10.1	18.8	18.8	18.8	15.0	7.4		46.6	39.0	39.0
Actuated g/C Ratio	0.10	0.10	0.10	0.19	0.19	0.19	0.15	0.07		0.47	0.39	0.39
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	141	328	148	266	595	295	263	197		801	1292	601
v/s Ratio Prot	0.03	c0.06	0.01	c0.11	0.11	0.02	c0.11	0.03		0.09	c0.21	
v/s Ratio Perm												0.01
v/c Ratio	0.34	0.56	0.08	0.61	0.56	0.12	0.71	0.35		0.18	0.53	0.03
Uniform Delay, d1	41.8	42.9	40.7	37.2	36.9	33.7	40.5	44.0		15.6	23.5	18.9
Progression Factor	1.00	1.00	1.00	1.11	1.11	2.48	1.00	1.00		0.55	0.71	0.68
Incremental Delay, d2	0.5	1.3	0.1	3.8	1.2	0.2	7.5	0.4		0.5	1.4	0.1
Delay (s)	42.4	44.2	40.8	45.1	42.0	83.7	47.9	44.4		9.1	18.0	12.9
Level of Service	D	D	D	D	D	F	D	D		A	B	B
Approach Delay (s)		42.8			54.0			45.5			16.2	
Approach LOS		D			D			D			B	

Intersection Summary			
HCM Average Control Delay	37.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	83	314	288	26	107	447	688	6	137	142
v/c Ratio	0.53	0.81	0.52	0.25	0.37	0.27	0.42	0.03	0.64	0.47
Control Delay	52.9	46.8	10.2	50.2	39.0	18.0	11.6	49.8	63.5	27.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.9	46.8	10.2	50.2	39.0	18.0	11.6	49.8	63.5	27.2
Queue Length 50th (ft)	55	133	20	16	64	86	94	4	94	23
Queue Length 95th (ft)	88	294	146	43	101	m100	93	m10	m142	m84
Internal Link Dist (ft)		732			379		1000		765	
Turn Bay Length (ft)	140			70		300		90		
Base Capacity (vph)	190	436	582	124	399	1638	1640	317	358	411
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	0.44	0.72	0.49	0.21	0.27	0.27	0.42	0.02	0.38	0.35

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	186	404	25	98	7	438	330	344	6	134	139
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
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00		0.97	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.97
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	0.94	0.85	1.00	0.99		1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1641	1619	1443	1556	1823		3335	3054		1583	1792	1483
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1641	1619	1443	1556	1823		3335	3054		1583	1792	1483
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)	83	190	412	26	100	7	447	337	351	6	137	142
RTOR Reduction (vph)	0	24	223	0	2	0	0	148	0	0	0	125
Lane Group Flow (vph)	83	290	65	26	105	0	447	540	0	6	137	17
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot			Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	8.4	22.6	22.6	3.0	17.2		46.4	46.4		12.0	12.0	12.0
Effective Green, g (s)	8.4	22.6	22.6	3.0	17.2		46.4	46.4		12.0	12.0	12.0
Actuated g/C Ratio	0.08	0.23	0.23	0.03	0.17		0.46	0.46		0.12	0.12	0.12
Clearance Time (s)	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
Lane Grp Cap (vph)	138	366	326	47	314		1547	1417		190	215	178
v/s Ratio Prot	0.05	c0.18		0.02	c0.06		0.13	c0.18		0.00	c0.08	
v/s Ratio Perm			0.05									0.01
v/c Ratio	0.60	0.79	0.20	0.55	0.33		0.29	0.38		0.03	0.64	0.10
Uniform Delay, d1	44.2	36.5	31.4	47.8	36.4		16.6	17.4		38.9	41.9	39.2
Progression Factor	0.97	0.98	1.90	1.00	1.00		0.94	0.91		1.37	1.25	3.31
Incremental Delay, d2	4.7	10.0	0.1	7.8	0.2		0.4	0.6		0.0	4.0	0.1
Delay (s)	47.8	45.7	59.6	55.6	36.6		16.0	16.6		53.2	56.3	129.9
Level of Service	D	D	E	E	D		B	B		D	E	F
Approach Delay (s)		51.8			40.3			16.3			92.9	
Approach LOS		D			D			B			F	

Intersection Summary			
HCM Average Control Delay	38.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	462	454	391	25	13	176	294	13	365	82
v/c Ratio	0.82	0.80	0.54	0.27	0.14	0.67	0.20	0.15	0.39	0.18
Control Delay	40.6	39.2	6.7	49.9	23.8	30.3	8.3	52.9	35.8	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	39.2	6.7	49.9	23.8	30.3	8.3	52.9	35.8	16.2
Queue Length 50th (ft)	271	265	24	15	0	38	20	8	78	0
Queue Length 95th (ft)	358	349	84	43	20	70	130	m18	#221	m44
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	586	588	746	382	354	275	1497	128	939	461
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	0.79	0.77	0.52	0.07	0.04	0.64	0.20	0.10	0.39	0.18

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	842	10	364	17	0	6	13	164	261	12	12	339
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.99		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	1.00		1.00	1.00
Frt	1.00	1.00	0.85		0.96		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1523	1406		1467		1326	1597	3162		1597	3195
Flt Permitted	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1523	1406		1467		1326	1597	3162		1597	3195
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	905	11	391	18	0	6	14	176	281	13	13	365
RTOR Reduction (vph)	0	0	208	0	1	0	12	0	2	0	0	0
Lane Group Flow (vph)	462	454	183	0	24	0	1	176	292	0	13	365
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Perm	Prot			Prot	
Protected Phases	4	4		3	3			1	6		5	2
Permitted Phases			4				3					
Actuated Green, G (s)	37.1	37.1	37.1		4.4		4.4	16.4	43.6		1.4	28.1
Effective Green, g (s)	37.1	37.1	37.1		4.4		4.4	16.4	43.6		1.4	28.1
Actuated g/C Ratio	0.37	0.37	0.37		0.04		0.04	0.16	0.44		0.01	0.28
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	563	565	522		65		58	262	1379		22	898
v/s Ratio Prot	c0.30	0.30			c0.02			c0.11	0.09		0.01	c0.11
v/s Ratio Perm			0.13				0.00					
v/c Ratio	0.82	0.80	0.35		0.37		0.01	0.67	0.21		0.59	0.41
Uniform Delay, d1	28.4	28.2	22.7		46.5		45.7	39.3	17.5		49.0	29.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.47	0.42		1.11	1.03
Incremental Delay, d2	8.9	7.7	0.1		1.3		0.0	6.3	0.3		22.4	1.2
Delay (s)	37.3	35.9	22.9		47.7		45.7	24.6	7.7		76.9	31.4
Level of Service	D	D	C		D		D	C	A		E	C
Approach Delay (s)		32.5			47.1				14.0			34.7
Approach LOS		C			D				B			C

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	76
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1389
Flt Permitted	1.00
Satd. Flow (perm)	1389
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	82
RTOR Reduction (vph)	59
Lane Group Flow (vph)	23
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	28.1
Effective Green, g (s)	28.1
Actuated g/C Ratio	0.28
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	390
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.06
Uniform Delay, d1	26.3
Progression Factor	1.62
Incremental Delay, d2	0.3
Delay (s)	42.8
Level of Service	D
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	9,480	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,495	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	10,278	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	8,979	pcph	11,750	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	1,299	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,713	pcphpl
Average passenger-car speed, S	63.6	mph
Volume-to-capacity ratio, v/c	0.73	
Density, D	26.9	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,264	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,175	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,960	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,792	pcphpl
Average passenger-car speed, S	62.8	mph
Volume-to-capacity ratio, v/c	0.76	
Density, D	28.5	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,892	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,814	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,472	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,868	pcphpl
Average passenger-car speed, S	61.9	mph
Volume-to-capacity ratio, v/c	0.79	
Density, D	30.2	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,826	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,796	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,401	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,850	pcphpl
Average passenger-car speed, S	62.1	mph
Volume-to-capacity ratio, v/c	0.79	
Density, D	29.8	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,646	246	1,618	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,749	65	426	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,206	263	1,754	0	pcph

Volume ratio, VR	0.219

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,017	lc/h
Weaving lane changes, LC_W	1,727	lc/h
Non-weaving vehicle index, I_{NW}	288	
Non-weaving lane change, LC_{NW}	630	lc/h
Total lane changes, LC_{ALL}	2,357	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.583	
Average weaving speed, S_W	34.4	mph
Average non-weaving speed, S_{NW}	41.6	mph
Weaving segment speed, S	39.8	mph
Weaving segment density, D	46.4	pcpmpl
Level of Service, LOS	E	
Weaving segment volume-to-capacity ratio, v/c	0.92	
Weaving segment flow rate, v	9,223	pcph
Weaving segment capacity, c_W	9,726	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	8,964	pcph	11,750	pcph	No
Exiting freeway volume	7,498	pcph	9,400	pcph	No
On-ramp volume	263	pcph	2,000	pcph	No
Off-ramp volume	1,729	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	4,728	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,004	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.92	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,176	650	716	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,625	171	188	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,696	694	776	0	pcph

Volume ratio, VR	0.180

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,471	lc/h
Weaving lane changes, LC_W	1,464	lc/h
Non-weaving vehicle index, I_{NW}	870	
Non-weaving lane change, LC_{NW}	961	lc/h
Total lane changes, LC_{ALL}	2,425	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	0.639	
Average weaving speed, S_W	45.5	mph
Average non-weaving speed, S_{NW}	44.6	mph
Weaving segment speed, S	44.8	mph
Weaving segment density, D	45.6	pcpmpl
Level of Service, LOS	E	
Weaving segment volume-to-capacity ratio, v/c	0.99	
Weaving segment flow rate, v	8,167	pcph
Weaving segment capacity, c_W	8,032	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,483	pcph	9,400	pcph	No
Exiting freeway volume	7,412	pcph	9,400	pcph	No
On-ramp volume	694	pcph	2,100	pcph	No
Off-ramp volume	765	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	4,334	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,068	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.99	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,384	690	443	148	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,680	181	116	39	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,921	737	480	158	pcph

Volume ratio, VR	0.147

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,216	lc/h
Weaving lane changes, LC_W	1,073	lc/h
Non-weaving vehicle index, I_{NW}	-113	
Non-weaving lane change, LC_{NW}	644	lc/h
Total lane changes, LC_{ALL}	1,718	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	46.3	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.02	
Weaving segment flow rate, v	8,295	pcph
Weaving segment capacity, c_W	7,917	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,414	pcph	9,400	pcph	No
Exiting freeway volume	7,678	pcph	9,400	pcph	No
On-ramp volume	894	pcph	2,100	pcph	No
Off-ramp volume	630	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	3,998	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,038	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.02	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,605	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,264	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,330	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	7,978	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	1,352	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,332	pcphpl
Average passenger-car speed, S	52.7	mph
Volume-to-capacity ratio, v/c	0.99	
Density, D	44.3	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,340	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,932	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,958	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,990	pcphpl
Average passenger-car speed, S	60.1	mph
Volume-to-capacity ratio, v/c	0.85	
Density, D	33.1	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,040	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,116	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,717	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	7,969	pcph	9,400	pcph	No
Exiting freeway volume		pcph		pcph	
On-ramp volume	748	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,179	pcphpl
Average passenger-car speed, S	56.4	mph
Volume-to-capacity ratio, v/c	0.93	
Density, D	38.6	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,704	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,291	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,437	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	9,215	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	222	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,359	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Existing
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,912	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,345	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,662	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,416	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.03	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	8,409	295	331	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,213	78	87	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	9,117	315	359	214	pcph

Volume ratio, VR	0.067

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	674	lc/h
Weaving lane changes, LC_W	542	lc/h
Non-weaving vehicle index, I_{NW}	616	
Non-weaving lane change, LC_{NW}	1,331	lc/h
Total lane changes, LC_{ALL}	1,873	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	0.889	
Average weaving speed, S_W	41.5	mph
Average non-weaving speed, S_{NW}	48.1	mph
Weaving segment speed, S	47.6	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.18	
Weaving segment flow rate, v	10,005	pcph
Weaving segment capacity, c_W	8,268	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,484	pcph	9,400	pcph	Yes
Exiting freeway volume	9,445	pcph	9,400	pcph	Yes
On-ramp volume	529	pcph	2,000	pcph	No
Off-ramp volume	567	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	3,226	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,128	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.18	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	8,052	684	860	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,119	180	226	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	8,730	731	932	267	pcph

Volume ratio, VR	0.156

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,663	lc/h
Weaving lane changes, LC_W	1,625	lc/h
Non-weaving vehicle index, I_{NW}	1,026	
Non-weaving lane change, LC_{NW}	1,392	lc/h
Total lane changes, LC_{ALL}	3,017	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	0.842	
Average weaving speed, S_W	42.1	mph
Average non-weaving speed, S_{NW}	40.2	mph
Weaving segment speed, S	40.5	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.28	
Weaving segment flow rate, v	10,660	pcph
Weaving segment capacity, c_W	8,083	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,677	pcph	9,400	pcph	Yes
Exiting freeway volume	9,489	pcph	9,400	pcph	Yes
On-ramp volume	998	pcph	4,000	pcph	No
Off-ramp volume	1,186	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	4,091	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,081	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.28	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Existing PM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	100	94	439	34	220	274
v/c Ratio	0.41	0.19	0.98	0.08	0.53	0.54
Control Delay	24.0	5.6	62.6	10.3	20.1	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	5.6	62.6	10.3	20.1	22.2
Queue Length 50th (ft)	29	0	156	3	44	79
Queue Length 95th (ft)	69	28	#319	21	121	145
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	243	503	450	451	417	507
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	0.41	0.19	0.98	0.08	0.53	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	49	93	121	314	34	26	176	16	9	223	40
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.99			0.98	
Flt Protected		0.98	1.00		0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1816	1583		1837	1583		1834			1823	
Flt Permitted		0.47	1.00		0.88	1.00		0.81			0.99	
Satd. Flow (perm)		885	1583		1635	1583		1501			1807	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	51	49	94	122	317	34	26	178	16	9	225	40
RTOR Reduction (vph)	0	0	68	0	0	16	0	4	0	0	10	0
Lane Group Flow (vph)	0	100	26	0	439	18	0	216	0	0	264	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		243	435		450	435		413			497	
v/s Ratio Prot												
v/s Ratio Perm		0.11	0.02		c0.27	0.01		c0.14			c0.15	
v/c Ratio		0.41	0.06		0.98	0.04		0.52			0.53	
Uniform Delay, d1		17.8	16.0		21.6	16.0		18.4			18.5	
Progression Factor		1.00	1.00		1.00	1.00		0.83			1.00	
Incremental Delay, d2		5.1	0.3		36.8	0.2		4.6			4.0	
Delay (s)		22.9	16.3		58.3	16.1		19.9			22.5	
Level of Service		C	B		E	B		B			C	
Approach Delay (s)		19.7			55.3			19.9			22.5	
Approach LOS		B			E			B			C	

Intersection Summary			
HCM Average Control Delay	34.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	116	289	409	451	420
v/c Ratio	0.34	0.56	0.74	0.59	0.54
Control Delay	19.9	20.7	28.3	19.0	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	20.7	28.3	19.0	17.9
Queue Length 50th (ft)	27	76	117	55	52
Queue Length 95th (ft)	68	#153	#254	m82	77
Internal Link Dist (ft)			385	131	284
Turn Bay Length (ft)					
Base Capacity (vph)	346	515	550	770	1096
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	0.34	0.56	0.74	0.59	0.38

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	106	292	342	1	146	265	0	0	332	50
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	0.95	0.95			0.95			0.95	
Frpb, ped/bikes			1.00	1.00	1.00			1.00			0.99	
Flpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	
Frt			0.86	1.00	1.00			1.00			0.98	
Flt Protected			1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)			1565	1633	1742			3480			3353	
Flt Permitted			1.00	0.95	1.00			0.98			1.00	
Satd. Flow (perm)			1565	1633	1742			3480			3353	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	116	321	376	1	160	291	0	0	365	55
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	27	0
Lane Group Flow (vph)	0	0	116	289	409	0	0	451	0	0	393	0
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					
Protected Phases			1	6	6		1	1			4	
Permitted Phases												
Actuated Green, G (s)			11.1	15.7	15.7			11.1			11.2	
Effective Green, g (s)			11.1	15.7	15.7			11.1			11.2	
Actuated g/C Ratio			0.22	0.31	0.31			0.22			0.22	
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	
Lane Grp Cap (vph)			347	513	547			773			751	
v/s Ratio Prot			0.07	0.18	c0.23			c0.13			c0.12	
v/s Ratio Perm												
v/c Ratio			0.33	0.56	0.75			0.58			0.52	
Uniform Delay, d1			16.3	14.3	15.4			17.4			17.1	
Progression Factor			1.00	1.00	1.00			0.90			1.00	
Incremental Delay, d2			0.8	4.4	9.0			1.3			0.7	
Delay (s)			17.1	18.7	24.4			16.9			17.7	
Level of Service			B	B	C			B			B	
Approach Delay (s)		17.1			22.1			16.9			17.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	163	399	32	257	123
v/c Ratio	0.30	0.76	0.06	0.25	0.12
Control Delay	16.4	32.7	7.9	12.8	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	32.7	7.9	12.8	8.7
Queue Length 50th (ft)	50	176	3	35	21
Queue Length 95th (ft)	77	223	17	165	59
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	836	822	832	1040	1051
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	0.19	0.49	0.04	0.25	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	95	30	112	255	29	16	164	57	5	85	24
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.97			1.00	0.85		0.97			0.97	
Flt Protected		0.99			0.98	1.00		1.00			1.00	
Satd. Flow (prot)		1797			1835	1583		1796			1806	
Flt Permitted		0.88			0.85	1.00		0.98			0.99	
Satd. Flow (perm)		1588			1584	1583		1773			1794	
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)	27	103	33	122	277	32	17	178	62	5	92	26
RTOR Reduction (vph)	0	16	0	0	0	15	0	10	0	0	8	0
Lane Group Flow (vph)	0	147	0	0	399	17	0	247	0	0	115	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		26.5			26.5	26.5		46.5			46.5	
Effective Green, g (s)		26.5			26.5	26.5		46.5			46.5	
Actuated g/C Ratio		0.33			0.33	0.33		0.58			0.58	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		526			525	524		1031			1043	
v/s Ratio Prot												
v/s Ratio Perm		0.09			c0.25	0.01		c0.14			0.06	
v/c Ratio		0.28			0.76	0.03		0.24			0.11	
Uniform Delay, d1		19.7			23.9	18.1		8.1			7.5	
Progression Factor		1.00			1.00	1.00		1.31			1.00	
Incremental Delay, d2		0.1			5.8	0.0		0.5			0.2	
Delay (s)		19.8			29.7	18.1		11.2			7.7	
Level of Service		B			C	B		B			A	
Approach Delay (s)		19.8			28.8			11.2			7.7	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
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			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	36	361	1745	15	83
v/c Ratio	0.30	0.08	0.46	0.13	0.47
Control Delay	51.0	1.0	1.7	45.6	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	1.0	1.7	45.6	18.9
Queue Length 50th (ft)	23	6	17	9	0
Queue Length 95th (ft)	m47	m12	87	29	45
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	155	4348	3806	143	200
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	0.23	0.08	0.46	0.10	0.41

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	35	347	1627	48	14	80
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4698		1719	1477
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4698		1719	1477
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	36	361	1695	50	15	83
RTOR Reduction (vph)	0	0	1	0	0	78
Lane Group Flow (vph)	36	361	1744	0	15	5
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	4.6	86.4	77.8		5.6	5.6
Effective Green, g (s)	4.6	86.4	77.8		5.6	5.6
Actuated g/C Ratio	0.05	0.86	0.78		0.06	0.06
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)	79	4268	3655		96	83
v/s Ratio Prot	c0.02	0.07	c0.37		c0.01	
v/s Ratio Perm						0.00
v/c Ratio	0.46	0.08	0.48		0.16	0.06
Uniform Delay, d1	46.5	1.0	3.9		45.0	44.7
Progression Factor	1.02	0.86	0.31		1.00	1.00
Incremental Delay, d2	1.5	0.0	0.4		0.3	0.1
Delay (s)	49.0	0.9	1.6		45.2	44.8
Level of Service	D	A	A		D	D
Approach Delay (s)		5.3	1.6		44.9	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	4.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	365	52	1342	351	256
v/c Ratio	0.14	0.39	0.44	0.77	0.43
Control Delay	10.8	49.2	10.1	44.4	5.3
Queue Delay	0.0	0.0	0.9	0.0	0.0
Total Delay	10.8	49.2	11.0	44.4	5.3
Queue Length 50th (ft)	34	30	89	205	0
Queue Length 95th (ft)	73	m46	332	270	50
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2628	149	3033	673	769
Starvation Cap Reductn	0	0	1282	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.14	0.35	0.77	0.52	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	307	54	51	1329	347	253
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		1.00	0.91	1.00	1.00
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.98
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		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4784		1719	4715	1641	1506
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4784		1719	4715	1641	1506
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	310	55	52	1342	351	256
RTOR Reduction (vph)	19	0	0	0	0	185
Lane Group Flow (vph)	346	0	52	1342	351	71
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	53.8		6.5	64.3	27.7	27.7
Effective Green, g (s)	53.8		6.5	64.3	27.7	27.7
Actuated g/C Ratio	0.54		0.06	0.64	0.28	0.28
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0		2.0	2.0	3.0	3.0
Lane Grp Cap (vph)	2574		112	3032	455	417
v/s Ratio Prot	0.07		0.03	c0.28	c0.21	
v/s Ratio Perm						0.05
v/c Ratio	0.13		0.46	0.44	0.77	0.17
Uniform Delay, d1	11.5		45.1	8.9	33.2	27.4
Progression Factor	0.89		0.96	0.98	1.00	1.00
Incremental Delay, d2	0.1		1.0	0.4	7.9	0.2
Delay (s)	10.3		44.3	9.1	41.1	27.6
Level of Service	B		D	A	D	C
Approach Delay (s)	10.3			10.4	35.4	
Approach LOS	B			B	D	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	111	451	363	1127	101	182	78	592
v/c Ratio	0.45	0.31	0.91	0.59	0.58	0.22	0.50	0.80
Control Delay	37.6	15.5	68.8	28.3	59.0	22.5	53.6	37.7
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	37.6	15.5	68.8	28.4	59.0	22.5	53.6	37.7
Queue Length 50th (ft)	63	30	234	229	66	29	48	150
Queue Length 95th (ft)	85	65	#491	281	m121	m58	92	195
Internal Link Dist (ft)		284		599		325		294
Turn Bay Length (ft)	170		195		210		200	
Base Capacity (vph)	268	1467	399	1921	177	848	241	1052
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	148	0	0	0	3
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.31	0.91	0.64	0.57	0.21	0.32	0.56

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	104	297	127	341	842	217	95	108	63	73	344	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		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	0.97		1.00	0.94		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)	1719	4665		1719	4598		1641	3229		1719	3254	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1719	4665		1719	4598		1641	3229		1719	3254	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	111	316	135	363	896	231	101	115	67	78	366	226
RTOR Reduction (vph)	0	78	0	0	42	0	0	51	0	0	108	0
Lane Group Flow (vph)	111	373	0	363	1085	0	101	131	0	78	484	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	13.2	29.0		23.2	39.2		11.4	23.5		7.9	19.4	
Effective Green, g (s)	13.2	29.0		23.2	39.2		11.4	23.5		7.9	19.4	
Actuated g/C Ratio	0.13	0.29		0.23	0.39		0.11	0.24		0.08	0.19	
Clearance Time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	227	1353		399	1802		187	759		136	631	
v/s Ratio Prot	c0.06	0.08		c0.21	c0.24		c0.06	0.04		0.05	c0.15	
v/s Ratio Perm												
v/c Ratio	0.49	0.28		0.91	0.60		0.54	0.17		0.57	0.77	
Uniform Delay, d1	40.3	27.4		37.4	24.2		41.8	30.5		44.4	38.2	
Progression Factor	0.80	0.74		1.02	1.12		1.07	1.14		1.00	1.00	
Incremental Delay, d2	0.6	0.5		23.6	1.5		1.7	0.0		3.6	5.0	
Delay (s)	33.0	20.7		61.8	28.7		46.4	34.7		48.0	43.2	
Level of Service	C	C		E	C		D	C		D	D	
Approach Delay (s)		23.1			36.8			38.9			43.7	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	36.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	321	379	39	377	270
v/c Ratio	0.54	0.72	0.07	0.43	0.29
Control Delay	20.1	28.7	7.5	14.2	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.1	28.7	7.5	14.2	18.7
Queue Length 50th (ft)	113	160	5	95	88
Queue Length 95th (ft)	143	198	18	216	172
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	868	777	861	887	946
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	0.37	0.49	0.05	0.43	0.29

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	185	64	96	245	35	54	174	112	18	186	39
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	
Frt		0.97			1.00	0.85		0.96			0.98	
Flt Protected		0.99			0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1795			1837	1583		1766			1816	
Flt Permitted		0.88			0.78	1.00		0.91			0.96	
Satd. Flow (perm)		1591			1446	1583		1628			1758	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	44	206	71	107	272	39	60	193	124	20	207	43
RTOR Reduction (vph)	0	18	0	0	0	14	0	16	0	0	6	0
Lane Group Flow (vph)	0	303	0	0	379	25	0	361	0	0	264	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		29.2			29.2	29.2		42.8			42.8	
Effective Green, g (s)		29.2			29.2	29.2		42.8			42.8	
Actuated g/C Ratio		0.36			0.36	0.36		0.53			0.53	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		581			528	578		871			941	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.26	0.02		c0.22			0.15	
v/c Ratio		0.52			0.72	0.04		0.41			0.28	
Uniform Delay, d1		19.9			21.9	16.4		11.1			10.2	
Progression Factor		1.00			1.00	1.00		1.00			1.48	
Incremental Delay, d2		1.1			5.0	0.0		1.5			0.7	
Delay (s)		21.0			26.8	16.4		12.6			15.8	
Level of Service		C			C	B		B			B	
Approach Delay (s)		21.0			25.8			12.6			15.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	19.2	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	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	262	66	372	55	164	175
v/c Ratio	0.29	0.08	0.39	0.06	0.28	0.31
Control Delay	8.8	2.4	6.7	1.8	12.3	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	2.4	6.7	1.8	12.3	14.4
Queue Length 50th (ft)	47	0	50	1	31	38
Queue Length 95th (ft)	86	14	76	m6	70	81
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	904	875	947	864	592	561
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	0.29	0.08	0.39	0.06	0.28	0.31

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	208	63	37	316	52	23	83	50	42	86	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	4.0		4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.97	
Flt Protected		0.99	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1848	1583		1853	1583		1769			1783	
Flt Permitted		0.91	1.00		0.95	1.00		0.95			0.90	
Satd. Flow (perm)		1695	1583		1774	1583		1691			1629	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	43	219	66	39	333	55	24	87	53	44	91	40
RTOR Reduction (vph)	0	0	31	0	0	20	0	29	0	0	18	0
Lane Group Flow (vph)	0	262	35	0	372	35	0	135	0	0	157	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		904	844		946	844		564			543	
v/s Ratio Prot												
v/s Ratio Perm		0.15	0.02		c0.21	0.02		0.08			c0.10	
v/c Ratio		0.29	0.04		0.39	0.04		0.24			0.29	
Uniform Delay, d1		7.7	6.7		8.3	6.7		14.5			14.8	
Progression Factor		1.00	1.00		0.65	0.50		1.00			1.00	
Incremental Delay, d2		0.8	0.1		1.1	0.1		1.0			1.3	
Delay (s)		8.5	6.8		6.4	3.4		15.5			16.1	
Level of Service		A	A		A	A		B			B	
Approach Delay (s)		8.2			6.1			15.5			16.1	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	246	76	375	52	220	351
v/c Ratio	0.36	0.10	0.50	0.07	0.30	0.48
Control Delay	10.3	2.3	15.2	6.0	11.4	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	2.3	15.2	6.0	11.4	14.1
Queue Length 50th (ft)	46	0	93	4	44	91
Queue Length 95th (ft)	79	7	161	20	86	m157
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	687	727	750	704	732	725
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	0.36	0.10	0.50	0.07	0.30	0.48

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	176	72	51	305	49	35	141	33	66	183	85
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.97	
Flt Protected		0.99	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1840	1583		1849	1583		1808			1781	
Flt Permitted		0.85	1.00		0.93	1.00		0.91			0.90	
Satd. Flow (perm)		1584	1583		1730	1583		1662			1626	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	61	185	76	54	321	52	37	148	35	69	193	89
RTOR Reduction (vph)	0	0	41	0	0	18	0	11	0	0	20	0
Lane Group Flow (vph)	0	246	35	0	375	34	0	209	0	0	331	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		686	686		750	686		720			705	
v/s Ratio Prot												
v/s Ratio Perm		0.16	0.02		c0.22	0.02		0.13			c0.20	
v/c Ratio		0.36	0.05		0.50	0.05		0.29			0.47	
Uniform Delay, d1		11.4	9.9		12.3	9.8		11.0			12.1	
Progression Factor		0.75	0.57		1.00	1.00		1.00			1.08	
Incremental Delay, d2		1.4	0.1		2.4	0.1		1.0			1.8	
Delay (s)		10.0	5.8		14.7	10.0		12.0			14.9	
Level of Service		B	A		B	A		B			B	
Approach Delay (s)		9.0			14.1			12.0			14.9	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	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

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	247	99	763	276	251	58	494	86	100	438	126
v/c Ratio	0.78	0.29	0.94	0.56	0.42	0.22	0.92	0.13	0.47	0.87	0.38
Control Delay	54.5	8.6	54.1	33.4	5.7	29.5	57.4	6.8	45.5	58.1	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0
Total Delay	54.5	8.6	54.1	33.4	5.7	29.5	57.4	6.8	45.5	63.4	12.3
Queue Length 50th (ft)	150	0	252	142	1	32	172	16	62	139	2
Queue Length 95th (ft)	222	39	#425	#269	52	m49	#261	15	m118	#228	m43
Internal Link Dist (ft)	585			161			328			103	
Turn Bay Length (ft)						150					
Base Capacity (vph)	412	412	810	495	591	270	540	650	222	531	340
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	4	0	0	0	0	0	0	0	53	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.24	0.94	0.56	0.42	0.21	0.91	0.13	0.45	0.92	0.37

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	58	92	710	257	233	54	459	80	103	397	117
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
Lane Util. Factor		1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.93	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1585	1300	2717	1660	1391	1577	3154	1384	1232	2950	1314
Flt Permitted		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1585	1300	2717	1660	1391	1577	3154	1384	1232	2950	1314
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	185	62	99	763	276	251	58	494	86	111	427	126
RTOR Reduction (vph)	0	0	79	0	0	176	0	0	0	0	0	104
Lane Group Flow (vph)	0	247	20	763	276	75	58	494	86	100	438	22
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm	Split		pt+ov	Split		Perm
Protected Phases	8	8		7	7		6	6	6 7	2	2	
Permitted Phases			8			7						2
Actuated Green, G (s)		20.0	20.0	29.8	29.8	29.8	17.1	17.1	46.9	17.1	17.1	17.1
Effective Green, g (s)		20.0	20.0	29.8	29.8	29.8	17.1	17.1	46.9	17.1	17.1	17.1
Actuated g/C Ratio		0.20	0.20	0.30	0.30	0.30	0.17	0.17	0.47	0.17	0.17	0.17
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0	2.5	2.5		2.0	2.0	2.0
Lane Grp Cap (vph)		317	260	810	495	415	270	539	649	211	504	225
v/s Ratio Prot		c0.16		c0.28	0.17		0.04	c0.16	0.06	0.08	c0.15	
v/s Ratio Perm			0.02			0.05						0.02
v/c Ratio		0.78	0.08	0.94	0.56	0.18	0.21	0.92	0.13	0.47	0.87	0.10
Uniform Delay, d1		37.9	32.5	34.3	29.6	26.0	35.7	40.7	15.0	37.4	40.4	34.9
Progression Factor		1.00	1.00	0.90	0.89	0.80	0.76	0.83	0.73	1.02	1.01	1.34
Incremental Delay, d2		11.0	0.1	18.9	1.4	0.2	0.3	19.8	0.1	7.1	17.3	0.8
Delay (s)		48.9	32.6	49.6	27.7	21.0	27.5	53.5	11.0	45.1	58.0	47.5
Level of Service		D	C	D	C	C	C	D	B	D	E	D
Approach Delay (s)		44.3			39.4			45.4			54.1	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	44.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	11	78	563	0	0
Sign Control	Yield		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)	0	12	85	612	0	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	391	348			697	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	391	348			697	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	586	648			895	

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	12	57	640
Volume Left	0	0	0
Volume Right	12	0	612
cSH	648	1700	1700
Volume to Capacity	0.02	0.03	0.38
Queue Length 95th (ft)	1	0	0
Control Delay (s)	10.7	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.7	0.0	
Approach LOS	B		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	229	368	244	220	297	355
v/c Ratio	0.44	1.56	0.63	0.55	0.21	0.91
Control Delay	20.6	296.7	30.7	27.5	1.2	52.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	296.7	30.7	27.5	1.2	52.3
Queue Length 50th (ft)	36	~240	90	81	0	141
Queue Length 95th (ft)	70	#396	165	146	14	#291
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	518	236	385	429	1472	416
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	0.44	1.56	0.63	0.51	0.20	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	124	36	342	179	48	20	184	276	44	210	76
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		0.99		1.00	0.99			1.00	1.00		0.99	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	0.97			1.00	0.85		0.97	
Flt Protected		0.99		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		2699		1413	1428			1480	2224		1411	
Flt Permitted		0.57		0.61	1.00			0.96	1.00		0.94	
Satd. Flow (perm)		1552		906	1428			1422	2224		1331	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	57	133	39	368	192	52	22	198	297	47	226	82
RTOR Reduction (vph)	0	23	0	0	13	0	0	0	135	0	15	0
Lane Group Flow (vph)	0	206	0	368	231	0	0	220	162	0	340	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		23.3		19.0	19.0			20.7	43.2		20.7	
Effective Green, g (s)		23.3		19.0	19.0			20.7	39.7		20.7	
Actuated g/C Ratio		0.32		0.26	0.26			0.28	0.54		0.28	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		495		236	372			403	1209		377	
v/s Ratio Prot					0.16				0.07			
v/s Ratio Perm		c0.13		c0.41				0.15			c0.26	
v/c Ratio		0.42		1.56	0.62			0.55	0.13		0.90	
Uniform Delay, d1		19.5		27.0	23.8			22.2	8.2		25.2	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		2.6		271.4	2.3			0.8	0.0		23.5	
Delay (s)		22.1		298.4	26.1			23.0	8.2		48.6	
Level of Service		C		F	C			C	A		D	
Approach Delay (s)		22.1			189.9			14.5			48.6	
Approach LOS		C			F			B			D	

Intersection Summary			
HCM Average Control Delay	85.2	HCM Level of Service	F
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	514	247	287	2	892	284
v/c Ratio	0.83	0.39	0.14	0.02	0.69	0.40
Control Delay	36.6	40.3	4.3	36.5	17.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	8.0	0.0
Total Delay	36.6	40.3	4.3	36.5	25.5	6.8
Queue Length 50th (ft)	109	78	11	1	256	46
Queue Length 95th (ft)	155	m115	m59	m2	m361	m93
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	972	632	2001	85	1301	706
Starvation Cap Reductn	0	0	0	0	369	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	0.39	0.14	0.02	0.96	0.40

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	302	197	240	278	2	865	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.94		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2585		2740	2825	1413	2825	1201
Flt Permitted	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2585		2740	2825	1413	2825	1201
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	311	203	247	287	2	892	284
RTOR Reduction (vph)	143	0	0	0	0	0	163
Lane Group Flow (vph)	371	0	247	287	2	892	121
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	18.6		26.2	67.6	1.2	42.6	42.6
Effective Green, g (s)	18.6		26.2	67.6	1.2	42.6	42.6
Actuated g/C Ratio	0.19		0.26	0.68	0.01	0.43	0.43
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	481		718	1910	17	1203	512
v/s Ratio Prot	c0.14		c0.09	0.10	0.00	c0.32	
v/s Ratio Perm							0.10
v/c Ratio	0.77		0.34	0.15	0.12	0.74	0.24
Uniform Delay, d1	38.7		29.9	5.8	48.9	24.1	18.3
Progression Factor	1.00		1.11	0.69	0.82	0.74	2.92
Incremental Delay, d2	6.8		0.1	0.1	0.6	2.1	0.5
Delay (s)	45.5		33.3	4.1	40.5	19.9	54.1
Level of Service	D		C	A	D	B	D
Approach Delay (s)	45.5			17.6		28.1	
Approach LOS	D			B		C	

Intersection Summary			
HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	101	207	241	381	597	470	94	265	184	1212	92
v/c Ratio	0.60	0.55	0.70	0.98	0.95dl	0.75	0.59	0.29	0.71	1.00	0.15
Control Delay	55.9	46.2	21.5	78.9	44.4	26.3	58.2	6.6	67.9	53.6	9.4
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	55.9	46.2	21.5	78.9	44.4	26.3	58.2	6.6	67.9	53.6	9.4
Queue Length 50th (ft)	68	69	29	~304	197	119	58	8	120	~256	5
Queue Length 95th (ft)	121	102	104	m#528	m#339	m#250	109	40	m178	#546	m30
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	237	535	409	387	822	630	193	925	481	1206	618
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	0.43	0.39	0.59	0.98	0.73	0.75	0.49	0.29	0.38	1.00	0.15

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	160	239	755	213	465	93	35	228	182	1200	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	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.91	0.91	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3150	1468	1416	3010	1568	1752	2675		1719	3312	1541
Flt Permitted	0.95	0.99	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3150	1468	1416	3010	1568	1752	2675		1719	3312	1541
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	146	162	241	763	215	470	94	35	230	184	1212	92
RTOR Reduction (vph)	0	0	169	0	0	202	0	163	0	0	0	58
Lane Group Flow (vph)	101	207	72	381	597	268	94	102	0	184	1212	34
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	12.0	12.0	12.0	27.3	27.3	27.3	7.9	29.2		14.4	35.7	35.7
Effective Green, g (s)	12.0	12.0	12.0	27.3	27.3	27.3	7.9	29.2		14.4	35.7	35.7
Actuated g/C Ratio	0.12	0.12	0.12	0.27	0.27	0.27	0.08	0.29		0.14	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	167	378	176	387	822	428	138	781		248	1182	550
v/s Ratio Prot	c0.07	0.07	0.05	c0.27	0.20	0.17	c0.05	0.04		0.11	c0.37	
v/s Ratio Perm												0.02
v/c Ratio	0.60	0.55	0.41	0.98	0.95dl	0.63	0.68	0.13		0.74	1.03	0.06
Uniform Delay, d1	41.8	41.4	40.7	36.1	33.0	31.9	44.8	26.1		41.0	32.1	21.1
Progression Factor	1.00	1.00	1.00	1.13	1.13	1.37	1.00	1.00		1.38	0.84	1.77
Incremental Delay, d2	4.2	0.9	0.6	34.5	2.3	2.1	10.5	0.0		16.3	31.4	0.2
Delay (s)	45.9	42.3	41.3	75.2	39.7	45.6	55.3	26.1		72.7	58.3	37.6
Level of Service	D	D	D	E	D	D	E	C		E	E	D
Approach Delay (s)		42.5			50.9			33.7			58.8	
Approach LOS		D			D			C			E	

Intersection Summary			
HCM Average Control Delay	51.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	79.8%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	42	281	259	126	431	602	225	8	244	433
v/c Ratio	0.34	0.83	0.54	0.55	0.79	0.56	0.21	0.03	0.72	0.87
Control Delay	44.5	49.4	14.0	53.1	46.4	22.3	12.3	25.9	45.4	34.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	49.4	14.0	53.1	46.4	22.3	12.3	25.9	45.4	34.2
Queue Length 50th (ft)	27	160	33	70	241	125	23	4	116	98
Queue Length 95th (ft)	56	249	91	#201	#492	154	43	m6	m171	m#180
Internal Link Dist (ft)		732			379		1000		765	
Turn Bay Length (ft)	140			70		300		90		
Base Capacity (vph)	181	423	543	230	547	1169	1166	342	387	529
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	0.23	0.66	0.48	0.55	0.79	0.51	0.19	0.02	0.63	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	121	409	123	418	4	590	148	73	8	239	424
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
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00		0.97	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	0.98	1.00	1.00		1.00	0.99		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	0.92	0.85	1.00	1.00		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1641	1569	1442	1556	1842		3335	3188		1583	1792	1486
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1641	1569	1442	1556	1842		3335	3188		1583	1792	1486
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)	42	123	417	126	427	4	602	151	74	8	244	433
RTOR Reduction (vph)	0	50	212	0	0	0	0	52	0	0	0	216
Lane Group Flow (vph)	42	231	47	126	431	0	602	173	0	8	244	217
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot			Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	5.0	18.3	18.3	16.4	29.7		30.4	30.4		18.9	18.9	18.9
Effective Green, g (s)	5.0	18.3	18.3	16.4	29.7		30.4	30.4		18.9	18.9	18.9
Actuated g/C Ratio	0.05	0.18	0.18	0.16	0.30		0.30	0.30		0.19	0.19	0.19
Clearance Time (s)	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
Lane Grp Cap (vph)	82	287	264	255	547		1014	969		299	339	281
v/s Ratio Prot	0.03	c0.15		0.08	c0.23		c0.18	0.05		0.01	0.14	
v/s Ratio Perm			0.03									c0.15
v/c Ratio	0.51	0.81	0.18	0.49	0.79		0.59	0.18		0.03	0.72	0.77
Uniform Delay, d1	46.3	39.1	34.5	38.0	32.3		29.6	25.6		33.1	38.1	38.5
Progression Factor	0.85	0.99	2.27	1.00	1.00		0.68	0.67		0.85	0.96	1.37
Incremental Delay, d2	2.1	13.7	0.1	0.6	6.8		2.3	0.4		0.0	4.5	8.6
Delay (s)	41.6	52.3	78.5	38.6	39.1		22.5	17.4		28.1	41.1	61.2
Level of Service	D	D	E	D	D		C	B		C	D	E
Approach Delay (s)		63.2			39.0			21.1			53.7	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM Average Control Delay	42.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	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

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	321	322	169	28	11	300	491	38	633	138
v/c Ratio	0.81	0.81	0.34	0.29	0.11	0.58	0.29	0.34	0.82	0.34
Control Delay	49.7	49.6	5.8	50.6	24.1	22.1	11.3	43.5	48.4	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	49.6	5.8	50.6	24.1	22.1	11.3	43.5	48.4	21.0
Queue Length 50th (ft)	200	201	0	17	0	97	58	24	162	14
Queue Length 95th (ft)	272	273	43	46	18	156	190	m42	#431	m84
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	526	528	598	378	361	517	1681	133	771	408
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	0.61	0.61	0.28	0.07	0.03	0.58	0.29	0.29	0.82	0.34

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	591	13	159	17	0	8	11	282	435	26	36	595
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.99		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	1.00
Frt	1.00	1.00	0.85		0.95		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1524	1404		1453		1358	1597	3153		1597	3195
Flt Permitted	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1524	1404		1453		1358	1597	3153		1597	3195
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	629	14	169	18	0	9	12	300	463	28	38	633
RTOR Reduction (vph)	0	0	125	0	1	0	10	0	2	0	0	0
Lane Group Flow (vph)	321	322	44	0	27	0	1	300	489	0	38	633
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Prot	Prot			Prot	
Protected Phases	4	4		3	3		3	1	6		5	2
Permitted Phases			4									
Actuated Green, G (s)	26.2	26.2	26.2		4.6		4.6	32.3	50.8		4.9	22.9
Effective Green, g (s)	26.2	26.2	26.2		4.6		4.6	32.3	50.8		4.9	22.9
Actuated g/C Ratio	0.26	0.26	0.26		0.05		0.05	0.32	0.51		0.05	0.23
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	397	399	368		67		62	516	1602		78	732
v/s Ratio Prot	c0.21	0.21			c0.02		0.00	c0.19	0.15		0.02	c0.20
v/s Ratio Perm			0.03									
v/c Ratio	0.81	0.81	0.12		0.40		0.01	0.58	0.30		0.49	0.86
Uniform Delay, d1	34.6	34.5	28.1		46.4		45.5	28.2	14.3		46.3	37.1
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.58	0.64		0.84	1.04
Incremental Delay, d2	10.9	10.7	0.1		1.4		0.0	1.6	0.5		1.5	11.1
Delay (s)	45.4	45.3	28.2		47.8		45.5	18.1	9.6		40.2	49.7
Level of Service	D	D	C		D		D	B	A		D	D
Approach Delay (s)		41.8			47.2				12.8			48.6
Approach LOS		D			D				B			D

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	130
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1387
Flt Permitted	1.00
Satd. Flow (perm)	1387
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	138
RTOR Reduction (vph)	78
Lane Group Flow (vph)	60
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	22.9
Effective Green, g (s)	22.9
Actuated g/C Ratio	0.23
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	318
v/s Ratio Prot	
v/s Ratio Perm	0.04
v/c Ratio	0.19
Uniform Delay, d1	31.1
Progression Factor	1.43
Incremental Delay, d2	1.1
Delay (s)	45.5
Level of Service	D
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,281	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,916	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,894	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	7,079	pcph	11,750	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	815	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,316	pcphpl
Average passenger-car speed, S	65.0	mph
Volume-to-capacity ratio, v/c	0.56	
Density, D	20.2	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,518	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,715	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,067	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,413	pcphpl
Average passenger-car speed, S	65.0	mph
Volume-to-capacity ratio, v/c	0.60	
Density, D	21.7	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,387	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,681	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	6,925	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,731	pcphpl
Average passenger-car speed, S	63.4	mph
Volume-to-capacity ratio, v/c	0.74	
Density, D	27.3	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,735	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,772	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,302	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,826	pcphpl
Average passenger-car speed, S	62.4	mph
Volume-to-capacity ratio, v/c	0.78	
Density, D	29.2	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	5,982	405	536	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,574	107	141	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,486	433	581	0	pcph

Volume ratio, VR	0.135	

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,014	lc/h
Weaving lane changes, LC_W	724	lc/h
Non-weaving vehicle index, I_{NW}	259	
Non-weaving lane change, LC_{NW}	481	lc/h
Total lane changes, LC_{ALL}	1,206	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	0.933	
Average weaving speed, S_W	40.9	mph
Average non-weaving speed, S_{NW}	50.5	mph
Weaving segment speed, S	48.9	mph
Weaving segment density, D	30.6	pcpmpl
Level of Service, LOS	D	
Weaving segment volume-to-capacity ratio, v/c	0.73	
Weaving segment flow rate, v	7,500	pcph
Weaving segment capacity, c_W	10,040	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,073	pcph	11,750	pcph	No
Exiting freeway volume	6,933	pcph	9,400	pcph	No
On-ramp volume	433	pcph	2,000	pcph	No
Off-ramp volume	573	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	3,884	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,068	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.73	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	5,893	842	494	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,551	222	130	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,389	900	536	0	pcph

Volume ratio, VR	0.183

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,435	lc/h
Weaving lane changes, LC_W	1,428	lc/h
Non-weaving vehicle index, I_{NW}	831	
Non-weaving lane change, LC_{NW}	898	lc/h
Total lane changes, LC_{ALL}	2,327	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	0.618	
Average weaving speed, S_W	45.9	mph
Average non-weaving speed, S_{NW}	45.3	mph
Weaving segment speed, S	45.4	mph
Weaving segment density, D	43.1	pcpmpl
Level of Service, LOS	E	
Weaving segment volume-to-capacity ratio, v/c	0.95	
Weaving segment flow rate, v	7,824	pcph
Weaving segment capacity, c_W	8,022	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	6,938	pcph	9,400	pcph	No
Exiting freeway volume	7,310	pcph	9,400	pcph	No
On-ramp volume	900	pcph	2,100	pcph	No
Off-ramp volume	528	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	4,367	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,066	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.95	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	5,948	1,018	788	263	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,565	268	207	69	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,448	1,087	854	280	pcph

Volume ratio, VR	0.224

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,941	lc/h
Weaving lane changes, LC_W	1,798	lc/h
Non-weaving vehicle index, I_{NW}	-108	
Non-weaving lane change, LC_{NW}	572	lc/h
Total lane changes, LC_{ALL}	2,370	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	40.6	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.10	
Weaving segment flow rate, v	8,670	pcph
Weaving segment capacity, c_W	7,685	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,322	pcph	9,400	pcph	No
Exiting freeway volume	7,568	pcph	9,400	pcph	No
On-ramp volume	1,368	pcph	2,100	pcph	No
Off-ramp volume	1,122	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	4,782	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,978	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.10	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,494	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,709	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,041	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	6,876	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	165	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,760	pcphpl
Average passenger-car speed, S	63.2	mph
Volume-to-capacity ratio, v/c	0.75	
Density, D	27.9	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,340	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,668	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	6,874	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,718	pcphpl
Average passenger-car speed, S	63.6	mph
Volume-to-capacity ratio, v/c	0.73	
Density, D	27.0	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,960	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,832	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,546	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	6,884	pcph	9,400	pcph	No
Exiting freeway volume		pcph		pcph	
On-ramp volume	662	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,887	pcphpl
Average passenger-car speed, S	61.6	mph
Volume-to-capacity ratio, v/c	0.80	
Density, D	30.6	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,312	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,187	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,012	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	8,564	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	448	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,253	pcphpl
Average passenger-car speed, S	54.7	mph
Volume-to-capacity ratio, v/c	0.96	
Density, D	41.2	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Existing
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,731	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,298	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,466	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,367	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.01	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,249	1,063	331	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,908	280	87	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,859	1,136	359	214	pcph

Volume ratio, VR	0.156

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,495	lc/h
Weaving lane changes, LC_W	1,363	lc/h
Non-weaving vehicle index, I_{NW}	533	
Non-weaving lane change, LC_{NW}	1,072	lc/h
Total lane changes, LC_{ALL}	2,435	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.094	
Average weaving speed, S_W	38.9	mph
Average non-weaving speed, S_{NW}	42.8	mph
Weaving segment speed, S	42.1	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.16	
Weaving segment flow rate, v	9,568	pcph
Weaving segment capacity, c_W	8,011	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	8,238	pcph	9,400	pcph	No
Exiting freeway volume	9,020	pcph	9,400	pcph	No
On-ramp volume	1,349	pcph	2,000	pcph	No
Off-ramp volume	567	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	4,093	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,062	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.16	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,251	1,483	1,480	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,908	390	389	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,862	1,584	1,605	267	pcph

Volume ratio, VR	0.282	

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	3,189	lc/h
Weaving lane changes, LC_W	3,151	lc/h
Non-weaving vehicle index, I_{NW}	927	
Non-weaving lane change, LC_{NW}	1,213	lc/h
Total lane changes, LC_{ALL}	4,364	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.126	
Average weaving speed, S_W	38.5	mph
Average non-weaving speed, S_{NW}	28.5	mph
Weaving segment speed, S	30.7	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.43	
Weaving segment flow rate, v	11,318	pcph
Weaving segment capacity, c_W	7,697	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,494	pcph	9,400	pcph	Yes
Exiting freeway volume	9,497	pcph	9,400	pcph	Yes
On-ramp volume	1,852	pcph	4,000	pcph	No
Off-ramp volume	1,848	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	5,389	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,981	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.43	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Existing With Project AM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	146	80	305	13	188	228
v/c Ratio	0.35	0.16	0.73	0.03	0.48	0.45
Control Delay	20.4	5.8	32.2	9.8	20.3	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	5.8	32.2	9.8	20.3	20.2
Queue Length 50th (ft)	42	0	99	0	45	63
Queue Length 95th (ft)	86	26	#206	11	m105	119
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	416	493	420	444	391	506
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	0.35	0.16	0.73	0.03	0.48	0.45

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	96	75	112	175	12	28	118	30	8	173	33
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.98	
Flt Protected		0.99	1.00		0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1835	1583		1827	1583		1806			1821	
Flt Permitted		0.81	1.00		0.82	1.00		0.76			0.99	
Satd. Flow (perm)		1513	1583		1526	1583		1378			1803	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	102	80	119	186	13	30	126	32	9	184	35
RTOR Reduction (vph)	0	0	58	0	0	9	0	12	0	0	11	0
Lane Group Flow (vph)	0	146	22	0	305	4	0	176	0	0	217	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		416	435		420	435		379			496	
v/s Ratio Prot												
v/s Ratio Perm		0.10	0.01		c0.20	0.00		c0.13			c0.12	
v/c Ratio		0.35	0.05		0.73	0.01		0.46			0.44	
Uniform Delay, d1		17.5	16.0		19.7	15.8		18.1			17.9	
Progression Factor		1.00	1.00		1.00	1.00		0.94			1.00	
Incremental Delay, d2		2.3	0.2		10.5	0.0		4.0			2.8	
Delay (s)		19.8	16.2		30.2	15.9		20.9			20.7	
Level of Service		B	B		C	B		C			C	
Approach Delay (s)		18.5			29.6			20.9			20.7	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	158	395	407	263	514
v/c Ratio	0.66	0.46	0.46	0.49	0.74
Control Delay	52.7	18.9	18.8	32.1	42.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	52.7	18.9	18.8	32.1	42.9
Queue Length 50th (ft)	95	161	165	74	158
Queue Length 95th (ft)	162	281	287	m95	202
Internal Link Dist (ft)			385	131	284
Turn Bay Length (ft)					
Base Capacity (vph)	265	884	912	588	778
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	0.45	0.45	0.45	0.66

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	144	571	158	1	121	118	0	0	409	59
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	0.95	0.95			0.95			0.95	
Frpb, ped/bikes			1.00	1.00	1.00			1.00			0.99	
Flpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	
Frt			0.86	1.00	1.00			1.00			0.98	
Flt Protected			1.00	0.95	0.97			0.98			1.00	
Satd. Flow (prot)			1565	1633	1685			3470			3349	
Flt Permitted			1.00	0.95	0.97			0.98			1.00	
Satd. Flow (perm)			1565	1633	1685			3470			3349	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	158	627	174	1	133	130	0	0	449	65
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	158	395	407	0	0	263	0	0	502	0
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					
Protected Phases			1	6	6		1	1			4	
Permitted Phases												
Actuated Green, G (s)			15.4	52.3	52.3			15.4			20.3	
Effective Green, g (s)			15.4	52.3	52.3			15.4			20.3	
Actuated g/C Ratio			0.15	0.52	0.52			0.15			0.20	
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	
Lane Grp Cap (vph)			241	854	881			534			680	
v/s Ratio Prot			c0.10	c0.24	0.24			0.08			c0.15	
v/s Ratio Perm												
v/c Ratio			0.66	0.46	0.46			0.49			0.74	
Uniform Delay, d1			39.8	15.0	15.0			38.7			37.4	
Progression Factor			1.00	1.00	1.00			0.81			1.00	
Incremental Delay, d2			6.9	1.8	1.7			0.3			4.2	
Delay (s)			46.7	16.8	16.7			31.8			41.6	
Level of Service			D	B	B			C			D	
Approach Delay (s)		46.7			16.8			31.8			41.6	
Approach LOS		D			B			C			D	

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	232	160	16	179	117
v/c Ratio	0.67	0.87	0.05	0.15	0.09
Control Delay	30.7	67.5	10.4	1.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	67.5	10.4	1.9	3.6
Queue Length 50th (ft)	77	68	0	7	10
Queue Length 95th (ft)	120	112	12	m24	30
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	900	511	811	1228	1287
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	0.26	0.31	0.02	0.15	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	128	55	68	70	14	25	66	63	9	73	19
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.96			1.00	0.85		0.94			0.97	
Flt Protected		1.00			0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1786			1818	1583		1746			1808	
Flt Permitted		0.97			0.54	1.00		0.96			0.98	
Satd. Flow (perm)		1737			1007	1583		1684			1783	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	19	149	64	79	81	16	29	77	73	10	85	22
RTOR Reduction (vph)	0	33	0	0	0	13	0	16	0	0	6	0
Lane Group Flow (vph)	0	199	0	0	160	3	0	163	0	0	111	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		12.7			12.7	12.7		50.3			50.3	
Effective Green, g (s)		12.7			12.7	12.7		50.3			50.3	
Actuated g/C Ratio		0.18			0.18	0.18		0.72			0.72	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		315			183	287		1210			1281	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.16	0.00		c0.10			0.06	
v/c Ratio		0.63			0.87	0.01		0.13			0.09	
Uniform Delay, d1		26.5			27.9	23.5		3.1			3.0	
Progression Factor		1.00			1.00	1.00		0.59			1.00	
Incremental Delay, d2		3.0			33.1	0.0		0.2			0.1	
Delay (s)		29.5			60.9	23.5		2.0			3.1	
Level of Service		C			E	C		A			A	
Approach Delay (s)		29.5			57.5			2.0			3.1	
Approach LOS		C			E			A			A	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	40	1034	739	69	21
v/c Ratio	0.32	0.24	0.20	0.46	0.14
Control Delay	47.7	2.5	5.1	52.9	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	47.7	2.5	5.1	52.9	18.4
Queue Length 50th (ft)	23	45	28	43	0
Queue Length 95th (ft)	m30	m53	101	84	22
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	223	4255	3696	309	288
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	0.18	0.24	0.20	0.22	0.07

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	38	993	673	36	66	20
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4684		1719	1488
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4684		1719	1488
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	40	1034	701	38	69	21
RTOR Reduction (vph)	0	0	2	0	0	19
Lane Group Flow (vph)	40	1034	737	0	69	2
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	4.8	84.5	75.7		7.5	7.5
Effective Green, g (s)	4.8	84.5	75.7		7.5	7.5
Actuated g/C Ratio	0.05	0.84	0.76		0.08	0.08
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)	83	4174	3546		129	112
v/s Ratio Prot	c0.02	c0.21	0.16		c0.04	
v/s Ratio Perm						0.00
v/c Ratio	0.48	0.25	0.21		0.53	0.01
Uniform Delay, d1	46.4	1.5	3.5		44.6	42.8
Progression Factor	0.99	1.43	1.24		1.00	1.00
Incremental Delay, d2	1.0	0.1	0.1		2.1	0.0
Delay (s)	47.0	2.3	4.5		46.7	42.8
Level of Service	D	A	A		D	D
Approach Delay (s)		3.9	4.5		45.8	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1070	16	367	349	799
v/c Ratio	0.63	0.15	0.20	0.40	0.86
Control Delay	20.0	26.5	17.1	17.0	26.6
Queue Delay	0.0	0.0	0.0	0.0	0.1
Total Delay	20.0	26.5	17.1	17.0	26.7
Queue Length 50th (ft)	140	6	40	122	294
Queue Length 95th (ft)	174	19	50	234	#658
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2397	138	2923	876	924
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	40	0	0	0	2
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.45	0.12	0.13	0.40	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	770	289	16	363	346	791
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		1.00	0.91	1.00	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4651		1719	4715	1641	1506
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4651		1719	4715	1641	1506
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	778	292	16	367	349	799
RTOR Reduction (vph)	92	0	0	0	0	120
Lane Group Flow (vph)	978	0	16	367	349	679
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	32.0		2.6	38.6	53.4	53.4
Effective Green, g (s)	32.0		2.6	38.6	53.4	53.4
Actuated g/C Ratio	0.32		0.03	0.39	0.53	0.53
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)	1488		45	1820	876	804
v/s Ratio Prot	c0.21		c0.01	0.08	0.21	
v/s Ratio Perm						c0.45
v/c Ratio	0.66		0.36	0.20	0.40	0.84
Uniform Delay, d1	29.3		47.9	20.4	13.8	19.8
Progression Factor	0.77		0.53	0.86	1.00	1.00
Incremental Delay, d2	2.2		1.7	0.2	0.1	7.8
Delay (s)	24.8		27.1	17.8	13.9	27.6
Level of Service	C		C	B	B	C
Approach Delay (s)	24.8			18.2	23.4	
Approach LOS	C			B	C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	168	1277	122	337	84	667	283	172
v/c Ratio	0.28	0.74	0.77	0.62	0.21	0.87	0.87	0.32
Control Delay	20.9	24.2	71.0	31.5	38.7	28.8	68.0	30.0
Queue Delay	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	25.0	71.0	31.5	38.7	28.8	68.0	30.0
Queue Length 50th (ft)	60	249	79	58	48	134	179	37
Queue Length 95th (ft)	m96	228	#168	83	m56	m142	#362	69
Internal Link Dist (ft)		284		599		325		294
Turn Bay Length (ft)	170		195		210		200	
Base Capacity (vph)	597	1737	168	1647	400	874	325	1075
Starvation Cap Reductn	0	197	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.83	0.73	0.20	0.21	0.76	0.87	0.16

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	1111	115	117	243	81	81	294	347	272	110	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, 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		1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	0.92		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)	1719	4854		1719	4571		1586	3012		1662	3176	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1719	4854		1719	4571		1586	3012		1662	3176	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	168	1157	120	122	253	84	84	306	361	283	115	57
RTOR Reduction (vph)	0	12	0	0	76	0	0	190	0	0	48	0
Lane Group Flow (vph)	168	1265	0	122	261	0	84	477	0	283	124	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	34.7	34.7		9.3	9.5		23.6	19.3		20.3	15.4	
Effective Green, g (s)	34.7	34.7		9.3	9.5		23.6	19.3		20.3	15.4	
Actuated g/C Ratio	0.35	0.35		0.09	0.10		0.24	0.19		0.20	0.15	
Clearance Time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	596	1684		160	434		374	581		337	489	
v/s Ratio Prot	0.10	c0.26		c0.07	0.06		c0.05	c0.16		c0.17	0.04	
v/s Ratio Perm												
v/c Ratio	0.28	0.75		0.76	0.60		0.22	0.82		0.84	0.25	
Uniform Delay, d1	23.6	28.8		44.3	43.4		30.8	38.7		38.3	37.2	
Progression Factor	0.81	0.78		0.92	0.83		1.39	1.11		1.00	1.00	
Incremental Delay, d2	0.1	2.4		17.3	6.0		0.0	0.9		15.9	0.1	
Delay (s)	19.1	24.9		57.9	42.0		42.7	43.9		54.2	37.3	
Level of Service	B	C		E	D		D	D		D	D	
Approach Delay (s)		24.3			46.2			43.8			47.8	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	35.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.2
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	655	359	42	252	201
v/c Ratio	0.82	0.52	0.05	0.35	0.28
Control Delay	25.0	15.3	5.0	14.9	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	15.3	5.0	14.9	19.7
Queue Length 50th (ft)	207	93	3	65	77
Queue Length 95th (ft)	278	136	14	105	95
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	860	744	827	725	710
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	0.76	0.48	0.05	0.35	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	415	44	66	225	34	20	123	61	23	108	32
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	
Frt		0.99			1.00	0.85		0.96			0.97	
Flt Protected		0.99			0.99	1.00		1.00			0.99	
Satd. Flow (prot)		1830			1842	1583		1779			1800	
Flt Permitted		0.90			0.78	1.00		0.96			0.94	
Satd. Flow (perm)		1661			1447	1583		1723			1708	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	89	512	54	81	278	42	25	152	75	28	133	40
RTOR Reduction (vph)	0	5	0	0	0	14	0	21	0	0	12	0
Lane Group Flow (vph)	0	650	0	0	359	28	0	231	0	0	189	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		33.4			33.4	33.4		28.6			28.6	
Effective Green, g (s)		33.4			33.4	33.4		28.6			28.6	
Actuated g/C Ratio		0.48			0.48	0.48		0.41			0.41	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		793			690	755		704			698	
v/s Ratio Prot												
v/s Ratio Perm		c0.39			0.25	0.02		c0.13			0.11	
v/c Ratio		0.82			0.52	0.04		0.33			0.27	
Uniform Delay, d1		15.7			12.7	9.7		14.1			13.8	
Progression Factor		1.00			1.00	1.00		1.00			1.36	
Incremental Delay, d2		7.0			0.9	0.0		1.2			0.9	
Delay (s)		22.7			13.7	9.8		15.4			19.6	
Level of Service		C			B	A		B			B	
Approach Delay (s)		22.7			13.2			15.4			19.6	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	563	55	252	32	119	105
v/c Ratio	0.58	0.06	0.27	0.04	0.22	0.18
Control Delay	12.4	4.5	6.0	1.9	14.3	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.4	4.5	6.0	1.9	14.3	10.5
Queue Length 50th (ft)	125	4	29	0	27	16
Queue Length 95th (ft)	207	17	57	m2	60	45
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	978	857	936	859	540	578
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	0.58	0.06	0.27	0.04	0.22	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	508	52	22	215	30	45	54	13	22	39	39
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.95	
Flt Protected		1.00	1.00		1.00	1.00		0.98			0.99	
Satd. Flow (prot)		1859	1583		1854	1583		1797			1745	
Flt Permitted		0.98	1.00		0.94	1.00		0.87			0.94	
Satd. Flow (perm)		1834	1583		1754	1583		1596			1654	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	540	55	23	229	32	48	57	14	23	41	41
RTOR Reduction (vph)	0	0	13	0	0	15	0	8	0	0	27	0
Lane Group Flow (vph)	0	563	42	0	252	17	0	111	0	0	78	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		978	844		935	844		532			551	
v/s Ratio Prot												
v/s Ratio Perm		c0.31	0.03		0.14	0.01		c0.07			0.05	
v/c Ratio		0.58	0.05		0.27	0.02		0.21			0.14	
Uniform Delay, d1		9.4	6.7		7.6	6.6		14.3			14.0	
Progression Factor		1.00	1.00		0.68	0.63		1.00			1.00	
Incremental Delay, d2		2.5	0.1		0.6	0.0		0.9			0.5	
Delay (s)		11.9	6.8		5.8	4.2		15.2			14.5	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		11.4			5.6			15.2			14.5	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.7	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	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	697	44	274	28	113	312
v/c Ratio	0.89	0.06	0.57	0.04	0.15	0.43
Control Delay	27.6	8.2	18.7	5.3	8.3	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	8.2	18.7	5.3	8.3	13.5
Queue Length 50th (ft)	116	2	71	1	16	77
Queue Length 95th (ft)	#400	m15	141	13	41	m147
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	786	694	479	700	752	730
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	0.89	0.06	0.57	0.04	0.15	0.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	614	41	41	214	26	15	59	32	69	173	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	4.0		4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.98	
Flt Protected		1.00	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1858	1583		1848	1583		1775			1799	
Flt Permitted		0.97	1.00		0.59	1.00		0.95			0.91	
Satd. Flow (perm)		1814	1583		1105	1583		1692			1657	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	37	660	44	44	230	28	16	63	34	74	186	52
RTOR Reduction (vph)	0	0	9	0	0	14	0	19	0	0	12	0
Lane Group Flow (vph)	0	697	36	0	274	14	0	94	0	0	300	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		786	686		479	686		733			718	
v/s Ratio Prot												
v/s Ratio Perm		c0.38	0.02		0.25	0.01		0.06			c0.18	
v/c Ratio		0.89	0.05		0.57	0.02		0.13			0.42	
Uniform Delay, d1		15.6	9.9		12.8	9.7		10.2			11.8	
Progression Factor		0.76	1.06		1.00	1.00		1.00			1.04	
Incremental Delay, d2		13.1	0.1		4.9	0.1		0.4			1.6	
Delay (s)		24.9	10.6		17.7	9.8		10.6			13.8	
Level of Service		C	B		B	A		B			B	
Approach Delay (s)		24.1			17.0			10.6			13.8	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	19.4	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	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	664	212	208	152	107	703	323	664	145
v/c Ratio	1.50	0.44	0.66	0.80	0.42	0.87	1.03	0.93	0.33
Control Delay	266.2	10.6	29.2	49.7	9.4	55.9	95.4	58.0	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	266.2	10.6	29.2	49.7	9.4	55.9	95.4	58.0	10.8
Queue Length 50th (ft)	~597	19	40	57	4	172	~251	241	11
Queue Length 95th (ft)	#813	81	62	#187	46	#228	#449	#361	m64
Internal Link Dist (ft)	585			161		328		103	
Turn Bay Length (ft)									
Base Capacity (vph)	443	484	326	199	260	827	314	712	444
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	1.50	0.44	0.64	0.76	0.41	0.85	1.03	0.93	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	300	344	206	202	147	104	0	468	214	513	444	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)		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	0.97	1.00	1.00		0.91		0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.93	1.00	1.00	0.98		1.00		1.00	1.00	0.95
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85		0.95		1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	1.00	1.00		1.00		0.95	0.98	1.00
Satd. Flow (prot)		1607	1302	2717	1660	1386		4132		1232	2795	1315
Flt Permitted		0.98	1.00	0.95	1.00	1.00		1.00		0.95	0.98	1.00
Satd. Flow (perm)		1607	1302	2717	1660	1386		4132		1232	2795	1315
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	309	355	212	208	152	107	0	482	221	529	458	145
RTOR Reduction (vph)	0	0	125	0	0	95	0	0	0	0	0	108
Lane Group Flow (vph)	0	664	87	208	152	12	0	703	0	323	664	37
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm				Split		Perm
Protected Phases	8	8		7	7			6		2	2	
Permitted Phases			8			7						2
Actuated Green, G (s)		27.5	27.5	11.5	11.5	11.5		19.5		25.5	25.5	25.5
Effective Green, g (s)		27.5	27.5	11.5	11.5	11.5		19.5		25.5	25.5	25.5
Actuated g/C Ratio		0.28	0.28	0.12	0.12	0.12		0.20		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
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0		2.5		2.0	2.0	2.0
Lane Grp Cap (vph)		442	358	312	191	159		806		314	713	335
v/s Ratio Prot		c0.41		0.08	c0.09			c0.17		c0.26	0.24	
v/s Ratio Perm			0.07			0.01						0.03
v/c Ratio		1.50	0.24	0.67	0.80	0.08		0.87		1.03	0.93	0.11
Uniform Delay, d1		36.2	28.2	42.4	43.1	39.5		39.0		37.2	36.4	28.6
Progression Factor		1.00	1.00	0.44	0.45	0.51		1.12		1.04	1.04	1.67
Incremental Delay, d2		237.6	0.3	5.3	19.9	0.2		9.5		55.6	19.0	0.6
Delay (s)		273.9	28.4	23.8	39.2	20.3		53.2		94.2	56.8	48.2
Level of Service		F	C	C	D	C		D		F	E	D
Approach Delay (s)		214.5			28.0			53.2			66.4	
Approach LOS		F			C			D			E	

Intersection Summary			
HCM Average Control Delay	98.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	14	576	1496	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	15	613	1591	0	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	1409	1102			2204	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1409	1102			2204	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	130	206			235	

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	15	409	1796
Volume Left	0	0	0
Volume Right	15	0	1591
cSH	206	1700	1700
Volume to Capacity	0.07	0.24	1.06
Queue Length 95th (ft)	6	0	0
Control Delay (s)	23.8	0.0	0.0
Lane LOS	C		
Approach Delay (s)	23.8	0.0	
Approach LOS	C		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	419	234	116	144	320	304
v/c Ratio	0.62	1.19	0.30	0.37	0.23	0.82
Control Delay	24.1	155.8	22.0	23.8	1.2	43.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	155.8	22.0	23.8	1.2	43.6
Queue Length 50th (ft)	78	~130	37	50	0	119
Queue Length 95th (ft)	129	#261	79	96	14	#234
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	671	196	385	444	1481	420
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	0.62	1.19	0.30	0.32	0.22	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	295	76	218	91	17	5	129	298	41	215	27
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		0.99		1.00	0.99			1.00	1.00		0.99	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	0.98			1.00	0.85		0.99	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		2713		1413	1444			1484	2224		1449	
Flt Permitted		0.70		0.51	1.00			0.99	1.00		0.94	
Satd. Flow (perm)		1901		754	1444			1472	2224		1377	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	317	82	234	98	18	5	139	320	44	231	29
RTOR Reduction (vph)	0	28	0	0	9	0	0	0	152	0	5	0
Lane Group Flow (vph)	0	391	0	234	107	0	0	144	168	0	299	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		24.7		19.0	19.0			19.3	41.8		19.3	
Effective Green, g (s)		24.7		19.0	19.0			19.3	38.3		19.3	
Actuated g/C Ratio		0.34		0.26	0.26			0.26	0.52		0.26	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		643		196	376			389	1167		364	
v/s Ratio Prot					0.07				0.08			
v/s Ratio Perm		c0.21		c0.31				0.10			c0.22	
v/c Ratio		0.61		1.19	0.28			0.37	0.14		0.82	
Uniform Delay, d1		20.1		27.0	21.6			21.9	8.9		25.2	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		4.2		126.3	0.2			0.2	0.0		13.2	
Delay (s)		24.4		153.3	21.7			22.1	8.9		38.4	
Level of Service		C		F	C			C	A		D	
Approach Delay (s)		24.4			109.7			13.0			38.4	
Approach LOS		C			F			B			D	

Intersection Summary			
HCM Average Control Delay	43.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	677	121	221	23	728	213
v/c Ratio	0.86	0.23	0.13	0.27	0.59	0.33
Control Delay	35.7	31.9	6.3	62.5	15.3	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	35.7	31.9	6.3	62.5	15.4	1.8
Queue Length 50th (ft)	153	39	15	15	105	6
Queue Length 95th (ft)	198	m69	m43	m22	m120	m2
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	986	563	1708	85	1273	655
Starvation Cap Reductn	0	0	0	0	43	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.21	0.13	0.27	0.59	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	372	284	117	214	22	706	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.94		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2569		2649	2731	1366	2731	1161
Flt Permitted	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2569		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	384	293	121	221	23	728	213
RTOR Reduction (vph)	156	0	0	0	0	0	121
Lane Group Flow (vph)	521	0	121	221	23	728	92
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	24.6		19.8	60.2	2.6	43.0	43.0
Effective Green, g (s)	24.6		19.8	60.2	2.6	43.0	43.0
Actuated g/C Ratio	0.25		0.20	0.60	0.03	0.43	0.43
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	632		525	1644	36	1174	499
v/s Ratio Prot	c0.20		c0.05	0.08	0.02	c0.27	
v/s Ratio Perm							0.08
v/c Ratio	0.82		0.23	0.13	0.64	0.62	0.18
Uniform Delay, d1	35.7		33.7	8.6	48.2	22.2	17.6
Progression Factor	1.00		0.91	0.62	1.26	0.58	0.27
Incremental Delay, d2	8.2		0.1	0.2	18.2	1.8	0.6
Delay (s)	43.8		30.7	5.5	78.8	14.6	5.4
Level of Service	D		C	A	E	B	A
Approach Delay (s)	43.8			14.4		14.1	
Approach LOS	D			B		B	

Intersection Summary			
HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	49	245	124	194	405	235	188	683	230	803	56
v/c Ratio	0.29	0.62	0.43	0.64	0.61	0.46	0.76	0.98dr	0.36	0.72	0.10
Control Delay	43.4	48.6	12.1	43.7	37.9	14.2	59.5	19.1	18.4	26.2	4.7
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	43.4	48.6	12.1	43.7	37.9	14.2	59.5	19.1	18.4	26.2	4.7
Queue Length 50th (ft)	31	82	0	146	152	59	115	35	95	250	6
Queue Length 95th (ft)	68	119	50	219	194	111	186	92	m#244	#445	m15
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	251	585	366	367	810	572	305	972	634	1115	554
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	0.20	0.42	0.34	0.53	0.50	0.41	0.62	0.70	0.36	0.72	0.10

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.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	237	123	356	237	233	186	43	634	228	795	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.91	0.91	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98		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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3249	1468	1416	3128	1568	1694	2536		1662	3202	1489
Flt Permitted	0.95	1.00	1.00	0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3249	1468	1416	3128	1568	1694	2536		1662	3202	1489
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	55	239	124	360	239	235	188	43	640	230	803	56
RTOR Reduction (vph)	0	0	109	0	0	176	0	507	0	0	0	37
Lane Group Flow (vph)	49	245	15	194	405	59	188	176	0	230	803	19
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	12.1	12.1	12.1	21.3	21.3	21.3	14.7	11.4		38.1	34.8	34.8
Effective Green, g (s)	12.1	12.1	12.1	21.3	21.3	21.3	14.7	11.4		38.1	34.8	34.8
Actuated g/C Ratio	0.12	0.12	0.12	0.21	0.21	0.21	0.15	0.11		0.38	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	168	393	178	302	666	334	249	289		633	1114	518
v/s Ratio Prot	0.04	c0.08	0.01	c0.14	0.13	0.04	c0.11	0.07		c0.14	c0.25	
v/s Ratio Perm												0.01
v/c Ratio	0.29	0.62	0.08	0.64	0.61	0.18	0.76	0.98dr		0.36	0.72	0.04
Uniform Delay, d1	40.0	41.8	39.0	35.9	35.6	32.2	40.9	42.2		22.2	28.4	21.5
Progression Factor	1.00	1.00	1.00	0.98	0.98	2.32	1.00	1.00		0.59	0.64	0.49
Incremental Delay, d2	0.4	2.2	0.1	4.2	1.4	0.2	10.9	2.5		1.3	3.4	0.1
Delay (s)	40.4	44.0	39.1	39.5	36.4	74.8	51.9	44.7		14.4	21.6	10.7
Level of Service	D	D	D	D	D	E	D	D		B	C	B
Approach Delay (s)		42.1			47.9			46.2			19.5	
Approach LOS		D			D			D			B	

Intersection Summary			
HCM Average Control Delay	37.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.1
Intersection Capacity Utilization	67.4%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	518	314	288	26	107	495	850	6	153	249
v/c Ratio	1.34	0.53	0.41	0.25	0.46	0.43	0.71	0.03	0.66	0.61
Control Delay	196.4	28.1	7.7	50.2	43.7	21.1	18.4	48.7	65.7	24.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	196.4	28.1	7.7	50.2	43.7	21.1	18.4	48.7	65.7	24.8
Queue Length 50th (ft)	~446	129	12	16	64	71	96	4	103	41
Queue Length 95th (ft)	#789	#310	81	43	104	129	153	m9	m142	m111
Internal Link Dist (ft)		732			379		1000		765	
Turn Bay Length (ft)	140			70		300		90		
Base Capacity (vph)	387	598	700	124	385	1148	1199	306	347	487
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	1.34	0.53	0.41	0.21	0.28	0.43	0.71	0.02	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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	508	186	404	25	98	7	485	489	344	6	150	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	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	0.95	0.95	1.00	1.00		0.97	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.97
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	0.94	0.85	1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1641	1620	1446	1556	1823		3335	3126		1531	1733	1434
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1641	1620	1446	1556	1823		3335	3126		1531	1733	1434
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)	518	190	412	26	100	7	495	499	351	6	153	249
RTOR Reduction (vph)	0	20	185	0	3	0	0	128	0	0	0	216
Lane Group Flow (vph)	518	294	103	26	104	0	495	722	0	6	153	33
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot			Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	23.6	35.7	35.7	3.0	15.1		32.0	32.0		13.3	13.3	13.3
Effective Green, g (s)	23.6	35.7	35.7	3.0	15.1		32.0	32.0		13.3	13.3	13.3
Actuated g/C Ratio	0.24	0.36	0.36	0.03	0.15		0.32	0.32		0.13	0.13	0.13
Clearance Time (s)	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
Lane Grp Cap (vph)	387	578	516	47	275		1067	1000		204	230	191
v/s Ratio Prot	c0.32	c0.18		0.02	c0.06		0.15	c0.23		0.00	c0.09	
v/s Ratio Perm			0.07									0.02
v/c Ratio	1.34	0.51	0.20	0.55	0.38		0.46	0.72		0.03	0.67	0.17
Uniform Delay, d1	38.2	25.3	22.3	47.8	38.2		27.2	30.1		37.7	41.2	38.5
Progression Factor	0.83	0.96	1.56	1.00	1.00		0.79	0.70		1.40	1.32	3.76
Incremental Delay, d2	166.3	0.2	0.1	7.8	0.3		1.1	3.5		0.0	4.9	0.1
Delay (s)	198.1	24.5	34.9	55.6	38.6		22.5	24.7		52.8	59.2	144.7
Level of Service	F	C	C	E	D		C	C		D	E	F
Approach Delay (s)		107.5			41.9			23.9			111.3	
Approach LOS		F			D			C			F	

Intersection Summary			
HCM Average Control Delay	67.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	563	575	391	25	13	176	294	13	365	99
v/c Ratio	0.73	0.74	0.46	0.27	0.14	0.77	0.28	0.15	0.66	0.31
Control Delay	25.7	26.3	6.8	49.9	23.8	42.8	17.1	55.2	51.2	20.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	26.3	6.8	49.9	23.8	42.8	17.1	55.2	51.2	20.4
Queue Length 50th (ft)	287	296	43	15	0	115	92	8	91	9
Queue Length 95th (ft)	418	433	107	43	20	#216	139	m20	#221	60
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	775	778	847	382	354	243	1053	128	553	319
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	0.74	0.46	0.07	0.04	0.72	0.28	0.10	0.66	0.31

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1048	10	364	17	0	6	13	164	261	12	12	339
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		0.99		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	1.00		1.00	1.00
Frt	1.00	1.00	0.85		0.96		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1523	1408		1467		1326	1597	3162		1597	3195
Flt Permitted	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1523	1408		1467		1326	1597	3162		1597	3195
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1127	11	391	18	0	6	14	176	281	13	13	365
RTOR Reduction (vph)	0	0	128	0	1	0	12	0	3	0	0	0
Lane Group Flow (vph)	563	575	263	0	24	0	1	176	291	0	13	365
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Perm	Prot			Prot	
Protected Phases	4	4		3	3			1	6		5	2
Permitted Phases			4				3					
Actuated Green, G (s)	51.1	51.1	51.1		4.4		4.4	14.4	29.6		1.4	16.1
Effective Green, g (s)	51.1	51.1	51.1		4.4		4.4	14.4	29.6		1.4	16.1
Actuated g/C Ratio	0.51	0.51	0.51		0.04		0.04	0.14	0.30		0.01	0.16
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	775	778	719		65		58	230	936		22	514
v/s Ratio Prot	0.37	c0.38			c0.02			c0.11	0.09		0.01	c0.11
v/s Ratio Perm			0.19				0.00					
v/c Ratio	0.73	0.74	0.37		0.37		0.01	0.77	0.31		0.59	0.71
Uniform Delay, d1	19.0	19.2	14.7		46.5		45.7	41.2	27.3		49.0	39.7
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.50	0.61		1.16	1.10
Incremental Delay, d2	2.9	3.2	0.1		1.3		0.0	13.3	0.8		23.3	7.4
Delay (s)	21.9	22.4	14.8		47.7		45.7	34.1	17.5		80.3	51.3
Level of Service	C	C	B		D		D	C	B		F	D
Approach Delay (s)		20.3			47.1				23.7			56.3
Approach LOS		C			D				C			E

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	92
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1381
Flt Permitted	1.00
Satd. Flow (perm)	1381
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	99
RTOR Reduction (vph)	83
Lane Group Flow (vph)	16
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	16.1
Effective Green, g (s)	16.1
Actuated g/C Ratio	0.16
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	222
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.07
Uniform Delay, d1	35.6
Progression Factor	1.99
Incremental Delay, d2	0.6
Delay (s)	71.4
Level of Service	E
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	9,909	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,608	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	10,743	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	9,224	pcph	11,750	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	1,519	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,791	pcphpl
Average passenger-car speed, S	62.8	mph
Volume-to-capacity ratio, v/c	0.76	
Density, D	28.5	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,487	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,233	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,202	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,840	pcphpl
Average passenger-car speed, S	62.3	mph
Volume-to-capacity ratio, v/c	0.78	
Density, D	29.6	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,735	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,772	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,302	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,826	pcphpl
Average passenger-car speed, S	62.4	mph
Volume-to-capacity ratio, v/c	0.78	
Density, D	29.2	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,826	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,796	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,401	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,850	pcphpl
Average passenger-car speed, S	62.1	mph
Volume-to-capacity ratio, v/c	0.79	
Density, D	29.8	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,473	262	2,014	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,703	69	530	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,018	280	2,184	0	pcph

Volume ratio, VR	0.260

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,464	lc/h
Weaving lane changes, LC_W	2,174	lc/h
Non-weaving vehicle index, I_{NW}	281	
Non-weaving lane change, LC_{NW}	591	lc/h
Total lane changes, LC_{ALL}	2,765	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.795	
Average weaving speed, S_W	32.9	mph
Average non-weaving speed, S_{NW}	38.2	mph
Weaving segment speed, S	36.6	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.03	
Weaving segment flow rate, v	9,482	pcph
Weaving segment capacity, c_W	8,968	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,206	pcph	11,750	pcph	No
Exiting freeway volume	7,334	pcph	9,400	pcph	No
On-ramp volume	280	pcph	2,000	pcph	No
Off-ramp volume	2,152	pcph	2,100	pcph	Yes

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	5,157	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,971	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.03	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,019	807	716	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,584	212	188	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,526	862	776	0	pcph

Volume ratio, VR	0.201

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,639	lc/h
Weaving lane changes, LC_W	1,632	lc/h
Non-weaving vehicle index, I_{NW}	848	
Non-weaving lane change, LC_{NW}	926	lc/h
Total lane changes, LC_{ALL}	2,558	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	0.666	
Average weaving speed, S_W	45.0	mph
Average non-weaving speed, S_{NW}	43.4	mph
Weaving segment speed, S	43.7	mph
Weaving segment density, D	46.7	pcpmpl
Level of Service, LOS	E	
Weaving segment volume-to-capacity ratio, v/c	0.99	
Weaving segment flow rate, v	8,164	pcph
Weaving segment capacity, c_W	7,970	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,315	pcph	9,400	pcph	No
Exiting freeway volume	7,412	pcph	9,400	pcph	No
On-ramp volume	862	pcph	2,100	pcph	No
Off-ramp volume	765	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	4,543	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,052	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.99	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,384	690	443	148	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,680	181	116	39	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,921	737	480	158	pcph

Volume ratio, VR	0.147

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,216	lc/h
Weaving lane changes, LC_W	1,073	lc/h
Non-weaving vehicle index, I_{NW}	-113	
Non-weaving lane change, LC_{NW}	644	lc/h
Total lane changes, LC_{ALL}	1,718	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	46.3	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.02	
Weaving segment flow rate, v	8,295	pcph
Weaving segment capacity, c_W	7,917	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,414	pcph	9,400	pcph	No
Exiting freeway volume	7,678	pcph	9,400	pcph	No
On-ramp volume	894	pcph	2,100	pcph	No
Off-ramp volume	630	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	3,998	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,038	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.02	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,611	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,266	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,336	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	7,978	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	1,358	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,334	pcphpl
Average passenger-car speed, S	52.6	mph
Volume-to-capacity ratio, v/c	0.99	
Density, D	44.3	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,340	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,932	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,958	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,990	pcphpl
Average passenger-car speed, S	60.1	mph
Volume-to-capacity ratio, v/c	0.85	
Density, D	33.1	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,040	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,116	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,717	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	7,969	pcph	9,400	pcph	No
Exiting freeway volume		pcph		pcph	
On-ramp volume	748	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,179	pcphpl
Average passenger-car speed, S	56.4	mph
Volume-to-capacity ratio, v/c	0.93	
Density, D	38.6	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,524	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,243	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,242	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	8,712	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	530	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,310	pcphpl
Average passenger-car speed, S	53.2	mph
Volume-to-capacity ratio, v/c	0.98	
Density, D	43.4	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Existing Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	9,020	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,374	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,780	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,445	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.04	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	8,229	295	511	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,166	78	134	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	8,922	315	554	214	pcph

Volume ratio, VR	0.087	

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	869	lc/h
Weaving lane changes, LC_W	738	lc/h
Non-weaving vehicle index, I_{NW}	603	
Non-weaving lane change, LC_{NW}	1,290	lc/h
Total lane changes, LC_{ALL}	2,028	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	0.947	
Average weaving speed, S_W	40.7	mph
Average non-weaving speed, S_{NW}	46.7	mph
Weaving segment speed, S	46.1	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.18	
Weaving segment flow rate, v	10,005	pcph
Weaving segment capacity, c_W	8,213	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,484	pcph	9,400	pcph	Yes
Exiting freeway volume	9,253	pcph	9,400	pcph	No
On-ramp volume	529	pcph	2,000	pcph	No
Off-ramp volume	760	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	3,413	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,114	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.18	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	8,160	895	860	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,147	236	226	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	8,847	956	932	267	pcph

Volume ratio, VR	0.172

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,889	lc/h
Weaving lane changes, LC_W	1,851	lc/h
Non-weaving vehicle index, I_{NW}	1,039	
Non-weaving lane change, LC_{NW}	1,416	lc/h
Total lane changes, LC_{ALL}	3,267	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	0.896	
Average weaving speed, S_W	41.4	mph
Average non-weaving speed, S_{NW}	38.2	mph
Weaving segment speed, S	38.7	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.33	
Weaving segment flow rate, v	11,003	pcph
Weaving segment capacity, c_W	8,036	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,798	pcph	9,400	pcph	Yes
Exiting freeway volume	9,835	pcph	9,400	pcph	Yes
On-ramp volume	1,223	pcph	4,000	pcph	No
Off-ramp volume	1,186	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	4,248	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,069	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.33	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Existing With Project PM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	113	102	498	34	250	274
v/c Ratio	0.59	0.20	1.13	0.08	0.63	0.54
Control Delay	34.2	5.5	110.5	11.0	22.3	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	5.5	110.5	11.0	22.3	22.2
Queue Length 50th (ft)	35	0	~217	4	56	79
Queue Length 95th (ft)	#99	30	#377	21	m117	145
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	193	509	439	449	398	507
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	0.59	0.20	1.13	0.08	0.63	0.54

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	61	101	149	344	34	33	176	39	9	223	40
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.98	
Flt Protected		0.98	1.00		0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1822	1583		1835	1583		1812			1823	
Flt Permitted		0.38	1.00		0.86	1.00		0.77			0.99	
Satd. Flow (perm)		701	1583		1597	1583		1406			1806	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	51	62	102	151	347	34	33	178	39	9	225	40
RTOR Reduction (vph)	0	0	74	0	0	14	0	11	0	0	10	0
Lane Group Flow (vph)	0	113	28	0	498	20	0	239	0	0	264	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		193	435		439	435		387			497	
v/s Ratio Prot												
v/s Ratio Perm		0.16	0.02		c0.31	0.01		c0.17			c0.15	
v/c Ratio		0.59	0.06		1.13	0.05		0.62			0.53	
Uniform Delay, d1		18.8	16.1		21.8	16.0		19.0			18.5	
Progression Factor		1.00	1.00		1.00	1.00		0.83			1.00	
Incremental Delay, d2		12.4	0.3		85.1	0.2		6.5			4.0	
Delay (s)		31.2	16.3		106.8	16.2		22.2			22.5	
Level of Service		C	B		F	B		C			C	
Approach Delay (s)		24.1			101.0			22.2			22.5	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM Average Control Delay	55.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	163	389	467	677	431
v/c Ratio	0.41	0.85	0.96	0.77	0.54
Control Delay	21.9	38.5	54.4	19.0	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	38.5	54.4	19.0	17.4
Queue Length 50th (ft)	39	111	140	83	53
Queue Length 95th (ft)	#107	#248	#302	m#151	78
Internal Link Dist (ft)			385	131	284
Turn Bay Length (ft)					
Base Capacity (vph)	395	457	487	874	1098
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	0.85	0.96	0.77	0.39

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	148	393	385	1	351	265	0	0	334	58
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	0.95	0.95			0.95			0.95	
Frpb, ped/bikes			1.00	1.00	1.00			1.00			0.99	
Flpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	
Frt			0.86	1.00	1.00			1.00			0.98	
Flt Protected			1.00	0.95	1.00			0.97			1.00	
Satd. Flow (prot)			1565	1633	1741			3465			3341	
Flt Permitted			1.00	0.95	1.00			0.97			1.00	
Satd. Flow (perm)			1565	1633	1741			3465			3341	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	163	432	423	1	386	291	0	0	367	64
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	32	0
Lane Group Flow (vph)	0	0	163	389	467	0	0	677	0	0	399	0
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					
Protected Phases			1	6	6		1	1			4	
Permitted Phases												
Actuated Green, G (s)			12.6	14.0	14.0			12.6			11.4	
Effective Green, g (s)			12.6	14.0	14.0			12.6			11.4	
Actuated g/C Ratio			0.25	0.28	0.28			0.25			0.23	
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	
Lane Grp Cap (vph)			394	457	487			873			762	
v/s Ratio Prot			0.10	0.24	c0.27			c0.20			c0.12	
v/s Ratio Perm												
v/c Ratio			0.41	0.85	0.96			0.78			0.52	
Uniform Delay, d1			15.6	17.0	17.7			17.4			16.9	
Progression Factor			1.00	1.00	1.00			0.74			1.00	
Incremental Delay, d2			1.0	17.8	31.8			1.5			0.7	
Delay (s)			16.6	34.8	49.5			14.5			17.6	
Level of Service			B	C	D			B			B	
Approach Delay (s)		16.6			42.8			14.5			17.6	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM Average Control Delay	26.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	168	425	32	265	123
v/c Ratio	0.29	0.78	0.06	0.27	0.12
Control Delay	15.3	32.4	7.4	19.0	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.3	32.4	7.4	19.0	9.5
Queue Length 50th (ft)	50	185	4	94	22
Queue Length 95th (ft)	76	234	16	179	62
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	843	800	831	999	1010
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	0.20	0.53	0.04	0.27	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	99	30	132	259	29	16	164	64	5	85	24
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.97			1.00	0.85		0.96			0.97	
Flt Protected		0.99			0.98	1.00		1.00			1.00	
Satd. Flow (prot)		1799			1832	1583		1791			1806	
Flt Permitted		0.89			0.83	1.00		0.98			0.99	
Satd. Flow (perm)		1605			1542	1583		1768			1794	
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)	27	108	33	143	282	32	17	178	70	5	92	26
RTOR Reduction (vph)	0	15	0	0	0	14	0	12	0	0	9	0
Lane Group Flow (vph)	0	153	0	0	425	18	0	253	0	0	114	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		28.3			28.3	28.3		44.7			44.7	
Effective Green, g (s)		28.3			28.3	28.3		44.7			44.7	
Actuated g/C Ratio		0.35			0.35	0.35		0.56			0.56	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		568			545	560		988			1002	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.28	0.01		c0.14			0.06	
v/c Ratio		0.27			0.78	0.03		0.26			0.11	
Uniform Delay, d1		18.5			23.1	16.9		9.1			8.3	
Progression Factor		1.00			1.00	1.00		1.80			1.00	
Incremental Delay, d2		0.1			6.4	0.0		0.5			0.2	
Delay (s)		18.6			29.4	16.9		16.9			8.5	
Level of Service		B			C	B		B			A	
Approach Delay (s)		18.6			28.6			16.9			8.5	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.46		
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			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	36	505	2446	15	83
v/c Ratio	0.30	0.12	0.64	0.13	0.48
Control Delay	48.4	0.8	6.0	46.4	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	0.8	6.0	46.4	19.7
Queue Length 50th (ft)	19	4	168	9	0
Queue Length 95th (ft)	m33	m10	m242	30	46
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	155	4362	3823	138	196
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	0.23	0.12	0.64	0.11	0.42

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	35	485	2300	48	14	80
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4703		1719	1474
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4703		1719	1474
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	36	505	2396	50	15	83
RTOR Reduction (vph)	0	0	1	0	0	79
Lane Group Flow (vph)	36	505	2445	0	15	4
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	4.6	86.7	78.1		5.3	5.3
Effective Green, g (s)	4.6	86.7	78.1		5.3	5.3
Actuated g/C Ratio	0.05	0.87	0.78		0.05	0.05
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)	79	4283	3673		91	78
v/s Ratio Prot	c0.02	0.10	c0.52		c0.01	
v/s Ratio Perm						0.00
v/c Ratio	0.46	0.12	0.67		0.16	0.06
Uniform Delay, d1	46.5	1.0	5.0		45.2	45.0
Progression Factor	0.98	0.73	0.96		1.00	1.00
Incremental Delay, d2	1.3	0.0	0.6		0.3	0.1
Delay (s)	46.9	0.8	5.4		45.5	45.1
Level of Service	D	A	A		D	D
Approach Delay (s)		3.8	5.4		45.2	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	504	52	1498	875	256
v/c Ratio	0.31	0.43	0.76	1.06	0.30
Control Delay	14.9	43.2	34.8	77.2	6.3
Queue Delay	0.0	0.0	1.4	0.0	0.0
Total Delay	14.9	43.2	36.1	77.2	6.3
Queue Length 50th (ft)	65	35	322	~622	24
Queue Length 95th (ft)	91	m52	367	#928	80
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	1885	138	2405	822	845
Starvation Cap Reductn	0	0	649	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.38	0.85	1.06	0.30

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.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	364	135	51	1483	866	253
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		1.00	0.91	1.00	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4655		1719	4715	1641	1506
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4655		1719	4715	1641	1506
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	368	136	52	1498	875	256
RTOR Reduction (vph)	75	0	0	0	0	91
Lane Group Flow (vph)	429	0	52	1498	875	165
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	32.0		5.9	41.9	50.1	50.1
Effective Green, g (s)	32.0		5.9	41.9	50.1	50.1
Actuated g/C Ratio	0.32		0.06	0.42	0.50	0.50
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0		2.0	2.0	3.0	3.0
Lane Grp Cap (vph)	1490		101	1976	822	755
v/s Ratio Prot	0.09		0.03	c0.32	c0.53	
v/s Ratio Perm						0.11
v/c Ratio	0.29		0.51	0.76	1.06	0.22
Uniform Delay, d1	25.5		45.7	24.7	24.9	14.0
Progression Factor	0.75		0.79	1.34	1.00	1.00
Incremental Delay, d2	0.5		1.4	2.2	50.0	0.1
Delay (s)	19.5		37.3	35.3	74.9	14.1
Level of Service	B		D	D	E	B
Approach Delay (s)	19.5			35.3	61.2	
Approach LOS	B			D	E	

Intersection Summary			
HCM Average Control Delay	42.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	132	490	363	1146	228	182	78	611
v/c Ratio	0.49	0.33	1.33	0.80	0.82	0.18	0.51	0.81
Control Delay	59.2	32.8	209.1	38.9	55.0	15.7	53.9	36.7
Queue Delay	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.2
Total Delay	59.2	32.8	209.1	41.7	55.0	15.7	53.9	36.9
Queue Length 50th (ft)	85	84	~307	245	135	21	48	147
Queue Length 95th (ft)	#162	121	#490	287	m#266	m30	92	194
Internal Link Dist (ft)		284		599		325		294
Turn Bay Length (ft)	170		195		210		200	
Base Capacity (vph)	271	1469	272	1599	279	1006	233	1036
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	331	0	0	0	80
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.33	1.33	0.90	0.82	0.18	0.33	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	124	317	144	341	860	217	214	108	63	73	344	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		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	0.95		1.00	0.97		1.00	0.94		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)	1719	4653		1719	4600		1586	3122		1662	3134	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1719	4653		1719	4600		1586	3122		1662	3134	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	132	337	153	363	915	231	228	115	67	78	366	245
RTOR Reduction (vph)	0	83	0	0	47	0	0	46	0	0	130	0
Lane Group Flow (vph)	132	407	0	363	1099	0	228	136	0	78	481	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	15.8	29.0		15.8	29.2		18.4	30.7		8.1	19.8	
Effective Green, g (s)	15.8	29.0		15.8	29.2		18.4	30.7		8.1	19.8	
Actuated g/C Ratio	0.16	0.29		0.16	0.29		0.18	0.31		0.08	0.20	
Clearance Time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	272	1349		272	1343		292	958		135	621	
v/s Ratio Prot	c0.08	0.09		c0.21	c0.24		c0.14	0.04		0.05	c0.15	
v/s Ratio Perm												
v/c Ratio	0.49	0.30		1.33	0.82		0.78	0.14		0.58	0.77	
Uniform Delay, d1	38.4	27.6		42.1	32.9		38.9	25.1		44.3	38.0	
Progression Factor	1.31	1.56		1.02	1.13		0.80	0.87		1.00	1.00	
Incremental Delay, d2	0.5	0.6		173.5	5.7		9.1	0.0		3.7	5.5	
Delay (s)	50.8	43.7		216.5	42.9		40.2	21.9		48.0	43.5	
Level of Service	D	D		F	D		D	C		D	D	
Approach Delay (s)		45.2			84.7			32.1			44.0	
Approach LOS		D			F			C			D	

Intersection Summary			
HCM Average Control Delay	61.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	461	626	39	389	293
v/c Ratio	0.67	0.81	0.05	0.57	0.41
Control Delay	19.7	26.4	6.9	21.8	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	26.4	6.9	21.8	26.0
Queue Length 50th (ft)	145	229	6	142	110
Queue Length 95th (ft)	240	363	19	239	190
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	747	842	857	681	722
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	0.62	0.74	0.05	0.57	0.41

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	300	68	99	464	35	58	175	118	20	197	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	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.95			0.98	
Flt Protected		0.99			0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1811			1847	1583		1764			1811	
Flt Permitted		0.75			0.84	1.00		0.91			0.96	
Satd. Flow (perm)		1372			1566	1583		1613			1745	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	333	76	110	516	39	64	194	131	22	219	52
RTOR Reduction (vph)	0	10	0	0	0	7	0	21	0	0	9	0
Lane Group Flow (vph)	0	451	0	0	626	32	0	368	0	0	284	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		39.3			39.3	39.3		32.7			32.7	
Effective Green, g (s)		39.3			39.3	39.3		32.7			32.7	
Actuated g/C Ratio		0.49			0.49	0.49		0.41			0.41	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		674			769	778		659			713	
v/s Ratio Prot												
v/s Ratio Perm		0.33			c0.40	0.02		c0.23			0.16	
v/c Ratio		0.67			0.81	0.04		0.56			0.40	
Uniform Delay, d1		15.4			17.3	10.6		18.1			16.7	
Progression Factor		1.00			1.00	1.00		1.00			1.39	
Incremental Delay, d2		2.8			6.9	0.0		3.4			1.6	
Delay (s)		18.2			24.2	10.6		21.5			24.7	
Level of Service		B			C	B		C			C	
Approach Delay (s)		18.2			23.4			21.5			24.7	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM Average Control Delay	21.9	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	96.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	400	78	622	57	178	201
v/c Ratio	0.45	0.09	0.65	0.07	0.31	0.37
Control Delay	10.6	3.5	8.5	4.3	13.2	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	3.5	8.5	4.3	13.2	15.5
Queue Length 50th (ft)	80	4	89	3	36	46
Queue Length 95th (ft)	139	19	m99	m4	78	94
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	895	870	953	856	573	545
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	0.45	0.09	0.65	0.07	0.31	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	336	74	39	552	54	34	83	52	55	91	45
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.97	
Flt Protected		0.99	1.00		1.00	1.00		0.99			0.99	
Satd. Flow (prot)		1852	1583		1857	1583		1767			1778	
Flt Permitted		0.90	1.00		0.96	1.00		0.92			0.88	
Satd. Flow (perm)		1678	1583		1786	1583		1638			1582	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	46	354	78	41	581	57	36	87	55	58	96	47
RTOR Reduction (vph)	0	0	26	0	0	12	0	27	0	0	18	0
Lane Group Flow (vph)	0	400	52	0	622	45	0	151	0	0	183	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		895	844		953	844		546			527	
v/s Ratio Prot												
v/s Ratio Perm		0.24	0.03		c0.35	0.03		0.09			c0.12	
v/c Ratio		0.45	0.06		0.65	0.05		0.28			0.35	
Uniform Delay, d1		8.6	6.8		10.0	6.7		14.7			15.1	
Progression Factor		1.00	1.00		0.66	0.94		1.00			1.00	
Incremental Delay, d2		1.6	0.1		1.5	0.1		1.3			1.8	
Delay (s)		10.2	6.9		8.1	6.4		15.9			16.9	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		9.7			8.0			15.9			16.9	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	394	76	735	62	240	389
v/c Ratio	1.15	0.11	0.98	0.09	0.33	0.54
Control Delay	111.4	4.3	48.9	7.9	11.7	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	111.4	4.3	48.9	7.9	11.7	14.3
Queue Length 50th (ft)	~177	1	249	8	49	99
Queue Length 95th (ft)	#308	15	#465	27	94	m162
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	344	711	749	697	733	714
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	1.15	0.11	0.98	0.09	0.33	0.54

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	309	72	67	631	59	35	154	39	77	195	98
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.96	
Flt Protected		0.99	1.00		1.00	1.00		0.99			0.99	
Satd. Flow (prot)		1847	1583		1854	1583		1806			1778	
Flt Permitted		0.43	1.00		0.93	1.00		0.91			0.89	
Satd. Flow (perm)		793	1583		1729	1583		1661			1598	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	69	325	76	71	664	62	37	162	41	81	205	103
RTOR Reduction (vph)	0	0	26	0	0	11	0	12	0	0	22	0
Lane Group Flow (vph)	0	394	51	0	735	51	0	228	0	0	367	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		344	686		749	686		720			692	
v/s Ratio Prot												
v/s Ratio Perm		c0.50	0.03		0.43	0.03		0.14			c0.23	
v/c Ratio		1.15	0.07		0.98	0.07		0.32			0.53	
Uniform Delay, d1		17.0	10.0		16.8	10.0		11.2			12.5	
Progression Factor		0.69	0.72		1.00	1.00		1.00			1.02	
Incremental Delay, d2		92.4	0.2		28.6	0.2		1.2			2.2	
Delay (s)		104.1	7.3		45.4	10.2		12.3			15.0	
Level of Service		F	A		D	B		B			B	
Approach Delay (s)		88.4			42.7			12.3			15.0	
Approach LOS		F			D			B			B	

Intersection Summary			
HCM Average Control Delay	44.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	434	167	876	529	275	804	155	490	174
v/c Ratio	1.05	0.44	1.40	1.38	0.52	1.09	0.70	0.93	0.46
Control Delay	95.7	24.4	222.3	219.8	10.4	93.2	54.3	63.3	11.3
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	234.1	0.0
Total Delay	95.7	24.5	222.3	219.8	10.4	93.2	54.3	297.5	11.3
Queue Length 50th (ft)	~303	57	~393	~459	33	~213	98	156	6
Queue Length 95th (ft)	#493	122	#515	#663	68	#284	m143	m#246	m26
Internal Link Dist (ft)	585			161		328		103	
Turn Bay Length (ft)		50							
Base Capacity (vph)	413	380	625	382	525	736	222	530	379
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	7	0	0	0	0	0	210	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.05	0.45	1.40	1.38	0.52	1.09	0.70	1.53	0.46

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	272	132	155	815	492	256	0	660	87	160	440	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)		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	0.97	1.00	1.00		0.91		0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.93	1.00	1.00	0.99		1.00		1.00	1.00	0.95
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)		1591	1302	2717	1660	1390		4288		1232	2944	1314
Flt Permitted		0.97	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (perm)		1591	1302	2717	1660	1390		4288		1232	2944	1314
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	292	142	167	876	529	275	0	710	94	172	473	174
RTOR Reduction (vph)	0	0	41	0	0	206	0	0	0	0	0	143
Lane Group Flow (vph)	0	434	126	876	529	69	0	804	0	155	490	31
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm				Split		Perm
Protected Phases	8	8		7	7			6		2	2	
Permitted Phases			8			7						2
Actuated Green, G (s)		26.0	26.0	23.0	23.0	23.0		17.2		17.8	17.8	17.8
Effective Green, g (s)		26.0	26.0	23.0	23.0	23.0		17.2		17.8	17.8	17.8
Actuated g/C Ratio		0.26	0.26	0.23	0.23	0.23		0.17		0.18	0.18	0.18
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0		2.5		2.0	2.0	2.0
Lane Grp Cap (vph)		414	339	625	382	320		738		219	524	234
v/s Ratio Prot		c0.27		c0.32	0.32			c0.19		0.13	c0.17	
v/s Ratio Perm			0.10			0.05						0.02
v/c Ratio		1.05	0.37	1.40	1.38	0.22		1.09		0.71	0.94	0.13
Uniform Delay, d1		37.0	30.3	38.5	38.5	31.2		41.4		38.7	40.5	34.6
Progression Factor		1.00	1.00	1.12	1.11	1.54		0.78		1.00	0.99	1.35
Incremental Delay, d2		57.4	0.5	188.2	185.4	0.3		59.3		14.5	22.6	0.9
Delay (s)		94.4	30.8	231.2	228.3	48.3		91.7		53.2	62.7	47.5
Level of Service		F	C	F	F	D		F		D	E	D
Approach Delay (s)		76.8			200.3			91.7			57.7	
Approach LOS		E			F			F			E	

Intersection Summary			
HCM Average Control Delay	129.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	97.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	11	78	749	0	0
Sign Control	Yield		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)	0	12	85	814	0	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	492	449			899	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	492	449			899	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	506	557			751	

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	12	57	842
Volume Left	0	0	0
Volume Right	12	0	814
cSH	557	1700	1700
Volume to Capacity	0.02	0.03	0.50
Queue Length 95th (ft)	2	0	0
Control Delay (s)	11.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.6	0.0	
Approach LOS	B		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	285	370	282	229	299	385
v/c Ratio	0.58	1.66	0.73	0.55	0.20	0.96
Control Delay	24.8	340.1	36.3	27.2	1.2	63.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	340.1	36.3	27.2	1.2	63.7
Queue Length 50th (ft)	50	~248	108	86	0	161
Queue Length 95th (ft)	91	#404	#220	153	14	#331
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	490	223	385	425	1472	405
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	0.58	1.66	0.73	0.54	0.20	0.95

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	167	43	344	205	58	22	191	278	60	218	80
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		0.99		1.00	0.99			1.00	1.00		0.99	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		0.98		1.00	0.97			1.00	0.85		0.97	
Flt Protected		0.99		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		2709		1413	1426			1479	2224		1411	
Flt Permitted		0.56		0.58	1.00			0.95	1.00		0.91	
Satd. Flow (perm)		1533		858	1426			1412	2224		1298	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	59	180	46	370	220	62	24	205	299	65	234	86
RTOR Reduction (vph)	0	22	0	0	14	0	0	0	132	0	14	0
Lane Group Flow (vph)	0	263	0	370	268	0	0	229	167	0	371	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		22.3		19.0	19.0			21.7	44.2		21.7	
Effective Green, g (s)		22.3		19.0	19.0			21.7	40.7		21.7	
Actuated g/C Ratio		0.31		0.26	0.26			0.30	0.56		0.30	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		468		223	371			420	1240		386	
v/s Ratio Prot					0.19				0.07			
v/s Ratio Perm		c0.17		c0.43				0.16			c0.29	
v/c Ratio		0.56		1.66	0.72			0.55	0.13		0.96	
Uniform Delay, d1		21.3		27.0	24.6			21.5	7.7		25.2	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		4.8		315.7	5.8			0.8	0.0		35.4	
Delay (s)		26.1		342.7	30.4			22.3	7.7		60.6	
Level of Service		C		F	C			C	A		E	
Approach Delay (s)		26.1			207.6			14.1			60.6	
Approach LOS		C			F			B			E	

Intersection Summary			
HCM Average Control Delay	93.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	599	279	415	2	1089	304
v/c Ratio	0.84	0.65	0.22	0.02	0.80	0.42
Control Delay	35.6	49.7	5.6	34.0	21.2	6.5
Queue Delay	0.0	0.0	0.0	0.0	62.3	0.5
Total Delay	35.6	49.7	5.6	34.0	83.6	7.0
Queue Length 50th (ft)	128	94	16	1	395	72
Queue Length 95th (ft)	174	m#127	m73	m2	m340	m63
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	984	427	1858	82	1363	732
Starvation Cap Reductn	0	0	0	0	401	143
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.65	0.22	0.02	1.13	0.52

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.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	331	250	271	403	2	1056	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.94		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2570		2649	2731	1366	2731	1161
Flt Permitted	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2570		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	341	258	279	415	2	1089	304
RTOR Reduction (vph)	160	0	0	0	0	0	162
Lane Group Flow (vph)	439	0	279	415	2	1089	142
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	21.4		19.3	64.8	1.2	46.7	46.7
Effective Green, g (s)	21.4		19.3	64.8	1.2	46.7	46.7
Actuated g/C Ratio	0.21		0.19	0.65	0.01	0.47	0.47
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	550		511	1770	16	1275	542
v/s Ratio Prot	c0.17		c0.11	0.15	0.00	c0.40	
v/s Ratio Perm							0.12
v/c Ratio	0.80		0.55	0.23	0.12	0.85	0.26
Uniform Delay, d1	37.2		36.4	7.3	48.9	23.6	16.2
Progression Factor	1.00		1.09	0.72	0.76	0.97	3.56
Incremental Delay, d2	7.4		0.3	0.1	0.1	0.7	0.1
Delay (s)	44.6		40.1	5.4	37.3	23.7	57.8
Level of Service	D		D	A	D	C	E
Approach Delay (s)	44.6			19.3		31.1	
Approach LOS	D			B		C	

Intersection Summary			
HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	109	227	257	583	863	623	94	377	201	1437	96
v/c Ratio	0.63	0.57	0.74	1.53	1.47dl	1.03	0.60	0.40	0.73	1.23	0.16
Control Delay	56.7	46.5	25.9	273.6	78.3	47.0	59.6	6.1	64.0	140.8	13.2
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	56.7	46.5	25.9	273.6	78.3	47.0	59.6	6.1	64.0	140.8	13.2
Queue Length 50th (ft)	73	76	42	~605	~364	~269	58	8	130	~586	13
Queue Length 95th (ft)	129	111	124	m#552	m#332	m#208	110	46	m175	#729	m36
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	237	538	405	380	801	607	186	943	465	1166	593
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	0.46	0.42	0.63	1.53	1.08	1.03	0.51	0.40	0.43	1.23	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.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	183	254	1154	277	617	93	35	339	199	1423	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.91	0.91	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98		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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3166	1468	1416	2992	1568	1694	2558		1662	3202	1490
Flt Permitted	0.95	0.99	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3166	1468	1416	2992	1568	1694	2558		1662	3202	1490
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	151	185	257	1166	280	623	94	35	342	201	1437	96
RTOR Reduction (vph)	0	0	164	0	0	187	0	247	0	0	0	51
Lane Group Flow (vph)	109	227	93	583	863	436	94	130	0	201	1437	45
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	12.5	12.5	12.5	26.8	26.8	26.8	8.0	27.9		15.7	35.6	35.6
Effective Green, g (s)	12.5	12.5	12.5	26.8	26.8	26.8	8.0	27.9		15.7	35.6	35.6
Actuated g/C Ratio	0.12	0.12	0.12	0.27	0.27	0.27	0.08	0.28		0.16	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	174	396	184	379	802	420	136	714		261	1140	530
v/s Ratio Prot	c0.08	0.07	0.06	c0.41	0.29	0.28	c0.06	0.05		0.12	c0.45	
v/s Ratio Perm												0.03
v/c Ratio	0.63	0.57	0.51	1.54	1.47dl	1.04	0.69	0.18		0.77	1.26	0.09
Uniform Delay, d1	41.5	41.2	40.9	36.6	36.6	36.6	44.8	27.4		40.4	32.2	21.4
Progression Factor	1.00	1.00	1.00	1.13	1.13	1.28	1.00	1.00		1.31	0.99	1.83
Incremental Delay, d2	5.0	1.2	0.8	243.4	36.9	24.8	11.5	0.0		16.2	123.1	0.3
Delay (s)	46.5	42.5	41.7	284.9	78.4	71.5	56.3	27.4		69.0	155.0	39.4
Level of Service	D	D	D	F	E	E	E	C		E	F	D
Approach Delay (s)		42.9			134.5			33.2			138.6	
Approach LOS		D			F			C			F	

Intersection Summary			
HCM Average Control Delay	115.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	97.9%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	195	281	259	126	431	684	287	8	322	979
v/c Ratio	1.08	0.83	0.54	0.59	1.11	0.79	0.33	0.02	0.71	1.75
Control Delay	129.7	52.6	13.6	56.7	118.3	29.3	15.3	28.5	41.5	362.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	129.7	52.6	13.6	56.7	118.3	29.3	15.3	28.5	41.5	362.4
Queue Length 50th (ft)	~144	158	27	77	~317	138	31	4	172	~828
Queue Length 95th (ft)	#278	248	81	#201	#505	184	m58	m9	m#289	m#928
Internal Link Dist (ft)		732			379		1000		765	
Turn Bay Length (ft)	140			70		300		90		
Base Capacity (vph)	181	423	543	212	387	1067	1071	399	452	561
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	1.08	0.66	0.48	0.59	1.11	0.64	0.27	0.02	0.71	1.75

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	191	121	409	123	418	4	670	209	73	8	316	959
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	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	0.95	0.95	1.00	1.00		0.97	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	0.98	1.00	1.00		1.00	0.99		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	0.92	0.85	1.00	1.00		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1641	1569	1442	1556	1842		3335	3241		1531	1733	1438
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1641	1569	1442	1556	1842		3335	3241		1531	1733	1438
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)	195	123	417	126	427	4	684	213	74	8	322	979
RTOR Reduction (vph)	0	50	212	0	0	0	0	38	0	0	0	186
Lane Group Flow (vph)	195	231	47	126	431	0	684	249	0	8	322	793
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot			Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	11.0	18.3	18.3	13.7	21.0		25.9	25.9		26.1	26.1	26.1
Effective Green, g (s)	11.0	18.3	18.3	13.7	21.0		25.9	25.9		26.1	26.1	26.1
Actuated g/C Ratio	0.11	0.18	0.18	0.14	0.21		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
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)	181	287	264	213	387		864	839		400	452	375
v/s Ratio Prot	c0.12	0.15		0.08	c0.23		c0.21	0.08		0.01	0.19	
v/s Ratio Perm			0.03									c0.55
v/c Ratio	1.08	0.81	0.18	0.59	1.11		0.79	0.30		0.02	0.71	2.11
Uniform Delay, d1	44.5	39.1	34.5	40.5	39.5		34.5	29.7		27.4	33.5	37.0
Progression Factor	0.98	1.11	2.20	1.00	1.00		0.68	0.62		0.92	0.92	0.92
Incremental Delay, d2	86.5	13.4	0.1	2.9	80.2		6.1	0.7		0.0	3.6	508.7
Delay (s)	130.1	56.7	76.1	43.4	119.7		29.7	19.1		25.1	34.6	542.6
Level of Service	F	E	E	D	F		C	B		C	C	F
Approach Delay (s)		83.0			102.5			26.6			414.4	
Approach LOS		F			F			C			F	

Intersection Summary			
HCM Average Control Delay	192.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	111.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	397	396	169	28	11	300	491	38	633	220
v/c Ratio	0.84	0.83	0.31	0.29	0.11	0.59	0.32	0.34	1.00	0.55
Control Delay	47.5	46.9	5.2	50.6	24.1	23.8	14.6	46.5	78.5	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	46.9	5.2	50.6	24.1	23.8	14.6	46.5	78.5	25.4
Queue Length 50th (ft)	245	243	2	17	0	95	64	22	~226	36
Queue Length 95th (ft)	329	326	42	46	18	#276	201	m44	#428	m#133
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	542	545	608	378	361	506	1523	133	632	400
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	0.73	0.28	0.07	0.03	0.59	0.32	0.29	1.00	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	732	13	159	17	0	8	11	282	435	26	36	595
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.99		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	1.00
Frt	1.00	1.00	0.85		0.95		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1524	1405		1453		1358	1597	3153		1597	3195
Flt Permitted	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1524	1405		1453		1358	1597	3153		1597	3195
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	779	14	169	18	0	9	12	300	463	28	38	633
RTOR Reduction (vph)	0	0	113	0	1	0	10	0	3	0	0	0
Lane Group Flow (vph)	397	396	56	0	27	0	1	300	488	0	38	633
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Prot	Prot			Prot	
Protected Phases	4	4		3	3		3	1	6		5	2
Permitted Phases			4									
Actuated Green, G (s)	31.2	31.2	31.2		4.6		4.6	31.7	45.8		4.9	18.5
Effective Green, g (s)	31.2	31.2	31.2		4.6		4.6	31.7	45.8		4.9	18.5
Actuated g/C Ratio	0.31	0.31	0.31		0.05		0.05	0.32	0.46		0.05	0.18
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	473	475	438		67		62	506	1444		78	591
v/s Ratio Prot	c0.26	0.26			c0.02		0.00	c0.19	0.15		0.02	c0.20
v/s Ratio Perm			0.04									
v/c Ratio	0.84	0.83	0.13		0.40		0.01	0.59	0.34		0.49	1.07
Uniform Delay, d1	32.1	32.0	24.7		46.4		45.5	28.7	17.4		46.3	40.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.60	0.69		0.91	1.10
Incremental Delay, d2	11.9	11.4	0.0		1.4		0.0	1.8	0.6		1.4	53.9
Delay (s)	43.9	43.4	24.7		47.8		45.5	19.1	12.7		43.5	98.8
Level of Service	D	D	C		D		D	B	B		D	F
Approach Delay (s)		40.3			47.2				15.1			87.0
Approach LOS		D			D				B			F

Intersection Summary			
HCM Average Control Delay	48.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	207
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1383
Flt Permitted	1.00
Satd. Flow (perm)	1383
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	220
RTOR Reduction (vph)	130
Lane Group Flow (vph)	90
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	18.5
Effective Green, g (s)	18.5
Actuated g/C Ratio	0.18
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	256
v/s Ratio Prot	
v/s Ratio Perm	0.06
v/c Ratio	0.35
Uniform Delay, d1	35.5
Progression Factor	1.62
Incremental Delay, d2	3.0
Delay (s)	60.6
Level of Service	E
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,102	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,869	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,700	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	6,734	pcph	11,750	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	966	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,283	pcphpl
Average passenger-car speed, S	65.0	mph
Volume-to-capacity ratio, v/c	0.55	
Density, D	19.7	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,198	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,631	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	6,720	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,344	pcphpl
Average passenger-car speed, S	65.0	mph
Volume-to-capacity ratio, v/c	0.57	
Density, D	20.7	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	5,958	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,568	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	6,460	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,615	pcphpl
Average passenger-car speed, S	64.3	mph
Volume-to-capacity ratio, v/c	0.69	
Density, D	25.1	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,735	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,772	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,302	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,826	pcphpl
Average passenger-car speed, S	62.4	mph
Volume-to-capacity ratio, v/c	0.78	
Density, D	29.2	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	5,476	482	722	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,441	127	190	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	5,937	515	783	0	pcph

Volume ratio, VR	0.179

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,298	lc/h
Weaving lane changes, LC_W	1,008	lc/h
Non-weaving vehicle index, I_{NW}	237	
Non-weaving lane change, LC_{NW}	368	lc/h
Total lane changes, LC_{ALL}	1,377	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Existing Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.035	
Average weaving speed, S_W	39.6	mph
Average non-weaving speed, S_{NW}	48.7	mph
Weaving segment speed, S	46.8	mph
Weaving segment density, D	30.9	pcpmpl
Level of Service, LOS	D	
Weaving segment volume-to-capacity ratio, v/c	0.71	
Weaving segment flow rate, v	7,235	pcph
Weaving segment capacity, c_W	9,875	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	6,728	pcph	11,750	pcph	No
Exiting freeway volume	6,471	pcph	9,400	pcph	No
On-ramp volume	515	pcph	2,000	pcph	No
Off-ramp volume	771	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	4,326	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,034	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.71	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	5,464	1,271	494	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,438	334	130	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	5,924	1,358	536	0	pcph

Volume ratio, VR	0.242

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,894	lc/h
Weaving lane changes, LC_W	1,887	lc/h
Non-weaving vehicle index, I_{NW}	770	
Non-weaving lane change, LC_{NW}	802	lc/h
Total lane changes, LC_{ALL}	2,689	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Existing Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	0.693	
Average weaving speed, S_W	44.5	mph
Average non-weaving speed, S_{NW}	42.0	mph
Weaving segment speed, S	42.6	mph
Weaving segment density, D	45.9	pcpmpl
Level of Service, LOS	E	
Weaving segment volume-to-capacity ratio, v/c	0.97	
Weaving segment flow rate, v	7,818	pcph
Weaving segment capacity, c_W	7,842	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	6,480	pcph	9,400	pcph	No
Exiting freeway volume	7,310	pcph	9,400	pcph	No
On-ramp volume	1,358	pcph	2,100	pcph	No
Off-ramp volume	528	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	4,972	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,019	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.97	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	5,948	1,018	788	263	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,565	268	207	69	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,448	1,087	854	280	pcph

Volume ratio, VR	0.224

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,941	lc/h
Weaving lane changes, LC_W	1,798	lc/h
Non-weaving vehicle index, I_{NW}	-108	
Non-weaving lane change, LC_{NW}	572	lc/h
Total lane changes, LC_{ALL}	2,370	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Existing Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	40.6	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.10	
Weaving segment flow rate, v	8,670	pcph
Weaving segment capacity, c_W	7,685	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,322	pcph	9,400	pcph	No
Exiting freeway volume	7,568	pcph	9,400	pcph	No
On-ramp volume	1,368	pcph	2,100	pcph	No
Off-ramp volume	1,122	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	4,782	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,978	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.10	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,504	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,712	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,052	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	6,876	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	175	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,763	pcphpl
Average passenger-car speed, S	63.1	mph
Volume-to-capacity ratio, v/c	0.75	
Density, D	27.9	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,340	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,668	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	6,874	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,718	pcphpl
Average passenger-car speed, S	63.6	mph
Volume-to-capacity ratio, v/c	0.73	
Density, D	27.0	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,960	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,832	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,546	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	6,884	pcph	9,400	pcph	No
Exiting freeway volume		pcph		pcph	
On-ramp volume	662	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,887	pcphpl
Average passenger-car speed, S	61.6	mph
Volume-to-capacity ratio, v/c	0.80	
Density, D	30.6	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,169	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,150	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,857	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	8,291	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	566	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,214	pcphpl
Average passenger-car speed, S	55.6	mph
Volume-to-capacity ratio, v/c	0.94	
Density, D	39.8	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Existing Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,699	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,289	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,432	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,358	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,106	1,063	474	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,870	280	125	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,704	1,136	514	214	pcph

Volume ratio, VR	0.172

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,650	lc/h
Weaving lane changes, LC_W	1,518	lc/h
Non-weaving vehicle index, I_{NW}	523	
Non-weaving lane change, LC_{NW}	1,040	lc/h
Total lane changes, LC_{ALL}	2,558	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Existing Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.137	
Average weaving speed, S_W	38.4	mph
Average non-weaving speed, S_{NW}	41.6	mph
Weaving segment speed, S	41.0	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.17	
Weaving segment flow rate, v	9,568	pcph
Weaving segment capacity, c_W	7,962	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	8,238	pcph	9,400	pcph	No
Exiting freeway volume	8,868	pcph	9,400	pcph	No
On-ramp volume	1,349	pcph	2,000	pcph	No
Off-ramp volume	720	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	4,256	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,050	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.17	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,219	2,120	1,480	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,900	558	389	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,827	2,265	1,605	267	pcph

Volume ratio, VR	0.323

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	3,870	lc/h
Weaving lane changes, LC_W	3,832	lc/h
Non-weaving vehicle index, I_{NW}	923	
Non-weaving lane change, LC_{NW}	1,206	lc/h
Total lane changes, LC_{ALL}	5,038	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Existing Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.261	
Average weaving speed, S_W	37.1	mph
Average non-weaving speed, S_{NW}	22.8	mph
Weaving segment speed, S	26.0	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.61	
Weaving segment flow rate, v	11,964	pcph
Weaving segment capacity, c_W	7,206	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,469	pcph	9,400	pcph	Yes
Exiting freeway volume	10,153	pcph	9,400	pcph	Yes
On-ramp volume	2,532	pcph	4,000	pcph	No
Off-ramp volume	1,848	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	5,837	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,947	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.61	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Existing With Project Mitigated

FEHR PEERS

Queues
1: Linden Ave. & Miller Ave.

9/10/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	146	80	305	13	188	228
v/c Ratio	0.35	0.16	0.73	0.03	0.48	0.45
Control Delay	20.4	5.8	32.3	0.1	20.3	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	5.8	32.3	0.1	20.3	20.2
Queue Length 50th (ft)	42	0	99	0	45	63
Queue Length 95th (ft)	86	26	#206	0	m105	119
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	416	493	419	488	391	506
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	0.35	0.16	0.73	0.03	0.48	0.45

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	96	75	112	175	12	28	118	30	8	173	33
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.98	
Flt Protected		0.99	1.00		0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1835	1583		1827	1583		1806			1821	
Flt Permitted		0.81	1.00		0.82	1.00		0.76			0.99	
Satd. Flow (perm)		1513	1583		1526	1583		1378			1803	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	102	80	119	186	13	30	126	32	9	184	35
RTOR Reduction (vph)	0	0	58	0	0	9	0	12	0	0	11	0
Lane Group Flow (vph)	0	146	22	0	305	4	0	176	0	0	217	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		416	435		419	435		378			495	
v/s Ratio Prot												
v/s Ratio Perm		0.10	0.01		c0.20	0.00		c0.13			c0.12	
v/c Ratio		0.35	0.05		0.73	0.01		0.46			0.44	
Uniform Delay, d1		17.5	16.0		19.7	15.8		18.1			17.9	
Progression Factor		1.00	1.00		1.00	1.00		0.94			1.00	
Incremental Delay, d2		2.3	0.2		10.6	0.0		4.0			2.8	
Delay (s)		19.8	16.2		30.3	15.8		21.0			20.7	
Level of Service		B	B		C	B		C			C	
Approach Delay (s)		18.5			29.7			21.0			20.7	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	158	395	407	263	514
v/c Ratio	0.66	0.46	0.46	0.49	0.74
Control Delay	52.8	18.9	18.8	49.6	43.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	18.9	18.8	49.6	43.0
Queue Length 50th (ft)	95	161	165	94	158
Queue Length 95th (ft)	162	281	287	m113	202
Internal Link Dist (ft)			385	131	284
Turn Bay Length (ft)					
Base Capacity (vph)	265	883	912	588	777
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	0.45	0.45	0.45	0.66

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	144	571	158	1	121	118	0	0	409	59
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	0.95	0.95			0.95			0.95	
Frpb, ped/bikes			1.00	1.00	1.00			1.00			0.99	
Flpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	
Frt			0.86	1.00	1.00			1.00			0.98	
Flt Protected			1.00	0.95	0.97			0.98			1.00	
Satd. Flow (prot)			1565	1633	1685			3470			3349	
Flt Permitted			1.00	0.95	0.97			0.98			1.00	
Satd. Flow (perm)			1565	1633	1685			3470			3349	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	158	627	174	1	133	130	0	0	449	65
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	158	395	407	0	0	263	0	0	502	0
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split	NA		Split	NA			NA	
Protected Phases			1	6	6		1	1			4	
Permitted Phases												
Actuated Green, G (s)			15.4	52.3	52.3			15.4			20.3	
Effective Green, g (s)			15.4	52.3	52.3			15.4			20.3	
Actuated g/C Ratio			0.15	0.52	0.52			0.15			0.20	
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	
Lane Grp Cap (vph)			241	854	881			534			679	
v/s Ratio Prot			c0.10	c0.24	0.24			0.08			c0.15	
v/s Ratio Perm												
v/c Ratio			0.66	0.46	0.46			0.49			0.74	
Uniform Delay, d1			39.8	15.0	15.0			38.7			37.4	
Progression Factor			1.00	1.00	1.00			1.24			1.00	
Incremental Delay, d2			6.9	1.8	1.7			0.6			4.2	
Delay (s)			46.7	16.8	16.7			48.7			41.6	
Level of Service			D	B	B			D			D	
Approach Delay (s)		46.7			16.8			48.7			41.6	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	31.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	232	160	16	179	117
v/c Ratio	0.67	0.88	0.05	0.15	0.09
Control Delay	30.8	67.7	10.4	1.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	67.7	10.4	1.9	3.6
Queue Length 50th (ft)	77	68	0	7	10
Queue Length 95th (ft)	120	112	12	m24	30
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	900	511	810	1227	1287
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	0.26	0.31	0.02	0.15	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	128	55	68	70	14	25	66	63	9	73	19
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.96			1.00	0.85		0.94			0.97	
Flt Protected		1.00			0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1786			1818	1583		1746			1808	
Flt Permitted		0.97			0.54	1.00		0.96			0.98	
Satd. Flow (perm)		1737			1007	1583		1684			1783	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	19	149	64	79	81	16	29	77	73	10	85	22
RTOR Reduction (vph)	0	33	0	0	0	13	0	16	0	0	6	0
Lane Group Flow (vph)	0	199	0	0	160	3	0	163	0	0	111	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		12.7			12.7	12.7		50.3			50.3	
Effective Green, g (s)		12.7			12.7	12.7		50.3			50.3	
Actuated g/C Ratio		0.18			0.18	0.18		0.72			0.72	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		315			182	287		1210			1281	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.16	0.00		c0.10			0.06	
v/c Ratio		0.63			0.88	0.01		0.13			0.09	
Uniform Delay, d1		26.5			27.9	23.5		3.1			3.0	
Progression Factor		1.00			1.00	1.00		0.59			1.00	
Incremental Delay, d2		3.0			33.9	0.0		0.2			0.1	
Delay (s)		29.5			61.8	23.5		2.0			3.1	
Level of Service		C			E	C		A			A	
Approach Delay (s)		29.5			58.3			2.0			3.1	
Approach LOS		C			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	40	1034	739	69	21
v/c Ratio	0.32	0.24	0.20	0.47	0.14
Control Delay	42.7	1.4	5.1	53.0	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	1.4	5.1	53.0	18.4
Queue Length 50th (ft)	25	30	28	43	0
Queue Length 95th (ft)	m35	m30	101	84	22
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	223	4255	3696	309	288
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	0.18	0.24	0.20	0.22	0.07

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	38	993	673	36	66	20
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4684		1719	1488
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4684		1719	1488
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	40	1034	701	38	69	21
RTOR Reduction (vph)	0	0	2	0	0	19
Lane Group Flow (vph)	40	1034	737	0	69	2
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	4.8	84.5	75.7		7.5	7.5
Effective Green, g (s)	4.8	84.5	75.7		7.5	7.5
Actuated g/C Ratio	0.05	0.84	0.76		0.08	0.08
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)	82	4174	3545		128	111
v/s Ratio Prot	c0.02	c0.21	0.16		c0.04	
v/s Ratio Perm						0.00
v/c Ratio	0.49	0.25	0.21		0.54	0.01
Uniform Delay, d1	46.4	1.5	3.5		44.6	42.8
Progression Factor	0.86	0.78	1.24		1.00	1.00
Incremental Delay, d2	1.2	0.1	0.1		2.2	0.0
Delay (s)	41.2	1.3	4.5		46.8	42.8
Level of Service	D	A	A		D	D
Approach Delay (s)		2.8	4.5		45.9	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	5.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1070	16	367	349	799
v/c Ratio	0.63	0.15	0.20	0.40	0.87
Control Delay	27.0	26.7	17.3	17.0	26.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	26.7	17.3	17.0	26.7
Queue Length 50th (ft)	178	6	40	122	294
Queue Length 95th (ft)	212	19	50	234	#658
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2397	137	2923	875	923
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	23	0	0	0	1
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.45	0.12	0.13	0.40	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	770	289	16	363	346	791
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		1.00	0.91	1.00	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4651		1719	4715	1641	1506
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4651		1719	4715	1641	1506
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	778	292	16	367	349	799
RTOR Reduction (vph)	92	0	0	0	0	120
Lane Group Flow (vph)	978	0	16	367	349	679
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	32.0		2.6	38.6	53.4	53.4
Effective Green, g (s)	32.0		2.6	38.6	53.4	53.4
Actuated g/C Ratio	0.32		0.03	0.39	0.53	0.53
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)	1488		44	1819	876	804
v/s Ratio Prot	c0.21		c0.01	0.08	0.21	
v/s Ratio Perm						c0.45
v/c Ratio	0.66		0.36	0.20	0.40	0.84
Uniform Delay, d1	29.3		47.9	20.4	13.8	19.8
Progression Factor	1.06		0.53	0.87	1.00	1.00
Incremental Delay, d2	2.2		1.8	0.2	0.1	7.8
Delay (s)	33.3		27.4	18.1	13.9	27.6
Level of Service	C		C	B	B	C
Approach Delay (s)	33.3			18.5	23.4	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	168	1277	122	337	84	667	283	172
v/c Ratio	0.28	0.74	0.77	0.62	0.21	0.87	0.87	0.32
Control Delay	20.7	24.2	70.5	31.9	35.4	26.5	68.0	30.0
Queue Delay	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	25.0	70.5	31.9	35.4	26.5	68.0	30.0
Queue Length 50th (ft)	60	250	80	59	50	140	179	37
Queue Length 95th (ft)	m93	222	#169	86	m53	m138	#362	69
Internal Link Dist (ft)		284		599		325		294
Turn Bay Length (ft)	170		195		210		200	
Base Capacity (vph)	596	1734	168	1646	399	874	325	1076
Starvation Cap Reductn	0	198	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.83	0.73	0.20	0.21	0.76	0.87	0.16

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	1111	115	117	243	81	81	294	347	272	110	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, 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		1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	0.92		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)	1719	4854		1719	4571		1586	3012		1662	3176	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1719	4854		1719	4571		1586	3012		1662	3176	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	168	1157	120	122	253	84	84	306	361	283	115	57
RTOR Reduction (vph)	0	12	0	0	76	0	0	190	0	0	48	0
Lane Group Flow (vph)	168	1265	0	122	261	0	84	477	0	283	124	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	34.8	34.6		9.3	9.3		23.6	19.3		20.4	15.5	
Effective Green, g (s)	34.8	34.6		9.3	9.3		23.6	19.3		20.4	15.5	
Actuated g/C Ratio	0.35	0.35		0.09	0.09		0.24	0.19		0.20	0.16	
Clearance Time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	598	1679		159	425		374	581		339	492	
v/s Ratio Prot	0.10	c0.26		c0.07	0.06		c0.05	c0.16		c0.17	0.04	
v/s Ratio Perm												
v/c Ratio	0.28	0.75		0.77	0.61		0.22	0.82		0.83	0.25	
Uniform Delay, d1	23.6	28.9		44.3	43.6		30.8	38.7		38.2	37.2	
Progression Factor	0.80	0.78		0.91	0.84		1.25	0.85		1.00	1.00	
Incremental Delay, d2	0.1	2.4		17.7	6.4		0.0	3.6		15.4	0.1	
Delay (s)	18.9	25.0		57.9	43.0		38.6	36.6		53.6	37.2	
Level of Service	B	C		E	D		D	D		D	D	
Approach Delay (s)		24.3			47.0			36.8			47.4	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	655	359	42	252	201
v/c Ratio	0.82	0.52	0.05	0.35	0.28
Control Delay	25.1	15.3	5.0	14.9	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.1	15.3	5.0	14.9	19.8
Queue Length 50th (ft)	207	93	3	65	77
Queue Length 95th (ft)	278	136	14	105	95
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	859	744	827	725	709
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	0.76	0.48	0.05	0.35	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	415	44	66	225	34	20	123	61	23	108	32
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	
Frt		0.99			1.00	0.85		0.96			0.97	
Flt Protected		0.99			0.99	1.00		1.00			0.99	
Satd. Flow (prot)		1830			1842	1583		1779			1800	
Flt Permitted		0.90			0.78	1.00		0.96			0.94	
Satd. Flow (perm)		1661			1447	1583		1723			1708	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	89	512	54	81	278	42	25	152	75	28	133	40
RTOR Reduction (vph)	0	5	0	0	0	14	0	21	0	0	12	0
Lane Group Flow (vph)	0	650	0	0	359	28	0	231	0	0	189	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		33.4			33.4	33.4		28.6			28.6	
Effective Green, g (s)		33.4			33.4	33.4		28.6			28.6	
Actuated g/C Ratio		0.48			0.48	0.48		0.41			0.41	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		792			690	755		703			697	
v/s Ratio Prot												
v/s Ratio Perm		c0.39			0.25	0.02		c0.13			0.11	
v/c Ratio		0.82			0.52	0.04		0.33			0.27	
Uniform Delay, d1		15.7			12.7	9.7		14.1			13.8	
Progression Factor		1.00			1.00	1.00		1.00			1.36	
Incremental Delay, d2		7.1			0.9	0.0		1.3			0.9	
Delay (s)		22.9			13.7	9.8		15.4			19.7	
Level of Service		C			B	A		B			B	
Approach Delay (s)		22.9			13.2			15.4			19.7	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	563	55	252	32	119	105
v/c Ratio	0.58	0.06	0.27	0.04	0.22	0.18
Control Delay	12.4	4.5	6.0	1.9	14.3	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.4	4.5	6.0	1.9	14.3	10.5
Queue Length 50th (ft)	125	4	29	0	27	16
Queue Length 95th (ft)	207	17	57	m2	60	45
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	977	857	936	859	539	578
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	0.58	0.06	0.27	0.04	0.22	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	508	52	22	215	30	45	54	13	22	39	39
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.95	
Flt Protected		1.00	1.00		1.00	1.00		0.98			0.99	
Satd. Flow (prot)		1859	1583		1854	1583		1797			1745	
Flt Permitted		0.98	1.00		0.94	1.00		0.87			0.94	
Satd. Flow (perm)		1834	1583		1754	1583		1596			1654	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	540	55	23	229	32	48	57	14	23	41	41
RTOR Reduction (vph)	0	0	13	0	0	15	0	8	0	0	27	0
Lane Group Flow (vph)	0	563	42	0	252	17	0	111	0	0	78	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		978	844		935	844		532			551	
v/s Ratio Prot												
v/s Ratio Perm		c0.31	0.03		0.14	0.01		c0.07			0.05	
v/c Ratio		0.58	0.05		0.27	0.02		0.21			0.14	
Uniform Delay, d1		9.4	6.7		7.6	6.6		14.3			14.0	
Progression Factor		1.00	1.00		0.68	0.64		1.00			1.00	
Incremental Delay, d2		2.5	0.1		0.6	0.0		0.9			0.5	
Delay (s)		11.9	6.8		5.8	4.3		15.2			14.5	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		11.4			5.6			15.2			14.5	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	697	44	274	28	113	312
v/c Ratio	0.89	0.06	0.57	0.04	0.15	0.43
Control Delay	27.6	7.9	18.7	5.3	8.3	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	7.9	18.7	5.3	8.3	13.5
Queue Length 50th (ft)	116	2	71	1	16	77
Queue Length 95th (ft)	#400	m14	141	13	41	m147
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	786	696	478	699	752	729
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	0.89	0.06	0.57	0.04	0.15	0.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	614	41	41	214	26	15	59	32	69	173	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	4.0		4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.98	
Flt Protected		1.00	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1858	1583		1848	1583		1775			1799	
Flt Permitted		0.97	1.00		0.59	1.00		0.95			0.91	
Satd. Flow (perm)		1814	1583		1105	1583		1692			1657	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	37	660	44	44	230	28	16	63	34	74	186	52
RTOR Reduction (vph)	0	0	10	0	0	14	0	19	0	0	12	0
Lane Group Flow (vph)	0	697	34	0	274	14	0	94	0	0	300	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		786	685		478	685		733			718	
v/s Ratio Prot												
v/s Ratio Perm		c0.38	0.02		0.25	0.01		0.06			c0.18	
v/c Ratio		0.89	0.05		0.57	0.02		0.13			0.42	
Uniform Delay, d1		15.6	9.8		12.8	9.7		10.2			11.8	
Progression Factor		0.76	1.08		1.00	1.00		1.00			1.04	
Incremental Delay, d2		13.1	0.1		4.9	0.1		0.4			1.6	
Delay (s)		25.0	10.8		17.7	9.8		10.6			13.8	
Level of Service		C	B		B	A		B			B	
Approach Delay (s)		24.1			17.0			10.6			13.8	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
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

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	309	567	208	152	107	703	323	664	145
v/c Ratio	0.86	1.09	0.96	0.51	0.29	0.95	1.05	0.95	0.21
Control Delay	59.7	98.1	97.0	55.8	16.8	59.3	98.7	58.5	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	98.1	97.0	55.8	16.8	59.3	98.7	58.5	5.5
Queue Length 50th (ft)	185	~396	63	82	8	165	~243	236	11
Queue Length 95th (ft)	#308	#606	#146	136	74	#249	#449	#360	m34
Internal Link Dist (ft)		585		161		328		103	
Turn Bay Length (ft)	50								
Base Capacity (vph)	406	520	217	298	365	743	308	699	695
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	1.09	0.96	0.51	0.29	0.95	1.05	0.95	0.21

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	300	344	206	202	147	104	0	468	214	513	444	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)	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		0.97	1.00	1.00		0.91		0.91	0.91	1.00
Frpb, ped/bikes	1.00	0.97		1.00	1.00	0.98		1.00		1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.94		1.00	1.00	0.85		0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	0.98	1.00
Satd. Flow (prot)	1562	1513		2717	1660	1389		4132		1232	2795	1316
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00		0.95	0.56	1.00
Satd. Flow (perm)	1562	1513		2717	1660	1389		4132		1232	1586	1316
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	309	355	212	208	152	107	0	482	221	529	458	145
RTOR Reduction (vph)	0	21	0	0	0	88	0	0	0	0	0	77
Lane Group Flow (vph)	309	546	0	208	152	19	0	703	0	323	664	68
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Prot	NA		Prot	NA	Perm		NA		Prot	NA	Perm
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases						4						2
Actuated Green, G (s)	23.0	33.0		8.0	18.0	18.0		18.0		25.0	47.0	47.0
Effective Green, g (s)	23.0	33.0		8.0	18.0	18.0		18.0		25.0	47.0	47.0
Actuated g/C Ratio	0.23	0.33		0.08	0.18	0.18		0.18		0.25	0.47	0.47
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5		3.0	3.0	3.0		2.5		2.0	2.0	2.0
Lane Grp Cap (vph)	359	499		217	298	250		743		308	1047	618
v/s Ratio Prot	c0.20	c0.36		0.08	0.09			c0.17		c0.26	0.16	
v/s Ratio Perm						0.01					0.14	0.05
v/c Ratio	0.86	1.09		0.96	0.51	0.08		0.95		1.05	0.63	0.11
Uniform Delay, d1	37.0	33.5		45.8	37.0	34.1		40.5		37.5	20.0	14.8
Progression Factor	1.00	1.00		0.97	1.27	4.68		0.92		0.96	0.95	1.81
Incremental Delay, d2	18.4	68.1		48.5	1.5	0.1		19.6		61.9	0.8	0.3
Delay (s)	55.4	101.6		92.8	48.5	159.9		56.8		97.7	19.9	27.2
Level of Service	E	F		F	D	F		E		F	B	C
Approach Delay (s)		85.3			93.8			56.8			43.1	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	65.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	14	576	1496	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	15	613	1591	0	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	1409	1102			2204	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1409	1102			2204	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	130	206			235	

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	15	409	1796
Volume Left	0	0	0
Volume Right	15	0	1591
cSH	206	1700	1700
Volume to Capacity	0.07	0.24	1.06
Queue Length 95th (ft)	6	0	0
Control Delay (s)	23.8	0.0	0.0
Lane LOS	C		
Approach Delay (s)	23.8	0.0	
Approach LOS	C		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	419	234	116	144	320	304
v/c Ratio	0.62	1.19	0.30	0.37	0.23	0.83
Control Delay	24.1	155.8	22.0	23.9	1.2	43.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	155.8	22.0	23.9	1.2	43.8
Queue Length 50th (ft)	78	~130	37	50	0	119
Queue Length 95th (ft)	129	#261	79	96	14	#234
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	671	196	384	443	1480	419
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	0.62	1.19	0.30	0.33	0.22	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	295	76	218	91	17	5	129	298	41	215	27
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		0.99		1.00	0.99			1.00	1.00		0.99	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	0.98			1.00	0.85		0.99	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		2713		1413	1444			1484	2224		1449	
Flt Permitted		0.70		0.51	1.00			0.99	1.00		0.94	
Satd. Flow (perm)		1901		754	1444			1472	2224		1377	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	317	82	234	98	18	5	139	320	44	231	29
RTOR Reduction (vph)	0	28	0	0	9	0	0	0	152	0	5	0
Lane Group Flow (vph)	0	391	0	234	107	0	0	144	168	0	299	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm	NA		Perm	NA		Perm	NA	custom	Perm	NA	
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		24.7		19.0	19.0			19.3	41.8		19.3	
Effective Green, g (s)		24.7		19.0	19.0			19.3	38.3		19.3	
Actuated g/C Ratio		0.34		0.26	0.26			0.26	0.52		0.26	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		643		196	375			389	1166		364	
v/s Ratio Prot					0.07				0.08			
v/s Ratio Perm		c0.21		c0.31				0.10			c0.22	
v/c Ratio		0.61		1.19	0.29			0.37	0.14		0.82	
Uniform Delay, d1		20.1		27.0	21.6			21.9	8.9		25.2	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		4.2		126.3	0.2			0.2	0.0		13.2	
Delay (s)		24.4		153.3	21.7			22.1	8.9		38.4	
Level of Service		C		F	C			C	A		D	
Approach Delay (s)		24.4			109.7			13.0			38.4	
Approach LOS		C			F			B			D	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	677	121	221	23	728	213
v/c Ratio	0.86	0.23	0.13	0.27	0.59	0.33
Control Delay	35.8	29.0	4.8	49.2	24.0	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	35.8	29.0	4.8	49.2	24.2	6.4
Queue Length 50th (ft)	153	39	9	14	213	7
Queue Length 95th (ft)	198	m69	m36	m15	m271	m9
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	986	563	1708	85	1273	654
Starvation Cap Reductn	0	0	0	0	99	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.21	0.13	0.27	0.62	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	372	284	117	214	22	706	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.94		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2569		2649	2731	1366	2731	1161
Flt Permitted	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2569		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	384	293	121	221	23	728	213
RTOR Reduction (vph)	156	0	0	0	0	0	121
Lane Group Flow (vph)	521	0	121	221	23	728	92
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type	NA		Prot	NA	Prot	NA	Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	24.6		19.8	60.2	2.6	43.0	43.0
Effective Green, g (s)	24.6		19.8	60.2	2.6	43.0	43.0
Actuated g/C Ratio	0.25		0.20	0.60	0.03	0.43	0.43
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	631		524	1644	35	1174	499
v/s Ratio Prot	c0.20		c0.05	0.08	0.02	c0.27	
v/s Ratio Perm							0.08
v/c Ratio	0.83		0.23	0.13	0.66	0.62	0.18
Uniform Delay, d1	35.7		33.7	8.6	48.3	22.2	17.6
Progression Factor	1.00		0.82	0.47	1.01	0.97	1.88
Incremental Delay, d2	8.3		0.1	0.2	13.3	1.0	0.3
Delay (s)	43.9		27.8	4.2	62.2	22.6	33.5
Level of Service	D		C	A	E	C	C
Approach Delay (s)	43.9			12.6		25.9	
Approach LOS	D			B		C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	49	245	124	194	405	235	188	683	230	803	56
v/c Ratio	0.29	0.62	0.43	0.64	0.61	0.46	0.76	0.98dr	0.36	0.72	0.10
Control Delay	43.4	48.7	12.1	37.6	31.7	13.1	59.8	19.1	19.5	28.4	1.9
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	43.4	48.7	12.1	37.6	31.7	13.1	59.8	19.1	19.5	28.4	1.9
Queue Length 50th (ft)	31	82	0	140	146	71	115	35	95	285	3
Queue Length 95th (ft)	68	119	50	220	194	132	186	92	m#251	#460	m8
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	250	585	365	366	810	572	304	972	633	1115	585
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	0.20	0.42	0.34	0.53	0.50	0.41	0.62	0.70	0.36	0.72	0.10

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.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	237	123	356	237	233	186	43	634	228	795	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.91	0.91	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98		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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3249	1468	1416	3128	1568	1694	2536		1662	3202	1489
Flt Permitted	0.95	1.00	1.00	0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3249	1468	1416	3128	1568	1694	2536		1662	3202	1489
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	55	239	124	360	239	235	188	43	640	230	803	56
RTOR Reduction (vph)	0	0	109	0	0	176	0	507	0	0	0	37
Lane Group Flow (vph)	49	245	15	194	405	59	188	176	0	230	803	19
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split	NA	Prot	Split	NA	Prot	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	12.1	12.1	12.1	21.3	21.3	21.3	14.7	11.4		38.1	34.8	34.8
Effective Green, g (s)	12.1	12.1	12.1	21.3	21.3	21.3	14.7	11.4		38.1	34.8	34.8
Actuated g/C Ratio	0.12	0.12	0.12	0.21	0.21	0.21	0.15	0.11		0.38	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	168	393	177	301	666	333	249	289		633	1114	518
v/s Ratio Prot	0.04	c0.08	0.01	c0.14	0.13	0.04	c0.11	0.07		c0.14	c0.25	
v/s Ratio Perm												0.01
v/c Ratio	0.29	0.62	0.08	0.64	0.61	0.18	0.76	0.98dr		0.36	0.72	0.04
Uniform Delay, d1	40.0	41.8	39.0	35.9	35.6	32.2	40.9	42.2		22.2	28.4	21.5
Progression Factor	1.00	1.00	1.00	0.82	0.81	2.12	1.00	1.00		0.63	0.73	1.46
Incremental Delay, d2	0.4	2.2	0.1	4.1	1.4	0.2	10.9	2.5		1.3	3.4	0.1
Delay (s)	40.4	44.0	39.1	33.4	30.2	68.4	51.9	44.7		15.3	24.1	31.5
Level of Service	D	D	D	C	C	E	D	D		B	C	C
Approach Delay (s)		42.1			41.7			46.2			22.6	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	67.4%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	518	314	288	26	107	495	850	6	153	249
v/c Ratio	0.99	0.47	0.39	0.20	0.57	0.52	0.84	0.03	0.67	0.61
Control Delay	72.1	25.1	7.3	45.6	52.6	23.8	26.4	51.0	69.3	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.1	25.1	7.3	45.6	52.6	23.8	26.4	51.0	69.3	25.5
Queue Length 50th (ft)	347	148	24	16	64	83	138	4	104	43
Queue Length 95th (ft)	#628	284	81	42	113	171	#360	m10	m144	m71
Internal Link Dist (ft)		732			379		1000		765	
Turn Bay Length (ft)	140			70		300		90		
Base Capacity (vph)	521	727	792	128	348	959	1013	290	329	474
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	0.99	0.43	0.36	0.20	0.31	0.52	0.84	0.02	0.47	0.53

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	508	186	404	25	98	7	485	489	344	6	150	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	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	0.95	0.95	1.00	1.00		0.97	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.97
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	0.94	0.85	1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1641	1620	1447	1556	1823		3335	3126		1531	1733	1434
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1641	1620	1447	1556	1823		3335	3126		1531	1733	1434
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)	518	190	412	26	100	7	495	499	351	6	153	249
RTOR Reduction (vph)	0	24	174	0	3	0	0	118	0	0	0	216
Lane Group Flow (vph)	518	290	114	26	104	0	495	732	0	6	153	33
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	31.8	39.7	39.7	4.6	12.5		26.5	26.5		13.2	13.2	13.2
Effective Green, g (s)	31.8	39.7	39.7	4.6	12.5		26.5	26.5		13.2	13.2	13.2
Actuated g/C Ratio	0.32	0.40	0.40	0.05	0.12		0.26	0.26		0.13	0.13	0.13
Clearance Time (s)	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
Lane Grp Cap (vph)	521	643	574	71	227		883	828		202	228	189
v/s Ratio Prot	c0.32	c0.18		0.02	c0.06		0.15	c0.23		0.00	c0.09	
v/s Ratio Perm			0.08									0.02
v/c Ratio	0.99	0.45	0.20	0.37	0.46		0.56	0.88		0.03	0.67	0.17
Uniform Delay, d1	34.0	22.2	19.7	46.3	40.6		31.7	35.3		37.8	41.3	38.6
Progression Factor	1.03	1.05	1.80	1.00	1.00		0.72	0.67		1.46	1.39	3.85
Incremental Delay, d2	34.3	0.2	0.1	1.2	0.5		2.0	10.7		0.0	5.4	0.1
Delay (s)	69.3	23.5	35.6	47.5	41.2		24.9	34.2		55.2	62.9	148.5
Level of Service	E	C	D	D	D		C	C		E	E	F
Approach Delay (s)		47.8			42.4			30.8			115.0	
Approach LOS		D			D			C			F	

Intersection Summary			
HCM 2000 Control Delay	49.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	563	575	391	25	13	176	294	13	365	99
v/c Ratio	0.72	0.73	0.46	0.14	0.07	0.72	0.27	0.15	0.64	0.30
Control Delay	25.0	25.5	6.5	1.6	0.8	38.0	15.7	54.0	54.1	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	25.5	6.5	1.6	0.8	38.0	15.7	54.0	54.1	19.0
Queue Length 50th (ft)	291	302	44	0	0	113	50	8	110	13
Queue Length 95th (ft)	377	391	95	0	0	#216	138	m22	#221	54
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	780	783	850	470	433	256	1094	127	568	333
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	0.72	0.73	0.46	0.05	0.03	0.69	0.27	0.10	0.64	0.30

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1048	10	364	17	0	6	13	164	261	12	12	339
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		0.99		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	1.00		1.00	1.00
Frt	1.00	1.00	0.85		0.96		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1523	1408		1467		1326	1597	3162		1597	3195
Flt Permitted	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1523	1408		1467		1326	1597	3162		1597	3195
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1127	11	391	18	0	6	14	176	281	13	13	365
RTOR Reduction (vph)	0	0	127	0	24	0	13	0	3	0	0	0
Lane Group Flow (vph)	563	575	264	0	1	0	0	176	291	0	13	365
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split	NA	Perm	Split	NA		Perm	Prot	NA		Prot	NA
Protected Phases	4	4		3	3			1	6		5	2
Permitted Phases			4				3					
Actuated Green, G (s)	51.5	51.5	51.5		2.7		2.7	15.3	30.9		1.4	16.5
Effective Green, g (s)	51.5	51.5	51.5		2.7		2.7	15.3	30.9		1.4	16.5
Actuated g/C Ratio	0.52	0.52	0.52		0.03		0.03	0.15	0.31		0.01	0.16
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	781	784	725		39		35	244	977		22	527
v/s Ratio Prot	0.37	c0.38			c0.00			c0.11	0.09		0.01	c0.11
v/s Ratio Perm			0.19				0.00					
v/c Ratio	0.72	0.73	0.36		0.02		0.01	0.72	0.30		0.59	0.69
Uniform Delay, d1	18.7	18.9	14.5		47.4		47.3	40.3	26.3		49.0	39.4
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.49	0.59		1.13	1.22
Incremental Delay, d2	2.8	3.1	0.1		0.1		0.0	9.5	0.7		23.7	6.9
Delay (s)	21.5	22.0	14.6		47.4		47.4	29.4	16.1		79.1	54.8
Level of Service	C	C	B		D		D	C	B		E	D
Approach Delay (s)		19.9			47.4				21.1			61.0
Approach LOS		B			D				C			E

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	92
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1381
Flt Permitted	1.00
Satd. Flow (perm)	1381
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	99
RTOR Reduction (vph)	83
Lane Group Flow (vph)	16
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	16.5
Effective Green, g (s)	16.5
Actuated g/C Ratio	0.16
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	227
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.07
Uniform Delay, d1	35.3
Progression Factor	2.29
Incremental Delay, d2	0.6
Delay (s)	81.3
Level of Service	F
Approach Delay (s)	
Approach LOS	

Intersection Summary

Queues
1: Linden Ave. & Miller Ave.

9/10/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	113	102	498	34	250	274
v/c Ratio	0.36	0.17	0.96	0.06	0.69	0.59
Control Delay	19.5	4.7	53.6	1.6	27.9	25.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	4.7	53.6	1.6	27.9	25.0
Queue Length 50th (ft)	31	0	173	0	87	82
Queue Length 95th (ft)	69	27	#345	6	#176	151
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	317	583	521	563	364	461
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	0.36	0.17	0.96	0.06	0.69	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	61	101	149	344	34	33	176	39	9	223	40
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.98	
Flt Protected		0.98	1.00		0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1822	1583		1835	1583		1812			1823	
Flt Permitted		0.52	1.00		0.86	1.00		0.77			0.99	
Satd. Flow (perm)		975	1583		1606	1583		1412			1805	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	51	62	102	151	347	34	33	178	39	9	225	40
RTOR Reduction (vph)	0	0	69	0	0	23	0	11	0	0	11	0
Lane Group Flow (vph)	0	113	33	0	498	11	0	239	0	0	264	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		19.5	19.5		19.5	19.5		15.0			15.0	
Effective Green, g (s)		19.5	19.5		19.5	19.5		15.0			15.0	
Actuated g/C Ratio		0.32	0.32		0.32	0.32		0.25			0.25	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		316	514		521	514		353			451	
v/s Ratio Prot												
v/s Ratio Perm		0.12	0.02		c0.31	0.01		c0.17			c0.15	
v/c Ratio		0.36	0.06		0.96	0.02		0.68			0.58	
Uniform Delay, d1		15.5	14.0		19.8	13.8		20.3			19.8	
Progression Factor		1.00	1.00		1.00	1.00		0.85			1.00	
Incremental Delay, d2		3.1	0.2		29.9	0.1		9.6			5.5	
Delay (s)		18.6	14.2		49.7	13.8		26.8			25.2	
Level of Service		B	B		D	B		C			C	
Approach Delay (s)		16.5			47.4			26.8			25.2	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	163	389	467	677	431
v/c Ratio	0.41	0.85	0.96	0.77	0.54
Control Delay	21.9	38.5	54.4	33.6	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	38.5	54.4	33.6	17.4
Queue Length 50th (ft)	39	111	140	200	53
Queue Length 95th (ft)	#107	#248	#302	m#251	78
Internal Link Dist (ft)			385	131	284
Turn Bay Length (ft)					
Base Capacity (vph)	395	457	487	874	1098
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	0.85	0.96	0.77	0.39

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	148	393	385	1	351	265	0	0	334	58
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	0.95	0.95			0.95			0.95	
Frpb, ped/bikes			1.00	1.00	1.00			1.00			0.99	
Flpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	
Frt			0.86	1.00	1.00			1.00			0.98	
Flt Protected			1.00	0.95	1.00			0.97			1.00	
Satd. Flow (prot)			1565	1633	1741			3465			3341	
Flt Permitted			1.00	0.95	1.00			0.97			1.00	
Satd. Flow (perm)			1565	1633	1741			3465			3341	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	163	432	423	1	386	291	0	0	367	64
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	32	0
Lane Group Flow (vph)	0	0	163	389	467	0	0	677	0	0	399	0
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split	NA		Split	NA			NA	
Protected Phases			1	6	6		1	1			4	
Permitted Phases												
Actuated Green, G (s)			12.6	14.0	14.0			12.6			11.4	
Effective Green, g (s)			12.6	14.0	14.0			12.6			11.4	
Actuated g/C Ratio			0.25	0.28	0.28			0.25			0.23	
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	
Lane Grp Cap (vph)			394	457	487			873			761	
v/s Ratio Prot			0.10	0.24	c0.27			c0.20			c0.12	
v/s Ratio Perm												
v/c Ratio			0.41	0.85	0.96			0.78			0.52	
Uniform Delay, d1			15.6	17.0	17.7			17.4			16.9	
Progression Factor			1.00	1.00	1.00			1.61			1.00	
Incremental Delay, d2			1.0	17.8	31.8			2.0			0.7	
Delay (s)			16.6	34.8	49.5			30.0			17.6	
Level of Service			B	C	D			C			B	
Approach Delay (s)		16.6			42.8			30.0			17.6	
Approach LOS		B			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	168	425	32	265	123
v/c Ratio	0.29	0.78	0.06	0.27	0.12
Control Delay	15.3	32.4	7.4	19.1	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.3	32.4	7.4	19.1	9.5
Queue Length 50th (ft)	50	185	4	94	22
Queue Length 95th (ft)	76	234	16	179	62
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	843	799	831	998	1009
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	0.20	0.53	0.04	0.27	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	99	30	132	259	29	16	164	64	5	85	24
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.97			1.00	0.85		0.96			0.97	
Flt Protected		0.99			0.98	1.00		1.00			1.00	
Satd. Flow (prot)		1799			1832	1583		1791			1806	
Flt Permitted		0.89			0.83	1.00		0.98			0.99	
Satd. Flow (perm)		1605			1542	1583		1768			1794	
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)	27	108	33	143	282	32	17	178	70	5	92	26
RTOR Reduction (vph)	0	15	0	0	0	14	0	12	0	0	9	0
Lane Group Flow (vph)	0	153	0	0	425	18	0	253	0	0	114	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		28.3			28.3	28.3		44.7			44.7	
Effective Green, g (s)		28.3			28.3	28.3		44.7			44.7	
Actuated g/C Ratio		0.35			0.35	0.35		0.56			0.56	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		567			545	559		987			1002	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.28	0.01		c0.14			0.06	
v/c Ratio		0.27			0.78	0.03		0.26			0.11	
Uniform Delay, d1		18.5			23.1	16.9		9.1			8.3	
Progression Factor		1.00			1.00	1.00		1.81			1.00	
Incremental Delay, d2		0.1			6.4	0.0		0.5			0.2	
Delay (s)		18.6			29.4	16.9		17.0			8.5	
Level of Service		B			C	B		B			A	
Approach Delay (s)		18.6			28.6			17.0			8.5	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
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			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	36	505	2446	15	83
v/c Ratio	0.30	0.12	0.64	0.14	0.48
Control Delay	41.8	1.5	6.0	46.4	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	1.5	6.0	46.4	19.7
Queue Length 50th (ft)	22	12	168	9	0
Queue Length 95th (ft)	m37	m26	m242	30	46
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	154	4362	3822	137	195
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	0.23	0.12	0.64	0.11	0.43

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	35	485	2300	48	14	80
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4703		1719	1474
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4703		1719	1474
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	36	505	2396	50	15	83
RTOR Reduction (vph)	0	0	1	0	0	79
Lane Group Flow (vph)	36	505	2445	0	15	4
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	4.6	86.7	78.1		5.3	5.3
Effective Green, g (s)	4.6	86.7	78.1		5.3	5.3
Actuated g/C Ratio	0.05	0.87	0.78		0.05	0.05
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)	79	4282	3673		91	78
v/s Ratio Prot	c0.02	0.10	c0.52		c0.01	
v/s Ratio Perm						0.00
v/c Ratio	0.46	0.12	0.67		0.16	0.06
Uniform Delay, d1	46.5	1.0	5.0		45.2	45.0
Progression Factor	0.82	1.34	0.97		1.00	1.00
Incremental Delay, d2	1.4	0.1	0.6		0.3	0.1
Delay (s)	39.6	1.4	5.4		45.5	45.1
Level of Service	D	A	A		D	D
Approach Delay (s)		3.9	5.4		45.2	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	504	52	1498	875	256
v/c Ratio	0.31	0.43	0.76	1.07	0.30
Control Delay	23.2	40.9	33.1	77.4	6.3
Queue Delay	0.0	0.0	1.7	0.0	0.0
Total Delay	23.2	40.9	34.8	77.4	6.3
Queue Length 50th (ft)	72	32	334	~622	24
Queue Length 95th (ft)	97	m43	m348	#928	80
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	1884	137	2404	821	844
Starvation Cap Reductn	0	0	689	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.38	0.87	1.07	0.30

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.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	364	135	51	1483	866	253
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		1.00	0.91	1.00	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4655		1719	4715	1641	1506
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4655		1719	4715	1641	1506
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	368	136	52	1498	875	256
RTOR Reduction (vph)	75	0	0	0	0	91
Lane Group Flow (vph)	429	0	52	1498	875	165
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	32.0		5.9	41.9	50.1	50.1
Effective Green, g (s)	32.0		5.9	41.9	50.1	50.1
Actuated g/C Ratio	0.32		0.06	0.42	0.50	0.50
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0		2.0	2.0	3.0	3.0
Lane Grp Cap (vph)	1489		101	1975	822	754
v/s Ratio Prot	0.09		0.03	c0.32	c0.53	
v/s Ratio Perm						0.11
v/c Ratio	0.29		0.51	0.76	1.06	0.22
Uniform Delay, d1	25.5		45.7	24.7	24.9	14.0
Progression Factor	1.17		0.77	1.29	1.00	1.00
Incremental Delay, d2	0.5		1.1	1.7	50.0	0.1
Delay (s)	30.4		36.4	33.5	74.9	14.1
Level of Service	C		D	C	E	B
Approach Delay (s)	30.4			33.6	61.2	
Approach LOS	C			C	E	

Intersection Summary			
HCM 2000 Control Delay	42.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	132	490	363	1146	228	182	78	611
v/c Ratio	1.10	0.33	0.89	0.99	0.69	0.16	0.55	0.81
Control Delay	162.7	30.4	69.1	60.2	50.7	15.3	58.6	36.7
Queue Delay	0.0	0.0	0.0	27.4	0.0	0.0	0.0	0.6
Total Delay	162.7	30.4	69.1	87.5	50.7	15.3	58.6	37.4
Queue Length 50th (ft)	~98	84	122	~408	132	26	48	147
Queue Length 95th (ft)	#221	120	#214	#542	#288	52	95	194
Internal Link Dist (ft)		284		599		325		294
Turn Bay Length (ft)	170		195		210		200	
Base Capacity (vph)	120	1485	407	1161	329	1129	166	1023
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	93	0	0	0	150
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.33	0.89	1.07	0.69	0.16	0.47	0.70

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	124	317	144	341	860	217	214	108	63	73	344	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Lane Util. Factor	1.00	0.91		0.97	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		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	0.95		1.00	0.97		1.00	0.94		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)	1719	4654		3335	3202		1586	3125		1662	3134	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1719	4654		3335	3202		1586	3125		1662	3134	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	132	337	153	363	915	231	228	115	67	78	366	245
RTOR Reduction (vph)	0	83	0	0	22	0	0	44	0	0	129	0
Lane Group Flow (vph)	132	407	0	363	1124	0	228	138	0	78	482	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.0	29.4		12.2	34.8		21.5	34.7		7.3	19.9	
Effective Green, g (s)	7.0	29.4		12.2	34.8		21.5	34.7		7.3	19.9	
Actuated g/C Ratio	0.07	0.29		0.12	0.35		0.22	0.35		0.07	0.20	
Clearance Time (s)	4.0	4.2		4.2	4.2		4.0	4.0		4.0	4.6	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	120	1368		406	1114		340	1084		121	623	
v/s Ratio Prot	c0.08	0.09		0.11	c0.35		c0.14	0.04		0.05	c0.15	
v/s Ratio Perm												
v/c Ratio	1.10	0.30		0.89	1.01		0.67	0.13		0.64	0.77	
Uniform Delay, d1	46.5	27.3		43.3	32.6		36.0	22.3		45.1	37.9	
Progression Factor	1.23	1.45		1.00	1.15		1.00	1.00		1.00	1.00	
Incremental Delay, d2	110.5	0.5		20.9	29.1		4.0	0.0		8.5	5.4	
Delay (s)	167.5	40.2		64.1	66.8		40.1	22.3		53.6	43.4	
Level of Service	F	D		E	E		D	C		D	D	
Approach Delay (s)		67.2			66.1			32.2			44.5	
Approach LOS		E			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	57.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	461	626	39	389	293
v/c Ratio	0.67	0.81	0.05	0.57	0.41
Control Delay	19.8	26.4	6.7	21.8	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	26.4	6.7	21.8	26.0
Queue Length 50th (ft)	145	229	6	142	110
Queue Length 95th (ft)	240	363	19	239	191
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	747	842	857	680	722
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	0.62	0.74	0.05	0.57	0.41

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	300	68	99	464	35	58	175	118	20	197	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	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.95			0.98	
Flt Protected		0.99			0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1811			1847	1583		1764			1811	
Flt Permitted		0.75			0.84	1.00		0.91			0.96	
Satd. Flow (perm)		1372			1566	1583		1613			1745	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	333	76	110	516	39	64	194	131	22	219	52
RTOR Reduction (vph)	0	10	0	0	0	7	0	21	0	0	9	0
Lane Group Flow (vph)	0	451	0	0	626	32	0	368	0	0	284	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		39.3			39.3	39.3		32.7			32.7	
Effective Green, g (s)		39.3			39.3	39.3		32.7			32.7	
Actuated g/C Ratio		0.49			0.49	0.49		0.41			0.41	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		673			769	777		659			713	
v/s Ratio Prot												
v/s Ratio Perm		0.33			c0.40	0.02		c0.23			0.16	
v/c Ratio		0.67			0.81	0.04		0.56			0.40	
Uniform Delay, d1		15.4			17.3	10.6		18.1			16.7	
Progression Factor		1.00			1.00	1.00		1.00			1.39	
Incremental Delay, d2		2.9			6.9	0.0		3.4			1.6	
Delay (s)		18.3			24.2	10.6		21.5			24.8	
Level of Service		B			C	B		C			C	
Approach Delay (s)		18.3			23.4			21.5			24.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	400	78	622	57	178	201
v/c Ratio	0.45	0.09	0.65	0.07	0.31	0.37
Control Delay	10.6	3.5	8.5	4.4	13.2	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	3.5	8.5	4.4	13.2	15.5
Queue Length 50th (ft)	80	4	89	3	36	46
Queue Length 95th (ft)	139	19	m99	m4	78	94
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	894	869	952	856	572	545
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	0.45	0.09	0.65	0.07	0.31	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	336	74	39	552	54	34	83	52	55	91	45
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.97	
Flt Protected		0.99	1.00		1.00	1.00		0.99			0.99	
Satd. Flow (prot)		1852	1583		1857	1583		1767			1778	
Flt Permitted		0.90	1.00		0.96	1.00		0.92			0.88	
Satd. Flow (perm)		1678	1583		1786	1583		1638			1582	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	46	354	78	41	581	57	36	87	55	58	96	47
RTOR Reduction (vph)	0	0	26	0	0	12	0	27	0	0	18	0
Lane Group Flow (vph)	0	400	52	0	622	45	0	151	0	0	183	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		894	844		952	844		546			527	
v/s Ratio Prot												
v/s Ratio Perm		0.24	0.03		c0.35	0.03		0.09			c0.12	
v/c Ratio		0.45	0.06		0.65	0.05		0.28			0.35	
Uniform Delay, d1		8.6	6.8		10.0	6.7		14.7			15.1	
Progression Factor		1.00	1.00		0.66	0.95		1.00			1.00	
Incremental Delay, d2		1.6	0.1		1.5	0.1		1.3			1.8	
Delay (s)		10.2	6.9		8.1	6.4		15.9			16.9	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		9.7			8.0			15.9			16.9	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	69	401	735	62	240	389
v/c Ratio	0.56	0.50	0.98	0.09	0.33	0.54
Control Delay	29.6	10.8	49.2	7.9	11.7	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	10.8	49.2	7.9	11.7	14.7
Queue Length 50th (ft)	12	65	249	8	49	103
Queue Length 95th (ft)	m#67	113	#465	27	94	m172
Internal Link Dist (ft)		455	585		365	321
Turn Bay Length (ft)	30			30		
Base Capacity (vph)	124	798	748	697	732	714
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	0.56	0.50	0.98	0.09	0.33	0.54

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	309	72	67	631	59	35	154	39	77	195	98
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	1.00	1.00			1.00	1.00		1.00			1.00	
Frt	1.00	0.97			1.00	0.85		0.98			0.96	
Flt Protected	0.95	1.00			1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	1810			1854	1583		1806			1778	
Flt Permitted	0.15	1.00			0.93	1.00		0.91			0.89	
Satd. Flow (perm)	287	1810			1727	1583		1661			1598	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	69	325	76	71	664	62	37	162	41	81	205	103
RTOR Reduction (vph)	0	14	0	0	0	11	0	12	0	0	22	0
Lane Group Flow (vph)	69	387	0	0	735	51	0	228	0	0	367	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	26.0	26.0			26.0	26.0		26.0			26.0	
Effective Green, g (s)	26.0	26.0			26.0	26.0		26.0			26.0	
Actuated g/C Ratio	0.43	0.43			0.43	0.43		0.43			0.43	
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)	124	784			748	685		719			692	
v/s Ratio Prot		0.21										
v/s Ratio Perm	0.24				c0.43	0.03		0.14			c0.23	
v/c Ratio	0.56	0.49			0.98	0.07		0.32			0.53	
Uniform Delay, d1	12.7	12.3			16.8	10.0		11.2			12.5	
Progression Factor	0.70	0.73			1.00	1.00		1.00			1.04	
Incremental Delay, d2	15.6	2.0			28.9	0.2		1.2			2.3	
Delay (s)	24.5	11.0			45.7	10.2		12.3			15.4	
Level of Service	C	B			D	B		B			B	
Approach Delay (s)		13.0			43.0			12.3			15.4	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	292	309	876	529	275	804	155	490	174
v/c Ratio	0.99	0.74	1.29	1.00	0.44	1.05	0.83	0.74	0.29
Control Delay	91.1	39.3	174.9	68.0	7.1	83.4	69.9	30.9	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	39.3	174.9	68.0	7.1	83.4	69.9	30.9	6.0
Queue Length 50th (ft)	187	148	~382	345	32	~230	108	137	6
Queue Length 95th (ft)	#356	#270	#508	#545	68	#321	m#171	m176	m24
Internal Link Dist (ft)		585		161		328		103	
Turn Bay Length (ft)	50								
Base Capacity (vph)	296	420	679	531	632	766	209	659	596
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	0.99	0.74	1.29	1.00	0.44	1.05	0.74	0.74	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	272	132	155	815	492	256	0	660	87	160	440	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)	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		0.97	1.00	1.00		0.91		0.91	0.91	1.00
Frpb, ped/bikes	1.00	0.96		1.00	1.00	0.99		1.00		1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.92		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1562	1455		2717	1660	1391		4288		1232	2944	1315
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00		0.95	0.94	1.00
Satd. Flow (perm)	1562	1455		2717	1660	1391		4288		1232	2782	1315
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	292	142	167	876	529	275	0	710	94	172	473	174
RTOR Reduction (vph)	0	42	0	0	0	187	0	0	0	0	0	110
Lane Group Flow (vph)	292	267	0	876	529	88	0	804	0	155	490	64
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Prot	NA		Prot	NA	Perm		NA		Prot	NA	Perm
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases						4						2
Actuated Green, G (s)	19.0	26.0		25.0	32.0	32.0		17.9		15.1	37.0	37.0
Effective Green, g (s)	19.0	26.0		25.0	32.0	32.0		17.9		15.1	37.0	37.0
Actuated g/C Ratio	0.19	0.26		0.25	0.32	0.32		0.18		0.15	0.37	0.37
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5		3.0	3.0	3.0		2.5		2.0	2.0	2.0
Lane Grp Cap (vph)	296	378		679	531	445		767		186	1053	486
v/s Ratio Prot	0.19	0.18		c0.32	c0.32			c0.19		c0.13	0.07	
v/s Ratio Perm						0.06					0.10	0.05
v/c Ratio	0.99	0.71		1.29	1.00	0.20		1.05		0.83	0.47	0.13
Uniform Delay, d1	40.4	33.5		37.5	33.9	24.7		41.0		41.2	24.0	20.9
Progression Factor	1.00	1.00		1.12	0.97	1.61		0.89		0.99	1.03	1.42
Incremental Delay, d2	48.2	5.5		139.1	33.1	0.2		45.0		21.2	0.1	0.5
Delay (s)	88.5	39.0		181.2	66.2	39.9		81.4		61.9	24.7	30.1
Level of Service	F	D		F	E	D		F		E	C	C
Approach Delay (s)		63.1			121.9			81.4			32.9	
Approach LOS		E			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	85.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	11	78	749	0	0
Sign Control	Yield		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)	0	12	85	814	0	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	492	449			899	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	492	449			899	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	506	557			751	

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	12	57	842
Volume Left	0	0	0
Volume Right	12	0	814
cSH	557	1700	1700
Volume to Capacity	0.02	0.03	0.50
Queue Length 95th (ft)	2	0	0
Control Delay (s)	11.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.6	0.0	
Approach LOS	B		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	285	370	282	229	299	385
v/c Ratio	0.71	1.20	0.54	0.63	0.19	1.18
Control Delay	39.0	145.1	25.8	37.9	1.0	141.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.0	145.1	25.8	37.9	1.0	141.0
Queue Length 50th (ft)	71	~257	117	115	0	~260
Queue Length 95th (ft)	#129	#428	196	194	13	#437
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	400	309	526	365	1582	325
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	0.71	1.20	0.54	0.63	0.19	1.18

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	167	43	344	205	58	22	191	278	60	218	80
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		0.99		1.00	0.99			1.00	1.00		0.98	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		0.98		1.00	0.97			1.00	0.85		0.97	
Flt Protected		0.99		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		2707		1413	1425			1479	2224		1409	
Flt Permitted		0.54		0.58	1.00			0.92	1.00		0.83	
Satd. Flow (perm)		1467		858	1425			1372	2224		1178	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	59	180	46	370	220	62	24	205	299	65	234	86
RTOR Reduction (vph)	0	18	0	0	12	0	0	0	111	0	12	0
Lane Group Flow (vph)	0	267	0	370	271	0	0	229	188	0	373	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm	NA		Perm	NA		Perm	NA	custom	Perm	NA	
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		23.5		32.5	32.5			24.0	60.0		24.0	
Effective Green, g (s)		23.5		32.5	32.5			24.0	56.5		24.0	
Actuated g/C Ratio		0.26		0.36	0.36			0.27	0.63		0.27	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		383		309	514			365	1396		314	
v/s Ratio Prot					0.19				0.08			
v/s Ratio Perm		c0.18		c0.43				0.17			c0.32	
v/c Ratio		0.70		1.20	0.53			0.63	0.13		1.19	
Uniform Delay, d1		30.0		28.8	22.7			29.1	6.8		33.0	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		10.1		115.9	0.5			2.4	0.0		112.3	
Delay (s)		40.1		144.7	23.1			31.5	6.8		145.3	
Level of Service		D		F	C			C	A		F	
Approach Delay (s)		40.1			92.1			17.5			145.3	
Approach LOS		D			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	73.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	599	279	415	2	1089	304
v/c Ratio	0.84	0.65	0.22	0.02	0.80	0.42
Control Delay	35.7	50.3	6.1	47.5	17.2	1.5
Queue Delay	0.0	0.0	0.0	0.0	1.3	0.3
Total Delay	35.7	50.3	6.1	47.5	18.5	1.8
Queue Length 50th (ft)	128	92	24	0	210	8
Queue Length 95th (ft)	174	m#164	m95	m1	m141	m11
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	984	427	1857	81	1362	731
Starvation Cap Reductn	0	0	0	0	118	115
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.65	0.22	0.02	0.88	0.49

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.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	331	250	271	403	2	1056	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.94		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2570		2649	2731	1366	2731	1161
Flt Permitted	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2570		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	341	258	279	415	2	1089	304
RTOR Reduction (vph)	160	0	0	0	0	0	162
Lane Group Flow (vph)	439	0	279	415	2	1089	142
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type	NA		Prot	NA	Prot	NA	Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	21.4		19.3	64.8	1.2	46.7	46.7
Effective Green, g (s)	21.4		19.3	64.8	1.2	46.7	46.7
Actuated g/C Ratio	0.21		0.19	0.65	0.01	0.47	0.47
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	549		511	1769	16	1275	542
v/s Ratio Prot	c0.17		c0.11	0.15	0.00	c0.40	
v/s Ratio Perm							0.12
v/c Ratio	0.80		0.55	0.23	0.12	0.85	0.26
Uniform Delay, d1	37.3		36.4	7.3	48.9	23.6	16.2
Progression Factor	1.00		1.06	0.77	1.07	0.78	0.76
Incremental Delay, d2	7.5		0.4	0.2	0.1	0.7	0.1
Delay (s)	44.7		39.0	5.8	52.3	19.1	12.4
Level of Service	D		D	A	D	B	B
Approach Delay (s)	44.7			19.2		17.7	
Approach LOS	D			B		B	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	109	227	257	1166	280	623	94	377	201	1437	96
v/c Ratio	0.62	0.56	0.79	0.99	0.57	0.83	0.93	0.40	0.75	1.20	0.16
Control Delay	55.8	46.0	33.7	62.6	38.1	20.8	121.4	6.6	64.7	124.9	7.2
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	55.8	46.0	33.7	62.6	38.1	20.8	121.4	6.6	64.7	124.9	7.2
Queue Length 50th (ft)	73	76	59	260	153	98	61	8	130	~585	5
Queue Length 95th (ft)	129	111	145	#406	254	#330	#160	48	m181	#718	m21
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	236	538	382	1175	494	753	101	944	365	1197	619
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	0.46	0.42	0.67	0.99	0.57	0.83	0.93	0.40	0.55	1.20	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	183	254	1154	277	617	93	35	339	199	1423	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.94	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98		1.00	1.00	0.97
Flpb, ped/bikes	1.00	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	0.86		1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3166	1468	4388	1845	1568	1694	2558		1662	3202	1473
Flt Permitted	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3166	1468	4388	1845	1568	1694	2558		1662	3202	1473
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	151	185	257	1166	280	623	94	35	342	201	1437	96
RTOR Reduction (vph)	0	0	140	0	0	333	0	249	0	0	0	60
Lane Group Flow (vph)	109	227	117	1166	280	290	94	128	0	201	1437	36
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split	NA	Prot	Split	NA	Prot	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	12.7	12.7	12.7	26.8	26.8	26.8	6.0	27.2		16.2	37.4	37.4
Effective Green, g (s)	12.7	12.7	12.7	26.8	26.8	26.8	6.0	27.2		16.2	37.4	37.4
Actuated g/C Ratio	0.13	0.13	0.13	0.27	0.27	0.27	0.06	0.27		0.16	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	176	402	186	1175	494	420	101	695		269	1197	550
v/s Ratio Prot	0.08	0.07	c0.08	c0.27	0.15	0.18	c0.06	0.05		0.12	c0.45	
v/s Ratio Perm												0.02
v/c Ratio	0.62	0.56	0.63	0.99	0.57	0.69	0.93	0.18		0.75	1.20	0.07
Uniform Delay, d1	41.4	41.1	41.4	36.5	31.6	32.9	46.8	27.9		39.9	31.3	20.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.29	0.90	2.05
Incremental Delay, d2	4.5	1.1	5.0	24.3	1.5	4.8	66.7	0.0		14.2	97.0	0.2
Delay (s)	45.9	42.1	46.5	60.8	33.1	37.7	113.5	27.9		65.7	125.1	41.4
Level of Service	D	D	D	E	C	D	F	C		E	F	D
Approach Delay (s)		44.7			50.1			45.0			113.6	
Approach LOS		D			D			D			F	

Intersection Summary			
HCM 2000 Control Delay	71.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	195	277	263	126	431	684	287	8	322	979
v/c Ratio	0.97	0.80	0.55	0.45	0.96	0.97	0.18	0.08	0.76	0.98
Control Delay	99.6	43.3	8.3	42.2	69.5	63.2	12.0	41.1	44.9	41.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.6	43.3	8.3	42.2	69.5	63.2	12.0	41.1	44.9	41.9
Queue Length 50th (ft)	112	121	0	65	242	200	36	4	170	167
Queue Length 95th (ft)	#246	198	62	#158	#427	#312	74	18	#294	#323
Internal Link Dist (ft)		732			379		1000		765	
Turn Bay Length (ft)	140			70		300		90		100
Base Capacity (vph)	200	451	565	280	450	708	1577	323	423	997
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	0.97	0.61	0.47	0.45	0.96	0.97	0.18	0.02	0.76	0.98

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	191	121	409	123	418	4	670	209	73	8	316	959
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	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	0.95	0.95	1.00	1.00		0.97	0.95		1.00	1.00	0.88
Frpb, ped/bikes	1.00	0.99	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.96
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	0.92	0.85	1.00	1.00		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1641	1571	1443	1556	1842		3335	3242		1531	1733	2493
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1641	1571	1443	1556	1842		3335	3242		1531	1733	2493
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)	195	123	417	126	427	4	684	213	74	8	322	979
RTOR Reduction (vph)	0	55	214	0	0	0	0	28	0	0	0	388
Lane Group Flow (vph)	195	222	49	126	431	0	684	259	0	8	322	591
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2									8
Actuated Green, G (s)	11.0	16.7	16.7	16.2	21.9		19.1	39.9		1.2	22.0	22.0
Effective Green, g (s)	11.0	16.7	16.7	16.2	21.9		19.1	39.9		1.2	22.0	22.0
Actuated g/C Ratio	0.12	0.19	0.19	0.18	0.24		0.21	0.44		0.01	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
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)	200	291	267	280	448		707	1437		20	423	609
v/s Ratio Prot	c0.12	c0.14		0.08	c0.23		c0.21	0.08		0.01	0.19	
v/s Ratio Perm			0.03									c0.24
v/c Ratio	0.97	0.76	0.18	0.45	0.96		0.97	0.18		0.40	0.76	0.97
Uniform Delay, d1	39.4	34.8	30.9	32.9	33.6		35.1	15.2		44.0	31.6	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	55.8	10.2	0.1	0.4	32.5		25.6	0.3		4.7	7.1	28.5
Delay (s)	95.1	45.0	31.0	33.3	66.2		60.7	15.4		48.8	38.7	62.1
Level of Service	F	D	C	C	E		E	B		D	D	E
Approach Delay (s)		53.3			58.7			47.3			56.3	
Approach LOS		D			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	53.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	397	396	169	28	11	300	491	38	633	220
v/c Ratio	0.84	0.83	0.31	0.16	0.06	0.58	0.31	0.35	0.95	0.54
Control Delay	47.7	47.0	5.2	1.8	0.7	22.0	12.5	52.2	67.3	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.7	47.0	5.2	1.8	0.7	22.0	12.5	52.2	67.3	18.4
Queue Length 50th (ft)	245	243	2	0	0	95	62	24	213	32
Queue Length 95th (ft)	329	326	42	0	0	153	186	55	#433	#145
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	542	544	607	466	441	519	1581	132	663	411
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	0.73	0.28	0.06	0.02	0.58	0.31	0.29	0.95	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	732	13	159	17	0	8	11	282	435	26	36	595
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.99		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	1.00
Frt	1.00	1.00	0.85		0.95		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1524	1405		1453		1358	1597	3153		1597	3195
Flt Permitted	0.95	0.95	1.00		0.97		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1524	1405		1453		1358	1597	3153		1597	3195
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	779	14	169	18	0	9	12	300	463	28	38	633
RTOR Reduction (vph)	0	0	113	0	27	0	11	0	3	0	0	0
Lane Group Flow (vph)	397	396	56	0	1	0	0	300	488	0	38	633
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split	NA	Perm	Split	NA		Prot	Prot	NA		Prot	NA
Protected Phases	4	4		3	3		3	1	6		5	2
Permitted Phases			4									
Actuated Green, G (s)	31.2	31.2	31.2		2.7		2.7	32.5	47.7		4.9	19.6
Effective Green, g (s)	31.2	31.2	31.2		2.7		2.7	32.5	47.7		4.9	19.6
Actuated g/C Ratio	0.31	0.31	0.31		0.03		0.03	0.32	0.48		0.05	0.20
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	473	475	438		39		36	519	1503		78	626
v/s Ratio Prot	c0.26	0.26			c0.00		0.00	c0.19	0.15		0.02	c0.20
v/s Ratio Perm			0.04									
v/c Ratio	0.84	0.83	0.13		0.02		0.01	0.58	0.32		0.49	1.01
Uniform Delay, d1	32.1	32.0	24.7		47.4		47.3	28.1	16.2		46.3	40.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.58	0.65		1.00	1.00
Incremental Delay, d2	11.9	11.4	0.0		0.1		0.0	1.5	0.6		1.7	38.8
Delay (s)	43.9	43.4	24.7		47.4		47.4	17.9	11.2		48.1	79.0
Level of Service	D	D	C		D		D	B	B		D	E
Approach Delay (s)		40.3			47.4				13.7			67.5
Approach LOS		D			D				B			E

Intersection Summary			
HCM 2000 Control Delay	41.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	207
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1384
Flt Permitted	1.00
Satd. Flow (perm)	1384
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	220
RTOR Reduction (vph)	129
Lane Group Flow (vph)	91
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	19.6
Effective Green, g (s)	19.6
Actuated g/C Ratio	0.20
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	271
v/s Ratio Prot	
v/s Ratio Perm	0.07
v/c Ratio	0.34
Uniform Delay, d1	34.6
Progression Factor	1.00
Incremental Delay, d2	3.3
Delay (s)	37.9
Level of Service	D
Approach Delay (s)	
Approach LOS	

Intersection Summary

Cumulative (2035) AM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	203	108	394	20	251	340
v/c Ratio	0.73	0.21	1.09	0.04	0.66	0.67
Control Delay	38.2	5.4	99.3	10.6	27.6	26.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	5.4	99.3	10.6	27.6	26.4
Queue Length 50th (ft)	66	0	~166	2	82	104
Queue Length 95th (ft)	#162	30	#312	15	m#164	#190
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	279	514	362	445	381	506
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	0.73	0.21	1.09	0.04	0.66	0.67

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	134	105	142	241	19	36	182	25	12	267	51
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.99			0.98	
Flt Protected		0.98	1.00		0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1833	1583		1829	1583		1823			1820	
Flt Permitted		0.55	1.00		0.71	1.00		0.74			0.99	
Satd. Flow (perm)		1016	1583		1314	1583		1359			1800	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	65	138	108	146	248	20	37	188	26	12	275	53
RTOR Reduction (vph)	0	0	78	0	0	10	0	7	0	0	11	0
Lane Group Flow (vph)	0	203	30	0	394	10	0	244	0	0	329	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		279	435		361	435		374			495	
v/s Ratio Prot												
v/s Ratio Perm		0.20	0.02		c0.30	0.01		c0.18			c0.18	
v/c Ratio		0.73	0.07		1.09	0.02		0.65			0.66	
Uniform Delay, d1		19.7	16.1		21.8	15.9		19.2			19.3	
Progression Factor		1.00	1.00		1.00	1.00		0.95			1.00	
Incremental Delay, d2		15.3	0.3		74.2	0.1		8.5			6.9	
Delay (s)		35.0	16.4		95.9	16.0		26.6			26.2	
Level of Service		D	B		F	B		C			C	
Approach Delay (s)		28.6			92.0			26.6			26.2	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM Average Control Delay	47.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	129	803	238	176	545	60
v/c Ratio	0.61	0.45	0.25	0.37	0.74	0.17
Control Delay	52.4	16.7	13.4	47.5	43.1	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.4	16.7	13.4	47.5	43.1	9.1
Queue Length 50th (ft)	78	159	70	57	171	0
Queue Length 95th (ft)	137	235	132	m66	218	31
Internal Link Dist (ft)			385	131	284	
Turn Bay Length (ft)						
Base Capacity (vph)	252	1815	983	563	799	383
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	0.51	0.44	0.24	0.31	0.68	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	125	779	166	65	35	136	0	0	529	58
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			1.00	0.97	1.00			0.95			0.95	1.00
Frpb, ped/bikes			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
Frt			0.86	1.00	0.96			1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00			0.99			1.00	1.00
Satd. Flow (prot)			1565	3335	1781			3490			3438	1452
Flt Permitted			1.00	0.95	1.00			0.99			1.00	1.00
Satd. Flow (perm)			1565	3335	1781			3490			3438	1452
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	129	803	171	67	36	140	0	0	545	60
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	0	0	0	47
Lane Group Flow (vph)	0	0	129	803	225	0	0	176	0	0	545	13
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					Perm
Protected Phases			1	6	6		1	1			4	
Permitted Phases												4
Actuated Green, G (s)			13.6	53.1	53.1			13.6			21.3	21.3
Effective Green, g (s)			13.6	53.1	53.1			13.6			21.3	21.3
Actuated g/C Ratio			0.14	0.53	0.53			0.14			0.21	0.21
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	3.0
Lane Grp Cap (vph)			213	1771	946			475			732	309
v/s Ratio Prot			c0.08	c0.24	0.13			0.05			c0.16	
v/s Ratio Perm												0.01
v/c Ratio			0.61	0.45	0.24			0.37			0.74	0.04
Uniform Delay, d1			40.7	14.5	12.6			39.3			36.8	31.2
Progression Factor			1.00	1.00	1.00			1.21			1.00	1.00
Incremental Delay, d2			5.5	0.8	0.6			0.2			4.1	0.1
Delay (s)			46.2	15.3	13.2			47.7			40.9	31.3
Level of Service			D	B	B			D			D	C
Approach Delay (s)		46.2			14.8			47.7			40.0	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	315	186	23	239	160
v/c Ratio	0.71	0.72	0.06	0.21	0.14
Control Delay	29.4	38.7	7.5	3.6	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	38.7	7.5	3.6	5.5
Queue Length 50th (ft)	110	75	0	19	18
Queue Length 95th (ft)	159	119	14	m50	54
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	898	554	814	1119	1179
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	0.35	0.34	0.03	0.21	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	195	85	79	102	22	39	102	91	14	113	29
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.96			1.00	0.85		0.95			0.97	
Flt Protected		1.00			0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1785			1823	1583		1749			1808	
Flt Permitted		0.97			0.59	1.00		0.94			0.98	
Satd. Flow (perm)		1732			1092	1583		1664			1771	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	201	88	81	105	23	40	105	94	14	116	30
RTOR Reduction (vph)	0	30	0	0	0	18	0	19	0	0	7	0
Lane Group Flow (vph)	0	285	0	0	186	5	0	220	0	0	153	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		16.7			16.7	16.7		46.3			46.3	
Effective Green, g (s)		16.7			16.7	16.7		46.3			46.3	
Actuated g/C Ratio		0.24			0.24	0.24		0.66			0.66	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		413			261	378		1101			1171	
v/s Ratio Prot												
v/s Ratio Perm		0.16			c0.17	0.00		c0.13			0.09	
v/c Ratio		0.69			0.71	0.01		0.20			0.13	
Uniform Delay, d1		24.3			24.4	20.4		4.6			4.4	
Progression Factor		1.00			1.00	1.00		0.67			1.00	
Incremental Delay, d2		3.8			7.4	0.0		0.4			0.2	
Delay (s)		28.1			31.9	20.4		3.5			4.6	
Level of Service		C			C	C		A			A	
Approach Delay (s)		28.1			30.6			3.5			4.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	88	1370	673	101	108
v/c Ratio	0.53	0.34	0.21	0.57	0.43
Control Delay	47.8	2.0	6.0	54.9	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	2.0	6.0	54.9	13.4
Queue Length 50th (ft)	55	40	51	62	0
Queue Length 95th (ft)	m77	m55	76	111	48
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	225	4038	3278	309	360
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	0.39	0.34	0.21	0.33	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	85	1329	605	48	98	105
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4671		1719	1496
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4671		1719	1496
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	88	1370	624	49	101	108
RTOR Reduction (vph)	0	0	4	0	0	97
Lane Group Flow (vph)	88	1370	669	0	101	11
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	8.4	81.7	69.3		10.3	10.3
Effective Green, g (s)	8.4	81.7	69.3		10.3	10.3
Actuated g/C Ratio	0.08	0.82	0.69		0.10	0.10
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)	144	4036	3237		177	154
v/s Ratio Prot	c0.05	c0.28	0.14		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.61	0.34	0.21		0.57	0.07
Uniform Delay, d1	44.2	2.3	5.5		42.7	40.5
Progression Factor	0.89	0.72	0.93		1.00	1.00
Incremental Delay, d2	4.5	0.2	0.1		2.7	0.1
Delay (s)	43.8	1.9	5.3		45.5	40.6
Level of Service	D	A	A		D	D
Approach Delay (s)		4.4	5.3		43.0	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	8.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1441	27	431	228	1022
v/c Ratio	0.61	0.24	0.17	0.37	0.87
Control Delay	21.2	35.8	7.8	25.3	29.7
Queue Delay	0.2	0.0	0.0	0.0	8.4
Total Delay	21.5	35.8	7.8	25.3	38.2
Queue Length 50th (ft)	251	12	29	101	243
Queue Length 95th (ft)	267	22	31	179	#423
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2530	138	2923	616	1181
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	372	0	0	0	138
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.67	0.20	0.15	0.37	0.98

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1386	41	27	427	226	1012
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		1.00	0.91	1.00	0.88
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	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4910		1719	4715	1641	2651
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4910		1719	4715	1641	2651
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	1400	41	27	431	228	1022
RTOR Reduction (vph)	3	0	0	0	0	185
Lane Group Flow (vph)	1438	0	27	431	228	837
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	46.2		4.2	54.4	37.6	37.6
Effective Green, g (s)	46.2		4.2	54.4	37.6	37.6
Actuated g/C Ratio	0.46		0.04	0.54	0.38	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)	2268		72	2565	617	997
v/s Ratio Prot	c0.29		c0.02	0.09	0.14	
v/s Ratio Perm						c0.32
v/c Ratio	0.63		0.38	0.17	0.37	0.84
Uniform Delay, d1	20.5		46.6	11.4	22.6	28.4
Progression Factor	1.01		0.70	0.68	1.00	1.00
Incremental Delay, d2	1.3		1.2	0.1	0.1	6.0
Delay (s)	21.9		33.8	7.9	22.7	34.5
Level of Service	C		C	A	C	C
Approach Delay (s)	21.9			9.4	32.3	
Approach LOS	C			A	C	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	235	2146	91	254	395	81	149	956	265	240
v/c Ratio	0.42	1.24	0.16	0.79	0.66	0.22	0.35	1.83	0.96	0.38
Control Delay	26.1	140.0	8.0	60.1	38.9	26.8	19.1	395.7	89.1	37.8
Queue Delay	0.0	19.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	159.6	8.0	60.1	38.9	26.8	19.1	395.7	89.1	37.8
Queue Length 50th (ft)	79	~609	5	84	83	46	68	~805	170	71
Queue Length 95th (ft)	m142	#713	m26	#143	109	m51	m46	m#753	#328	107
Internal Link Dist (ft)		284			599		325			294
Turn Bay Length (ft)	170			195		210			200	
Base Capacity (vph)	555	1730	564	327	1634	376	420	522	275	1132
Starvation Cap Reductn	0	59	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	0.42	1.28	0.16	0.78	0.24	0.22	0.35	1.83	0.96	0.21

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	228	2082	88	246	340	43	79	145	927	257	198	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	1.00	1.00	
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	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	4940	1482	3335	4651		1641	1827	1488	1719	3405	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	4940	1482	3335	4651		1641	1827	1488	1719	3405	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	235	2146	91	254	351	44	81	149	956	265	204	36
RTOR Reduction (vph)	0	0	46	0	21	0	0	0	179	0	17	0
Lane Group Flow (vph)	235	2146	45	254	374	0	81	149	777	265	223	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	32.3	34.2	34.2	9.6	11.7		21.3	23.0	23.0	16.8	17.9	
Effective Green, g (s)	32.3	34.2	34.2	9.6	11.7		21.3	23.0	23.0	16.8	17.9	
Actuated g/C Ratio	0.32	0.34	0.34	0.10	0.12		0.21	0.23	0.23	0.17	0.18	
Clearance Time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
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)	555	1689	507	320	544		350	420	342	289	609	
v/s Ratio Prot	0.14	c0.43		0.08	c0.08		0.05	0.08		c0.15	0.07	
v/s Ratio Perm			0.03						c0.52			
v/c Ratio	0.42	1.27	0.09	0.79	0.69		0.23	0.35	2.27	0.92	0.37	
Uniform Delay, d1	26.5	32.9	22.3	44.2	42.4		32.6	32.3	38.5	40.9	36.1	
Progression Factor	0.88	0.88	0.93	0.93	0.86		0.88	0.55	0.58	1.00	1.00	
Incremental Delay, d2	0.1	125.3	0.2	11.9	6.9		0.0	0.1	575.5	31.3	0.1	
Delay (s)	23.4	154.3	21.0	52.9	43.4		28.7	17.9	597.7	72.3	36.2	
Level of Service	C	F	C	D	D		C	B	F	E	D	
Approach Delay (s)		137.0			47.1			486.0			55.1	
Approach LOS		F			D			F			E	

Intersection Summary			
HCM Average Control Delay	202.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	123.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	511	341	55	315	232
v/c Ratio	0.78	0.57	0.08	0.40	0.30
Control Delay	24.7	17.9	4.7	15.0	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	17.9	4.7	15.0	17.4
Queue Length 50th (ft)	164	99	4	81	88
Queue Length 95th (ft)	251	154	19	157	154
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	770	709	833	797	772
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	0.66	0.48	0.07	0.40	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	326	65	99	232	53	25	190	90	32	153	40
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	
Frt		0.98			1.00	0.85		0.96			0.98	
Flt Protected		0.99			0.99	1.00		1.00			0.99	
Satd. Flow (prot)		1811			1835	1583		1781			1805	
Flt Permitted		0.81			0.74	1.00		0.97			0.93	
Satd. Flow (perm)		1484			1378	1583		1730			1692	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	108	336	67	102	239	55	26	196	93	33	158	41
RTOR Reduction (vph)	0	9	0	0	0	21	0	19	0	0	10	0
Lane Group Flow (vph)	0	502	0	0	341	34	0	296	0	0	222	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		30.5			30.5	30.5		31.5			31.5	
Effective Green, g (s)		30.5			30.5	30.5		31.5			31.5	
Actuated g/C Ratio		0.44			0.44	0.44		0.45			0.45	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		647			600	690		779			761	
v/s Ratio Prot												
v/s Ratio Perm		c0.34			0.25	0.02		c0.17			0.13	
v/c Ratio		0.78			0.57	0.05		0.38			0.29	
Uniform Delay, d1		16.8			14.8	11.4		12.8			12.2	
Progression Factor		1.00			1.00	1.00		1.00			1.22	
Incremental Delay, d2		6.2			1.5	0.0		1.4			1.0	
Delay (s)		23.0			16.3	11.4		14.2			15.9	
Level of Service		C			B	B		B			B	
Approach Delay (s)		23.0			15.6			14.2			15.9	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	492	70	244	46	165	129
v/c Ratio	0.51	0.08	0.27	0.05	0.31	0.22
Control Delay	11.3	4.1	5.7	1.0	15.8	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.3	4.1	5.7	1.0	15.8	10.1
Queue Length 50th (ft)	103	5	32	0	40	18
Queue Length 95th (ft)	174	20	45	m4	82	51
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	966	863	910	866	535	596
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	0.51	0.08	0.27	0.05	0.31	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	446	68	32	205	45	59	83	17	17	54	53
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.99			0.94	
Flt Protected		1.00	1.00		0.99	1.00		0.98			0.99	
Satd. Flow (prot)		1857	1583		1850	1583		1802			1743	
Flt Permitted		0.97	1.00		0.92	1.00		0.86			0.96	
Satd. Flow (perm)		1812	1583		1706	1583		1583			1679	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	32	460	70	33	211	46	61	86	18	18	56	55
RTOR Reduction (vph)	0	0	19	0	0	21	0	7	0	0	37	0
Lane Group Flow (vph)	0	492	51	0	244	25	0	158	0	0	92	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		966	844		910	844		528			560	
v/s Ratio Prot												
v/s Ratio Perm		c0.27	0.03		0.14	0.02		c0.10			0.05	
v/c Ratio		0.51	0.06		0.27	0.03		0.30			0.16	
Uniform Delay, d1		9.0	6.8		7.6	6.6		14.8			14.1	
Progression Factor		1.00	1.00		0.63	0.37		1.00			1.00	
Incremental Delay, d2		1.9	0.1		0.7	0.1		1.4			0.6	
Delay (s)		10.9	6.9		5.5	2.5		16.3			14.7	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		10.4			5.0			16.3			14.7	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.4	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	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	520	65	268	32	150	419
v/c Ratio	0.67	0.09	0.40	0.05	0.20	0.58
Control Delay	14.8	6.3	13.9	5.0	8.5	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	6.3	13.9	5.0	8.5	16.4
Queue Length 50th (ft)	81	3	63	1	22	126
Queue Length 95th (ft)	147	m14	115	13	52	m202
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	771	702	674	702	736	719
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	0.67	0.09	0.40	0.05	0.20	0.58

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	460	63	45	215	31	23	80	43	94	253	59
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.98	
Flt Protected		1.00	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1855	1583		1847	1583		1775			1805	
Flt Permitted		0.95	1.00		0.84	1.00		0.92			0.90	
Satd. Flow (perm)		1778	1583		1555	1583		1643			1635	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	46	474	65	46	222	32	24	82	44	97	261	61
RTOR Reduction (vph)	0	0	16	0	0	16	0	25	0	0	10	0
Lane Group Flow (vph)	0	520	49	0	268	16	0	125	0	0	409	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		770	686		674	686		712			709	
v/s Ratio Prot												
v/s Ratio Perm		c0.29	0.03		0.17	0.01		0.08			c0.25	
v/c Ratio		0.68	0.07		0.40	0.02		0.18			0.58	
Uniform Delay, d1		13.6	9.9		11.6	9.7		10.4			12.8	
Progression Factor		0.73	0.90		1.00	1.00		1.00			1.08	
Incremental Delay, d2		4.4	0.2		1.8	0.1		0.5			2.4	
Delay (s)		14.3	9.1		13.4	9.8		11.0			16.3	
Level of Service		B	A		B	A		B			B	
Approach Delay (s)		13.7			13.0			11.0			16.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	692	89	247	162	75	36	467	222	801	676
v/c Ratio	1.19	0.17	1.30	1.40	0.45	0.35	0.99	0.62	1.17	0.65
Control Delay	133.1	7.0	206.4	258.7	29.3	51.9	71.7	35.1	126.3	30.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	133.1	7.0	206.4	258.7	29.3	51.9	71.7	35.1	126.3	31.4
Queue Length 50th (ft)	~535	4	~107	~143	19	20	162	137	~310	155
Queue Length 95th (ft)	#755	36	#189	#276	61	m38	m#255	m188	#446	271
Internal Link Dist (ft)	585			161			328			103
Turn Bay Length (ft)						150				
Base Capacity (vph)	581	521	190	116	166	110	473	360	683	1044
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	100
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	1.19	0.17	1.30	1.40	0.45	0.33	0.99	0.62	1.17	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	249	422	86	240	157	73	35	453	215	777	527	129
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	
Lane Util. Factor		1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes		1.00	0.93	1.00	1.00	0.98	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected		0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1614	1304	2717	1660	1381	1577	3154	1384	2626	2974	
Flt Permitted		0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1614	1304	2717	1660	1381	1577	3154	1384	2626	2974	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	257	435	89	247	162	75	36	467	222	801	543	133
RTOR Reduction (vph)	0	0	51	0	0	70	0	0	0	0	22	0
Lane Group Flow (vph)	0	692	38	247	162	5	36	467	222	801	654	0
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm	Prot		pt+ov	Prot		
Protected Phases	8	8		7	7		1	6	6 7	5	2	
Permitted Phases			8			7						
Actuated Green, G (s)		36.0	36.0	7.0	7.0	7.0	6.6	15.0	26.0	26.0	34.4	
Effective Green, g (s)		36.0	36.0	7.0	7.0	7.0	6.6	15.0	26.0	26.0	34.4	
Actuated g/C Ratio		0.36	0.36	0.07	0.07	0.07	0.07	0.15	0.26	0.26	0.34	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0	2.5	2.5		2.0	2.0	
Lane Grp Cap (vph)		581	469	190	116	97	104	473	360	683	1023	
v/s Ratio Prot		c0.43		0.09	c0.10		0.02	c0.15	0.16	c0.30	0.22	
v/s Ratio Perm			0.03			0.00						
v/c Ratio		1.19	0.08	1.30	1.40	0.05	0.35	0.99	0.62	1.17	0.64	
Uniform Delay, d1		32.0	21.1	46.5	46.5	43.4	44.6	42.4	32.6	37.0	27.6	
Progression Factor		1.00	1.00	1.00	1.00	1.83	0.98	0.81	0.85	0.98	1.05	
Incremental Delay, d2		102.2	0.1	167.8	222.1	0.2	1.2	34.6	2.3	92.1	2.9	
Delay (s)		134.2	21.1	214.3	268.7	79.8	45.1	69.1	30.0	128.3	31.8	
Level of Service		F	C	F	F	E	D	E	C	F	C	
Approach Delay (s)		121.3			211.7			55.9			84.1	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM Average Control Delay	104.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	23	856	1318	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	24	882	1359	0	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	882	441			2241	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	882	441			2241	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	285	564			227	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3
Volume Total	24	588	747	906
Volume Left	0	0	0	0
Volume Right	24	0	453	906
cSH	564	1700	1700	1700
Volume to Capacity	0.04	0.35	0.44	0.53
Queue Length 95th (ft)	3	0	0	0
Control Delay (s)	11.7	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.7	0.0		
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	673	220	227	214	279	432
v/c Ratio	1.16	1.44	0.59	0.64	0.20	1.51
Control Delay	115.3	257.1	30.0	32.3	3.0	271.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.3	257.1	30.0	32.3	3.0	271.7
Queue Length 50th (ft)	~187	~137	86	83	10	~279
Queue Length 95th (ft)	#293	#264	156	#163	26	#450
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	581	153	386	336	1421	286
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	1.16	1.44	0.59	0.64	0.20	1.51

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	514	116	213	198	22	76	132	271	176	205	39
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		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	
Frt		0.97		1.00	0.98			1.00	0.85		0.99	
Flt Protected		1.00		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)		2724		1413	1459			1460	2224		1430	
Flt Permitted		0.68		0.40	1.00			0.75	1.00		0.64	
Satd. Flow (perm)		1843		589	1459			1114	2224		932	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	23	530	120	220	204	23	78	136	279	181	211	40
RTOR Reduction (vph)	0	25	0	0	6	0	0	0	73	0	5	0
Lane Group Flow (vph)	0	648	0	220	221	0	0	214	206	0	427	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		22.0		19.0	19.0			22.0	44.5		22.0	
Effective Green, g (s)		22.0		19.0	19.0			22.0	41.0		22.0	
Actuated g/C Ratio		0.30		0.26	0.26			0.30	0.56		0.30	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		555		153	380			336	1249		281	
v/s Ratio Prot					0.15				0.09			
v/s Ratio Perm		c0.35		c0.37				0.19			c0.46	
v/c Ratio		1.17		1.44	0.58			0.64	0.17		1.52	
Uniform Delay, d1		25.5		27.0	23.5			22.0	7.7		25.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		93.5		230.1	1.5			2.9	0.0		251.4	
Delay (s)		119.0		257.1	25.0			24.9	7.8		276.9	
Level of Service		F		F	C			C	A		F	
Approach Delay (s)		119.0			139.3			15.2			276.9	
Approach LOS		F			F			B			F	

Intersection Summary			
HCM Average Control Delay	131.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	816	119	285	22	593	265
v/c Ratio	0.90	0.19	0.17	0.26	0.54	0.42
Control Delay	37.4	29.9	8.9	72.2	22.7	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	29.9	8.9	72.2	22.7	5.7
Queue Length 50th (ft)	180	34	22	15	104	20
Queue Length 95th (ft)	251	m62	67	m22	m95	m53
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	1013	661	1674	85	1296	695
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	0.18	0.17	0.26	0.46	0.38

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	406	385	115	276	21	575	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.93		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2547		2740	2825	1413	2825	1201
Flt Permitted	0.97		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2547		2740	2825	1413	2825	1201
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	419	397	119	285	22	593	265
RTOR Reduction (vph)	185	0	0	0	0	0	168
Lane Group Flow (vph)	631	0	119	285	22	593	97
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	28.1		22.8	56.9	2.4	36.5	36.5
Effective Green, g (s)	28.1		22.8	56.9	2.4	36.5	36.5
Actuated g/C Ratio	0.28		0.23	0.57	0.02	0.36	0.36
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	716		625	1607	34	1031	438
v/s Ratio Prot	c0.25		0.04	c0.10	0.02	c0.21	
v/s Ratio Perm							0.08
v/c Ratio	0.88		0.19	0.18	0.65	0.58	0.22
Uniform Delay, d1	34.4		31.2	10.3	48.4	25.5	21.9
Progression Factor	1.00		0.95	0.78	1.49	0.79	1.35
Incremental Delay, d2	12.0		0.0	0.2	17.4	1.4	0.7
Delay (s)	46.3		29.6	8.2	89.5	21.5	30.3
Level of Service	D		C	A	F	C	C
Approach Delay (s)	46.3			14.5		25.9	
Approach LOS	D			B		C	

Intersection Summary			
HCM Average Control Delay	31.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.6
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	116	241	130	446	221	184	215	680	165	730	75
v/c Ratio	0.64	0.58	0.43	0.51	0.60	0.41	0.78	0.86	0.25	0.64	0.13
Control Delay	56.6	45.8	11.2	38.2	43.9	13.9	60.1	21.4	19.1	26.8	6.3
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	56.6	45.8	11.2	38.2	43.9	13.9	60.1	21.4	19.1	26.8	6.3
Queue Length 50th (ft)	79	80	0	102	144	27	132	51	59	253	5
Queue Length 95th (ft)	135	115	50	136	217	88	#222	110	m154	#395	m30
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	251	579	371	1119	470	532	319	974	648	1137	571
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	0.46	0.42	0.35	0.40	0.47	0.35	0.67	0.70	0.25	0.64	0.13

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	219	129	442	219	182	213	160	513	163	723	74
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	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.94	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	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	0.89		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3219	1468	4388	1845	1568	1752	2754		1719	3312	1523
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3219	1468	4388	1845	1568	1752	2754		1719	3312	1523
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	136	221	130	446	221	184	215	162	518	165	730	75
RTOR Reduction (vph)	0	0	113	0	0	142	0	454	0	0	0	49
Lane Group Flow (vph)	116	241	17	446	221	42	215	226	0	165	730	26
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	13.0	13.0	13.0	19.9	19.9	19.9	15.7	12.3		37.7	34.3	34.3
Effective Green, g (s)	13.0	13.0	13.0	19.9	19.9	19.9	15.7	12.3		37.7	34.3	34.3
Actuated g/C Ratio	0.13	0.13	0.13	0.20	0.20	0.20	0.16	0.12		0.38	0.34	0.34
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	181	418	191	873	367	312	275	339		648	1136	522
v/s Ratio Prot	c0.08	0.07	0.01	0.10	c0.12	0.03	c0.12	0.08		c0.10	c0.22	
v/s Ratio Perm												0.02
v/c Ratio	0.64	0.58	0.09	0.51	0.60	0.14	0.78	0.67		0.25	0.64	0.05
Uniform Delay, d1	41.3	40.9	38.3	35.7	36.4	33.0	40.5	41.9		21.5	27.7	22.0
Progression Factor	1.00	1.00	1.00	1.03	1.04	2.04	1.00	1.00		0.67	0.75	0.75
Incremental Delay, d2	5.7	1.2	0.1	0.5	2.7	0.2	12.5	3.8		0.8	2.3	0.1
Delay (s)	47.0	42.1	38.4	37.4	40.5	67.5	53.0	45.7		15.2	22.9	16.5
Level of Service	D	D	D	D	D	E	D	D		B	C	B
Approach Delay (s)		42.3			44.7			47.4			21.1	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	38.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.1
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	126	252	536	24	108	7	457	1764	6	182	295
v/c Ratio	0.47	0.70	0.56	0.24	0.18	1.00	0.28	1.08	0.03	0.70	0.47
Control Delay	39.3	42.6	8.1	49.7	38.0	374.4	19.4	63.1	46.5	68.5	20.9
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	39.3	42.6	8.1	49.7	38.0	374.4	19.4	63.1	46.5	68.5	20.9
Queue Length 50th (ft)	31	164	7	15	24	0	80	213	4	124	19
Queue Length 95th (ft)	m59	m243	114	41	36	#31	m92	m#514	m10	m156	m55
Internal Link Dist (ft)		732			376			1000		765	
Turn Bay Length (ft)	140			70			300		90		
Base Capacity (vph)	350	438	1040	124	1058	7	1643	1637	317	358	750
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	0.36	0.58	0.52	0.19	0.10	1.00	0.28	1.08	0.02	0.51	0.39

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	247	525	24	106	7	448	942	787	6	178	289
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
Lane Util. Factor	0.97	1.00	0.88	1.00	0.91	1.00	0.97	0.95		1.00	1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	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	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1827	2632	1556	5036	1568	3335	3094		1583	1792	2566
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1827	2632	1556	5036	1568	3335	3094		1583	1792	2566
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)	126	252	536	24	108	7	457	961	803	6	182	295
RTOR Reduction (vph)	0	0	430	0	0	7	0	117	0	0	0	253
Lane Group Flow (vph)	126	252	106	24	108	0	457	1647	0	6	182	42
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot		NA	Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	8.4	19.7	19.7	3.0	14.3	0.0	46.9	46.9		14.4	14.4	14.4
Effective Green, g (s)	8.4	19.7	19.7	3.0	14.3	0.0	46.9	46.9		14.4	14.4	14.4
Actuated g/C Ratio	0.08	0.20	0.20	0.03	0.14	0.00	0.47	0.47		0.14	0.14	0.14
Clearance Time (s)	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
Lane Grp Cap (vph)	267	360	519	47	720	0	1564	1451		228	258	370
v/s Ratio Prot	0.04	c0.14		c0.02	0.02		0.14	c0.53		0.00	c0.10	
v/s Ratio Perm			0.04									0.02
v/c Ratio	0.47	0.70	0.20	0.51	0.15	0.00	0.29	1.13		0.03	0.71	0.11
Uniform Delay, d1	43.7	37.4	33.6	47.8	37.5	50.0	16.3	26.6		36.8	40.8	37.3
Progression Factor	0.79	0.90	2.05	1.00	1.00	1.00	1.07	0.92		1.37	1.38	4.29
Incremental Delay, d2	0.4	4.1	0.1	3.8	0.0	0.0	0.2	64.5		0.0	6.3	0.0
Delay (s)	35.0	37.7	69.1	51.6	37.6	50.0	17.7	88.9		50.5	62.5	159.8
Level of Service	D	D	E	D	D	D	B	F		D	E	F
Approach Delay (s)		55.7			40.6			74.2			121.8	
Approach LOS		E			D			E			F	

Intersection Summary			
HCM Average Control Delay	74.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	885	874	459	90	26	226	304	97	561	107
v/c Ratio	1.14	1.11	0.34	0.60	0.16	0.97	0.52	0.78	1.60	0.47
Control Delay	102.9	94.3	9.4	56.9	16.1	83.1	32.5	88.6	314.2	27.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	102.9	94.3	9.4	56.9	16.1	83.1	32.5	88.6	314.2	27.3
Queue Length 50th (ft)	~713	~693	50	56	0	153	103	63	~256	0
Queue Length 95th (ft)	#1017	#997	98	106	24	#299	143	#151	#374	63
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	779	786	1356	358	364	232	581	128	351	229
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	1.14	1.11	0.34	0.25	0.07	0.97	0.52	0.76	1.60	0.47

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1619	87	445	19	0	65	28	219	280	15	94	544
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	0.88		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.98		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	1.00		1.00	1.00
Frt	1.00	1.00	0.85		0.88		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.96	1.00		0.99		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1529	2453		1370		1326	1597	3158		1597	3195
Flt Permitted	0.95	0.96	1.00		0.99		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1529	2453		1370		1326	1597	3158		1597	3195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1669	90	459	20	0	67	29	226	289	15	97	561
RTOR Reduction (vph)	0	0	98	0	2	0	23	0	4	0	0	0
Lane Group Flow (vph)	885	874	361	0	88	0	3	226	300	0	97	561
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Perm	Prot			Prot	
Protected Phases	4	4		3	3			1	6		5	2
Permitted Phases			4				3					
Actuated Green, G (s)	51.4	51.4	51.4		9.7		9.7	14.5	17.7		7.7	10.4
Effective Green, g (s)	51.4	51.4	51.4		9.7		9.7	14.5	17.7		7.7	10.4
Actuated g/C Ratio	0.51	0.51	0.51		0.10		0.10	0.14	0.18		0.08	0.10
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	780	786	1261		133		129	232	559		123	332
v/s Ratio Prot	c0.58	0.57			c0.06			c0.14	0.09		0.06	c0.18
v/s Ratio Perm			0.15				0.00					
v/c Ratio	1.13	1.11	0.29		0.66		0.02	0.97	0.54		0.79	1.69
Uniform Delay, d1	24.3	24.3	13.8		43.6		40.8	42.6	37.4		45.4	44.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.64	0.80		1.18	1.11
Incremental Delay, d2	76.1	67.4	0.0		9.2		0.0	50.2	3.5		23.3	321.7
Delay (s)	100.4	91.7	13.9		52.8		40.9	77.6	33.3		76.8	371.4
Level of Service	F	F	B		D		D	E	C		E	F
Approach Delay (s)		79.1			50.1				52.2			291.6
Approach LOS		E			D				D			F

Intersection Summary			
HCM Average Control Delay	119.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	104
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.96
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1370
Flt Permitted	1.00
Satd. Flow (perm)	1370
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	107
RTOR Reduction (vph)	79
Lane Group Flow (vph)	28
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	10.4
Effective Green, g (s)	10.4
Actuated g/C Ratio	0.10
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	142
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.20
Uniform Delay, d1	41.0
Progression Factor	1.60
Incremental Delay, d2	2.8
Delay (s)	68.1
Level of Service	E
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	13,710	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,608	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	14,865	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	12,567	pcph	11,750	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	2,298	pcph	2,000	pcph	Yes

LOS and Performance Measures

Flow rate, v_p	2,477	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.05	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	11,559	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,042	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	12,533	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,507	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.07	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	9,773	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,572	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	10,596	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,649	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.13	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,655	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,278	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,384	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,346	pcphpl
Average passenger-car speed, S	52.3	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	44.8	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	9,385	388	2,174	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,470	102	572	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	10,176	415	2,357	0	pcph

Volume ratio, VR	0.214

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,772	lc/h
Weaving lane changes, LC_W	2,482	lc/h
Non-weaving vehicle index, I_{NW}	407	
Non-weaving lane change, LC_{NW}	1,242	lc/h
Total lane changes, LC_{ALL}	3,724	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	2.270	
Average weaving speed, S_W	30.3	mph
Average non-weaving speed, S_{NW}	32.6	mph
Weaving segment speed, S	32.1	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.29	
Weaving segment flow rate, v	12,947	pcph
Weaving segment capacity, c_W	9,744	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	12,539	pcph	11,750	pcph	Yes
Exiting freeway volume	10,631	pcph	9,400	pcph	Yes
On-ramp volume	415	pcph	2,000	pcph	No
Off-ramp volume	2,323	pcph	2,100	pcph	Yes

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	4,681	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,007	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.29	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,811	844	1,962	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,056	222	516	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	8,469	902	2,127	0	pcph

Volume ratio, VR	0.263

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	3,029	lc/h
Weaving lane changes, LC_W	3,022	lc/h
Non-weaving vehicle index, I_{NW}	1,101	
Non-weaving lane change, LC_{NW}	1,327	lc/h
Total lane changes, LC_{ALL}	4,349	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.012	
Average weaving speed, S_W	39.8	mph
Average non-weaving speed, S_{NW}	29.4	mph
Weaving segment speed, S	31.6	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.44	
Weaving segment flow rate, v	11,498	pcph
Weaving segment capacity, c_W	7,776	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	10,610	pcph	9,400	pcph	Yes
Exiting freeway volume	9,415	pcph	9,400	pcph	Yes
On-ramp volume	902	pcph	2,100	pcph	No
Off-ramp volume	2,096	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	5,195	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,002	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.44	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,950	1,019	706	235	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,092	268	186	62	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	8,619	1,089	765	251	pcph

Volume ratio, VR	0.173

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,854	lc/h
Weaving lane changes, LC_W	1,710	lc/h
Non-weaving vehicle index, I_{NW}	-142	
Non-weaving lane change, LC_{NW}	1,014	lc/h
Total lane changes, LC_{ALL}	2,724	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	38.8	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.33	
Weaving segment flow rate, v	10,724	pcph
Weaving segment capacity, c_W	7,839	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,404	pcph	9,400	pcph	Yes
Exiting freeway volume	9,739	pcph	9,400	pcph	Yes
On-ramp volume	1,340	pcph	2,100	pcph	No
Off-ramp volume	1,005	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	4,260	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,018	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.33	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	13,342	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,511	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	14,466	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	11,842	pcph	9,400	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	2,624	pcph	2,000	pcph	Yes

LOS and Performance Measures

Flow rate, v_p	3,617	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.54	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	10,886	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,865	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	11,803	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,951	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.26	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	11,606	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,054	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	12,584	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	11,815	pcph	9,400	pcph	Yes
Exiting freeway volume		pcph		pcph	
On-ramp volume	769	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	3,146	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.34	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	12,523	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,296	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	13,578	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	13,118	pcph	9,400	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	460	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	3,395	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.44	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	12,954	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,409	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	14,045	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	3,511	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.49	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	11,516	1,007	810	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	3,031	265	213	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	12,486	1,076	878	214	pcph

Volume ratio, VR	0.133

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,954	lc/h
Weaving lane changes, LC_W	1,823	lc/h
Non-weaving vehicle index, I_{NW}	838	
Non-weaving lane change, LC_{NW}	2,025	lc/h
Total lane changes, LC_{ALL}	3,847	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.569	
Average weaving speed, S_W	34.5	mph
Average non-weaving speed, S_{NW}	33.3	mph
Weaving segment speed, S	33.5	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.76	
Weaving segment flow rate, v	14,654	pcph
Weaving segment capacity, c_W	8,077	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	13,384	pcph	9,400	pcph	Yes
Exiting freeway volume	13,594	pcph	9,400	pcph	Yes
On-ramp volume	1,290	pcph	2,000	pcph	No
Off-ramp volume	1,079	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	3,866	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,079	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.76	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	11,924	1,055	1,030	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	3,138	278	271	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	12,929	1,127	1,117	267	pcph

Volume ratio, VR	0.145	

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,244	lc/h
Weaving lane changes, LC_W	2,206	lc/h
Non-weaving vehicle index, I_{NW}	1,504	
Non-weaving lane change, LC_{NW}	3,003	lc/h
Total lane changes, LC_{ALL}	5,209	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035)
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.295	
Average weaving speed, S_W	36.8	mph
Average non-weaving speed, S_{NW}	30.3	mph
Weaving segment speed, S	31.1	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.85	
Weaving segment flow rate, v	15,440	pcph
Weaving segment capacity, c_W	8,114	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	14,066	pcph	9,400	pcph	Yes
Exiting freeway volume	14,093	pcph	9,400	pcph	Yes
On-ramp volume	1,394	pcph	4,000	pcph	No
Off-ramp volume	1,368	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	3,985	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,089	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.85	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Cumulative (2035) PM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	161	151	705	56	353	441
v/c Ratio	1.73	0.28	1.69	0.12	0.91	0.87
Control Delay	393.2	5.1	344.9	12.3	46.0	41.5
Queue Delay	0.0	0.0	24.6	0.0	0.0	0.1
Total Delay	393.2	5.2	369.5	12.3	46.0	41.6
Queue Length 50th (ft)	~89	0	~387	9	124	147
Queue Length 95th (ft)	#190	36	#569	32	m#234	#300
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	93	545	416	451	388	505
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	24	13	0	0	1
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.73	0.29	1.75	0.12	0.91	0.88

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	79	149	194	504	55	42	282	26	14	358	64
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.99			0.98	
Flt Protected		0.98	1.00		0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1817	1583		1837	1583		1833			1823	
Flt Permitted		0.18	1.00		0.81	1.00		0.76			0.98	
Satd. Flow (perm)		339	1583		1511	1583		1394			1798	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	81	80	151	196	509	56	42	285	26	14	362	65
RTOR Reduction (vph)	0	0	109	0	0	16	0	5	0	0	10	0
Lane Group Flow (vph)	0	161	42	0	705	40	0	348	0	0	431	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		93	435		416	435		383			494	
v/s Ratio Prot												
v/s Ratio Perm		c0.47	0.03		0.47	0.03		c0.25			c0.24	
v/c Ratio		1.73	0.10		1.69	0.09		0.91			0.87	
Uniform Delay, d1		21.8	16.2		21.8	16.2		21.0			20.7	
Progression Factor		1.00	1.00		1.00	1.00		0.79			1.00	
Incremental Delay, d2		369.8	0.4		322.8	0.4		25.2			18.7	
Delay (s)		391.6	16.6		344.6	16.6		41.8			39.5	
Level of Service		F	B		F	B		D			D	
Approach Delay (s)		210.1			320.5			41.8			39.5	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM Average Control Delay	183.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	96	261	510	441	421	63
v/c Ratio	0.29	0.25	0.87	0.60	0.52	0.16
Control Delay	19.9	14.3	37.4	24.2	18.5	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	14.3	37.4	24.2	18.5	5.4
Queue Length 50th (ft)	22	30	139	77	57	0
Queue Length 95th (ft)	61	54	#307	m111	80	20
Internal Link Dist (ft)			385	131	284	
Turn Bay Length (ft)						
Base Capacity (vph)	329	1050	584	732	1100	516
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	0.29	0.25	0.87	0.60	0.38	0.12

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	93	253	387	108	112	316	0	0	408	61
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			1.00	0.97	1.00			0.95			0.95	1.00
Frpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	0.96
Flpb, ped/bikes			1.00	1.00	1.00			1.00			1.00	1.00
Frt			0.86	1.00	0.97			1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00			0.99			1.00	1.00
Satd. Flow (prot)			1565	3335	1796			3486			3438	1477
Flt Permitted			1.00	0.95	1.00			0.99			1.00	1.00
Satd. Flow (perm)			1565	3335	1796			3486			3438	1477
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	96	261	399	111	115	326	0	0	421	63
RTOR Reduction (vph)	0	0	0	0	19	0	0	0	0	0	0	48
Lane Group Flow (vph)	0	0	96	261	491	0	0	441	0	0	421	15
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					Perm
Protected Phases			1	6	6		1	1			4	
Permitted Phases												4
Actuated Green, G (s)			10.5	15.7	15.7			10.5			11.8	11.8
Effective Green, g (s)			10.5	15.7	15.7			10.5			11.8	11.8
Actuated g/C Ratio			0.21	0.31	0.31			0.21			0.24	0.24
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	3.0
Lane Grp Cap (vph)			329	1047	564			732			811	349
v/s Ratio Prot			0.06	0.08	c0.27			c0.13			c0.12	
v/s Ratio Perm												0.01
v/c Ratio			0.29	0.25	0.87			0.60			0.52	0.04
Uniform Delay, d1			16.6	12.8	16.2			17.9			16.6	14.7
Progression Factor			1.00	1.00	1.00			1.10			1.00	1.00
Incremental Delay, d2			0.7	0.6	16.6			1.6			0.6	0.1
Delay (s)			17.3	13.3	32.8			21.2			17.2	14.8
Level of Service			B	B	C			C			B	B
Approach Delay (s)		17.3			26.2			21.2			16.9	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	247	608	48	392	187
v/c Ratio	0.39	0.88	0.06	0.49	0.23
Control Delay	13.7	34.6	6.6	28.1	14.4
Queue Delay	0.0	0.0	0.0	0.4	0.0
Total Delay	13.7	34.6	6.6	28.5	14.4
Queue Length 50th (ft)	65	246	6	183	52
Queue Length 95th (ft)	110	#398	22	m227	100
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	712	776	832	805	815
Starvation Cap Reductn	0	0	0	117	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.35	0.78	0.06	0.57	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	152	48	180	409	47	26	263	91	8	136	38
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.97			1.00	0.85		0.97			0.97	
Flt Protected		0.99			0.98	1.00		1.00			1.00	
Satd. Flow (prot)		1798			1835	1583		1796			1806	
Flt Permitted		0.75			0.80	1.00		0.98			0.98	
Satd. Flow (perm)		1353			1496	1583		1757			1783	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	157	49	186	422	48	27	271	94	8	140	39
RTOR Reduction (vph)	0	12	0	0	0	12	0	13	0	0	11	0
Lane Group Flow (vph)	0	235	0	0	608	36	0	379	0	0	176	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		36.9			36.9	36.9		36.1			36.1	
Effective Green, g (s)		36.9			36.9	36.9		36.1			36.1	
Actuated g/C Ratio		0.46			0.46	0.46		0.45			0.45	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		624			690	730		793			805	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.41	0.02		c0.22			0.10	
v/c Ratio		0.38			0.88	0.05		0.48			0.22	
Uniform Delay, d1		14.0			19.6	11.9		15.4			13.4	
Progression Factor		1.00			1.00	1.00		1.63			1.00	
Incremental Delay, d2		0.1			12.3	0.0		1.4			0.6	
Delay (s)		14.2			31.9	11.9		26.4			14.0	
Level of Service		B			C	B		C			B	
Approach Delay (s)		14.2			30.4			26.4			14.0	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	122	463	2206	57	343
v/c Ratio	0.58	0.11	0.69	0.46	0.81
Control Delay	43.6	1.7	6.5	56.6	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	1.7	6.5	56.6	20.7
Queue Length 50th (ft)	77	8	95	35	0
Queue Length 95th (ft)	m129	m23	269	76	#123
Internal Link Dist (ft)		350	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	213	4189	3212	138	435
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	0.57	0.11	0.69	0.41	0.79

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.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	118	449	1985	155	55	333
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4671		1719	1486
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4671		1719	1486
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	122	463	2046	160	57	343
RTOR Reduction (vph)	0	0	5	0	0	318
Lane Group Flow (vph)	122	463	2201	0	57	25
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	12.1	84.8	68.7		7.2	7.2
Effective Green, g (s)	12.1	84.8	68.7		7.2	7.2
Actuated g/C Ratio	0.12	0.85	0.69		0.07	0.07
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)	208	4189	3209		124	107
v/s Ratio Prot	c0.07	0.09	c0.47		c0.03	
v/s Ratio Perm						0.02
v/c Ratio	0.59	0.11	0.69		0.46	0.23
Uniform Delay, d1	41.6	1.3	9.3		44.5	43.8
Progression Factor	0.81	1.24	0.54		1.00	1.00
Incremental Delay, d2	2.5	0.0	1.0		1.0	0.4
Delay (s)	36.1	1.6	6.1		45.5	44.2
Level of Service	D	A	A		D	D
Approach Delay (s)		8.8	6.1		44.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	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

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	509	48	1859	303	495
v/c Ratio	0.18	0.37	0.59	0.73	0.48
Control Delay	15.2	36.6	12.4	44.1	3.9
Queue Delay	0.0	0.0	51.1	0.0	0.0
Total Delay	15.2	36.6	63.5	44.1	3.9
Queue Length 50th (ft)	67	27	68	178	0
Queue Length 95th (ft)	113	m22	m393	239	36
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2879	147	3149	673	1379
Starvation Cap Reductn	0	0	1470	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.18	0.33	1.11	0.45	0.36

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	459	45	48	1840	300	490
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		1.00	0.91	1.00	0.88
Frpb, ped/bikes	0.99		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		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4849		1719	4715	1641	2651
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4849		1719	4715	1641	2651
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	464	45	48	1859	303	495
RTOR Reduction (vph)	8	0	0	0	0	370
Lane Group Flow (vph)	501	0	48	1859	303	125
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	57.6		5.2	66.8	25.2	25.2
Effective Green, g (s)	57.6		5.2	66.8	25.2	25.2
Actuated g/C Ratio	0.58		0.05	0.67	0.25	0.25
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0		2.0	2.0	3.0	3.0
Lane Grp Cap (vph)	2793		89	3150	414	668
v/s Ratio Prot	0.10		0.03	c0.39	c0.18	
v/s Ratio Perm						0.05
v/c Ratio	0.18		0.54	0.59	0.73	0.19
Uniform Delay, d1	10.0		46.2	9.1	34.3	29.4
Progression Factor	1.34		0.82	1.20	1.00	1.00
Incremental Delay, d2	0.1		0.3	0.1	6.6	0.1
Delay (s)	13.6		38.4	11.0	40.9	29.5
Level of Service	B		D	B	D	C
Approach Delay (s)	13.6			11.7	33.8	
Approach LOS	B			B	C	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	200	615	163	737	1673	164	223	123	99	1120
v/c Ratio	0.97	0.42	0.29	1.40	1.05	1.25	0.41	0.23	0.57	1.10
Control Delay	97.5	27.1	9.1	224.6	73.3	202.8	36.3	13.9	55.2	95.0
Queue Delay	0.0	0.0	0.0	0.0	140.4	0.0	0.0	0.0	0.0	0.9
Total Delay	97.5	27.1	9.1	224.6	213.8	202.8	36.3	13.9	55.2	95.9
Queue Length 50th (ft)	132	71	0	~329	~430	~135	112	13	61	~424
Queue Length 95th (ft)	#278	176	81	#448	#528	#269	219	55	110	#557
Internal Link Dist (ft)		284			599		325			294
Turn Bay Length (ft)	170			195		210			200	
Base Capacity (vph)	206	1472	556	527	1589	131	547	532	241	1014
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	371	0	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.42	0.29	1.40	1.37	1.25	0.41	0.23	0.41	1.11

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	194	597	158	715	1526	97	159	216	119	96	884	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	1.00	1.00	
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	0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	4940	1480	3335	4681		1641	1827	1490	1719	3382	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	4940	1480	3335	4681		1641	1827	1490	1719	3382	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	200	615	163	737	1573	100	164	223	123	99	911	209
RTOR Reduction (vph)	0	0	116	0	7	0	0	0	86	0	20	0
Lane Group Flow (vph)	200	615	47	737	1666	0	164	223	37	99	1100	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	12.0	29.0	29.0	15.8	33.0		8.8	29.9	29.9	8.9	29.4	
Effective Green, g (s)	12.0	29.0	29.0	15.8	33.0		8.8	29.9	29.9	8.9	29.4	
Actuated g/C Ratio	0.12	0.29	0.29	0.16	0.33		0.09	0.30	0.30	0.09	0.29	
Clearance Time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
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)	206	1433	429	527	1545		144	546	446	153	994	
v/s Ratio Prot	c0.12	0.12		c0.22	c0.36		c0.10	0.12		0.06	c0.33	
v/s Ratio Perm			0.03						0.02			
v/c Ratio	0.97	0.43	0.11	1.40	1.08		1.14	0.41	0.08	0.65	1.11	
Uniform Delay, d1	43.8	28.8	26.0	42.1	33.5		45.6	28.0	25.2	44.0	35.3	
Progression Factor	0.92	0.93	1.75	1.01	1.09		1.10	1.12	2.21	1.00	1.00	
Incremental Delay, d2	53.2	0.9	0.5	190.6	47.1		116.3	0.2	0.0	6.9	62.5	
Delay (s)	93.4	27.6	46.2	233.3	83.6		166.3	31.5	55.6	50.9	97.8	
Level of Service	F	C	D	F	F		F	C	E	D	F	
Approach Delay (s)		44.2			129.4			80.7			94.0	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	99.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	478	564	58	564	402
v/c Ratio	0.68	0.85	0.07	0.89	0.57
Control Delay	19.5	30.5	6.6	41.8	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.1
Total Delay	19.5	30.5	6.6	41.8	28.5
Queue Length 50th (ft)	147	209	8	261	176
Queue Length 95th (ft)	249	#404	25	#475	m258
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	756	722	861	634	705
Starvation Cap Reductn	0	0	0	0	24
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.63	0.78	0.07	0.89	0.59

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	297	103	154	393	56	87	279	180	29	298	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		4.0			4.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.97			1.00	0.85		0.96			0.98	
Flt Protected		0.99			0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1795			1837	1583		1766			1815	
Flt Permitted		0.77			0.72	1.00		0.85			0.95	
Satd. Flow (perm)		1383			1344	1583		1519			1725	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	66	306	106	159	405	58	90	288	186	30	307	65
RTOR Reduction (vph)	0	14	0	0	0	11	0	21	0	0	8	0
Lane Group Flow (vph)	0	464	0	0	564	47	0	543	0	0	394	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		39.7			39.7	39.7		32.3			32.3	
Effective Green, g (s)		39.7			39.7	39.7		32.3			32.3	
Actuated g/C Ratio		0.50			0.50	0.50		0.40			0.40	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		686			667	786		613			696	
v/s Ratio Prot												
v/s Ratio Perm		0.34			c0.42	0.03		c0.36			0.23	
v/c Ratio		0.68			0.85	0.06		0.89			0.57	
Uniform Delay, d1		15.3			17.5	10.5		22.1			18.4	
Progression Factor		1.00			1.00	1.00		1.00			1.29	
Incremental Delay, d2		2.9			10.0	0.0		17.1			2.9	
Delay (s)		18.2			27.5	10.5		39.3			26.7	
Level of Service		B			C	B		D			C	
Approach Delay (s)		18.2			25.9			39.3			26.7	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	116.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	412	104	584	86	257	274
v/c Ratio	0.50	0.12	0.63	0.10	0.44	0.50
Control Delay	11.5	3.5	8.9	3.4	15.9	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	3.5	8.9	3.4	15.9	18.2
Queue Length 50th (ft)	86	5	78	3	59	69
Queue Length 95th (ft)	151	24	m123	m7	115	132
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	829	877	921	864	578	548
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	0.50	0.12	0.63	0.10	0.44	0.50

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	334	101	59	507	83	37	133	80	67	138	61
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.97	
Flt Protected		0.99	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1847	1583		1853	1583		1769			1782	
Flt Permitted		0.83	1.00		0.93	1.00		0.93			0.88	
Satd. Flow (perm)		1554	1583		1727	1583		1651			1591	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	68	344	104	61	523	86	38	137	82	69	142	63
RTOR Reduction (vph)	0	0	33	0	0	20	0	28	0	0	18	0
Lane Group Flow (vph)	0	412	71	0	584	66	0	229	0	0	256	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		829	844		921	844		550			530	
v/s Ratio Prot												
v/s Ratio Perm		0.27	0.04		c0.34	0.04		0.14			c0.16	
v/c Ratio		0.50	0.08		0.63	0.08		0.42			0.48	
Uniform Delay, d1		8.9	6.8		9.9	6.8		15.5			15.9	
Progression Factor		1.00	1.00		0.66	0.77		1.00			1.00	
Incremental Delay, d2		2.1	0.2		1.9	0.1		2.3			3.1	
Delay (s)		11.0	7.0		8.5	5.4		17.8			19.0	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		10.2			8.1			17.8			19.0	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	387	119	589	81	346	552
v/c Ratio	0.89	0.16	0.83	0.12	0.49	0.79
Control Delay	37.1	4.4	28.0	7.4	14.5	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.1	4.4	28.0	7.4	14.5	19.0
Queue Length 50th (ft)	79	2	179	10	80	195
Queue Length 95th (ft)	#268	23	#353	31	145	m219
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	434	727	710	704	702	699
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	0.89	0.16	0.83	0.12	0.49	0.79

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	282	115	82	489	79	56	226	53	106	294	136
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.97	
Flt Protected		0.99	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1840	1583		1849	1583		1808			1781	
Flt Permitted		0.54	1.00		0.88	1.00		0.87			0.87	
Satd. Flow (perm)		1002	1583		1638	1583		1594			1566	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	96	291	119	85	504	81	58	233	55	109	303	140
RTOR Reduction (vph)	0	0	41	0	0	18	0	11	0	0	20	0
Lane Group Flow (vph)	0	387	78	0	589	63	0	335	0	0	532	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		434	686		710	686		691			679	
v/s Ratio Prot												
v/s Ratio Perm		c0.39	0.05		0.36	0.04		0.21			c0.34	
v/c Ratio		0.89	0.11		0.83	0.09		0.48			0.78	
Uniform Delay, d1		15.7	10.1		15.0	10.0		12.2			14.6	
Progression Factor		0.72	0.76		1.00	1.00		1.00			1.07	
Incremental Delay, d2		21.2	0.3		10.8	0.3		2.4			2.6	
Delay (s)		32.6	8.0		25.9	10.3		14.6			18.2	
Level of Service		C	A		C	B		B			B	
Approach Delay (s)		26.8			24.0			14.6			18.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	21.6	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	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	357	78	852	588	240	46	543	175	251	527
v/c Ratio	0.91	0.21	1.21	1.36	0.46	0.47	0.87	0.25	0.71	0.63
Control Delay	64.9	8.3	142.0	210.1	9.9	66.9	50.6	10.7	49.2	33.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.9	8.3	142.0	210.1	9.9	66.9	50.6	10.7	49.2	33.5
Queue Length 50th (ft)	217	0	~347	~503	21	28	140	56	82	145
Queue Length 95th (ft)	#375	36	#469	#716	m85	m56	#335	m80	124	195
Internal Link Dist (ft)	585			161			328			103
Turn Bay Length (ft)						150				
Base Capacity (vph)	416	396	706	432	523	97	627	690	446	841
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	0.86	0.20	1.21	1.36	0.46	0.47	0.87	0.25	0.56	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	154	76	826	570	233	45	527	170	243	365	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	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes		1.00	0.93	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1600	1302	2717	1660	1391	1577	3154	1384	2626	2919	
Flt Permitted		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1600	1302	2717	1660	1391	1577	3154	1384	2626	2919	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	198	159	78	852	588	240	46	543	175	251	376	151
RTOR Reduction (vph)	0	0	59	0	0	161	0	0	0	0	42	0
Lane Group Flow (vph)	0	357	19	852	588	79	46	543	175	251	485	0
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm	Prot		pt+ov	Prot		
Protected Phases	8	8		7	7		1	6	6 7	5	2	
Permitted Phases			8			7						
Actuated Green, G (s)		24.5	24.5	26.0	26.0	26.0	6.1	19.9	49.9	13.6	27.4	
Effective Green, g (s)		24.5	24.5	26.0	26.0	26.0	6.1	19.9	49.9	13.6	27.4	
Actuated g/C Ratio		0.24	0.24	0.26	0.26	0.26	0.06	0.20	0.50	0.14	0.27	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0	2.5	2.5		2.0	2.0	
Lane Grp Cap (vph)		392	319	706	432	362	96	628	691	357	800	
v/s Ratio Prot		c0.22		0.31	c0.35		0.03	c0.17	0.13	c0.10	0.17	
v/s Ratio Perm			0.01			0.06						
v/c Ratio		0.91	0.06	1.21	1.36	0.22	0.48	0.86	0.25	0.70	0.61	
Uniform Delay, d1		36.7	28.9	37.0	37.0	29.0	45.4	38.7	14.4	41.3	31.6	
Progression Factor		1.00	1.00	1.07	1.07	1.19	1.13	0.86	0.62	0.94	1.04	
Incremental Delay, d2		24.8	0.1	106.0	176.8	0.3	2.5	11.0	0.1	5.0	3.3	
Delay (s)		61.5	29.0	145.8	216.6	34.7	53.7	44.4	9.0	43.7	36.2	
Level of Service		E	C	F	F	C	D	D	A	D	D	
Approach Delay (s)		55.7			154.7			36.9			38.6	
Approach LOS		E			F			D			D	

Intersection Summary			
HCM Average Control Delay	93.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	9	68	597	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	9	70	615	0	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	70	35			686	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	70	35			686	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	926	1030			904	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3
Volume Total	9	47	229	410
Volume Left	0	0	0	0
Volume Right	9	0	205	410
cSH	1030	1700	1700	1700
Volume to Capacity	0.01	0.03	0.13	0.24
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	8.5	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	8.5	0.0		
Approach LOS	A			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	439	298	528	267	245	402
v/c Ratio	0.91	1.55	1.37	0.88	0.17	1.40
Control Delay	48.9	298.0	209.3	56.5	1.2	225.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	298.0	209.3	56.5	1.2	225.3
Queue Length 50th (ft)	93	~194	~323	114	0	~246
Queue Length 95th (ft)	#184	#336	#506	#248	13	#413
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	484	192	385	303	1451	287
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	0.91	1.55	1.37	0.88	0.17	1.40

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	307	63	289	466	47	105	154	238	130	193	67
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		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	
Frt		0.98		1.00	0.99			1.00	0.85		0.98	
Flt Protected		0.99		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)		2727		1413	1462			1457	2224		1414	
Flt Permitted		0.56		0.50	1.00			0.68	1.00		0.64	
Satd. Flow (perm)		1540		739	1462			1004	2224		918	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	58	316	65	298	480	48	108	159	245	134	199	69
RTOR Reduction (vph)	0	20	0	0	5	0	0	0	107	0	10	0
Lane Group Flow (vph)	0	419	0	298	523	0	0	267	138	0	392	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		22.0		19.0	19.0			22.0	44.5		22.0	
Effective Green, g (s)		22.0		19.0	19.0			22.0	41.0		22.0	
Actuated g/C Ratio		0.30		0.26	0.26			0.30	0.56		0.30	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		464		192	381			303	1249		277	
v/s Ratio Prot					0.36				0.06			
v/s Ratio Perm		c0.27		c0.40				0.27			c0.43	
v/c Ratio		0.90		1.55	1.37			0.88	0.11		1.41	
Uniform Delay, d1		24.5		27.0	27.0			24.3	7.5		25.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		23.6		272.5	183.4			23.9	0.0		206.1	
Delay (s)		48.1		299.5	210.4			48.1	7.5		231.6	
Level of Service		D		F	F			D	A		F	
Approach Delay (s)		48.1			242.5			28.7			231.6	
Approach LOS		D			F			C			F	

Intersection Summary			
HCM Average Control Delay	151.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	102.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	661	281	446	2	986	319
v/c Ratio	0.86	0.56	0.24	0.02	0.77	0.44
Control Delay	34.9	46.7	9.0	56.0	19.0	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.7	0.5
Total Delay	34.9	46.7	9.0	56.0	19.7	2.8
Queue Length 50th (ft)	141	84	54	1	185	27
Queue Length 95th (ft)	188	#191	157	m2	m64	m2
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	988	506	1859	85	1291	722
Starvation Cap Reductn	0	0	0	0	91	137
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.56	0.24	0.02	0.82	0.55

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.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	307	335	273	433	2	956	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.92		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2533		2740	2825	1413	2825	1201
Flt Permitted	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2533		2740	2825	1413	2825	1201
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	316	345	281	446	2	986	319
RTOR Reduction (vph)	173	0	0	0	0	0	185
Lane Group Flow (vph)	488	0	281	446	2	986	134
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	23.6		21.7	62.6	1.2	42.1	42.1
Effective Green, g (s)	23.6		21.7	62.6	1.2	42.1	42.1
Actuated g/C Ratio	0.24		0.22	0.63	0.01	0.42	0.42
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	598		595	1768	17	1189	506
v/s Ratio Prot	c0.19		c0.10	0.16	0.00	c0.35	
v/s Ratio Perm							0.11
v/c Ratio	0.82		0.47	0.25	0.12	0.83	0.27
Uniform Delay, d1	36.2		34.2	8.3	48.9	25.8	18.9
Progression Factor	1.00		1.08	1.00	1.25	0.76	0.85
Incremental Delay, d2	8.0		0.2	0.3	0.3	1.9	0.3
Delay (s)	44.2		37.0	8.6	61.6	21.5	16.4
Level of Service	D		D	A	E	C	B
Approach Delay (s)	44.2			19.6		20.4	
Approach LOS	D			B		C	

Intersection Summary			
HCM Average Control Delay	26.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	118	246	247	1691	273	400	187	576	191	1197	96
v/c Ratio	0.64	0.60	0.69	1.73	0.66	0.70	0.97	0.50	0.72	0.99	0.16
Control Delay	56.6	46.5	21.2	355.6	38.4	14.0	103.4	11.8	59.2	51.9	10.1
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	56.6	46.5	21.2	355.6	38.4	14.0	103.4	11.8	59.2	51.9	10.1
Queue Length 50th (ft)	79	81	32	~588	130	47	121	51	120	306	6
Queue Length 95th (ft)	139	119	111	m#667	m195	m86	#258	111	m163	#538	m29
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	237	532	408	979	412	571	193	1158	481	1206	615
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	0.50	0.46	0.61	1.73	0.66	0.70	0.97	0.50	0.40	0.99	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	179	181	245	1674	270	396	185	206	364	189	1185	95
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	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.94	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	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	0.90		1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3130	1468	4388	1845	1568	1752	2848		1719	3312	1524
Flt Permitted	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3130	1468	4388	1845	1568	1752	2848		1719	3312	1524
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	181	183	247	1691	273	400	187	208	368	191	1197	96
RTOR Reduction (vph)	0	0	166	0	0	221	0	251	0	0	0	60
Lane Group Flow (vph)	118	246	81	1691	273	179	187	325	0	191	1197	36
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	13.2	13.2	13.2	22.3	22.3	22.3	11.0	31.9		15.5	36.4	36.4
Effective Green, g (s)	13.2	13.2	13.2	22.3	22.3	22.3	11.0	31.9		15.5	36.4	36.4
Actuated g/C Ratio	0.13	0.13	0.13	0.22	0.22	0.22	0.11	0.32		0.16	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	184	413	194	979	411	350	193	909		266	1206	555
v/s Ratio Prot	c0.08	0.08	0.06	c0.39	0.15	0.11	c0.11	0.11		0.11	c0.36	
v/s Ratio Perm												0.02
v/c Ratio	0.64	0.60	0.42	1.73	0.66	0.51	0.97	0.36		0.72	0.99	0.06
Uniform Delay, d1	41.2	40.9	39.9	38.9	35.4	34.1	44.3	26.2		40.2	31.7	20.7
Progression Factor	1.00	1.00	1.00	0.88	0.88	0.80	1.00	1.00		1.21	0.96	2.03
Incremental Delay, d2	5.6	1.5	0.5	329.9	2.5	0.8	54.8	0.1		11.7	20.6	0.2
Delay (s)	46.8	42.4	40.4	364.1	33.6	27.9	99.2	26.3		60.5	50.9	42.1
Level of Service	D	D	D	F	C	C	F	C		E	D	D
Approach Delay (s)		42.4			269.1			44.1			51.6	
Approach LOS		D			F			D			D	

Intersection Summary			
HCM Average Control Delay	147.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	94	103	552	105	765	3	512	421	7	442	1110
v/c Ratio	0.39	0.52	0.71	0.45	0.75	1.00	0.58	0.46	0.01	0.78	0.96
Control Delay	44.1	45.2	11.8	44.4	42.4	559.7	37.7	29.5	28.9	34.5	23.6
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	44.1	45.2	11.8	44.4	42.4	559.7	37.7	29.5	28.9	34.5	23.6
Queue Length 50th (ft)	28	63	25	61	169	0	124	83	3	196	178
Queue Length 95th (ft)	52	95	40	114	209	#20	188	141	m3	m197	m147
Internal Link Dist (ft)		732			379			1000		765	
Turn Bay Length (ft)	140			70			300		90		
Base Capacity (vph)	350	438	1052	234	1087	3	1067	1080	502	568	1156
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	0.27	0.24	0.52	0.45	0.70	1.00	0.48	0.39	0.01	0.78	0.96

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	101	541	103	750	3	502	277	135	7	433	1088
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
Lane Util. Factor	0.97	1.00	0.88	1.00	0.91	1.00	0.97	0.95		1.00	1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	1.00	1.00	0.99		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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1827	2611	1556	5036	1568	3335	3189		1583	1792	2619
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1827	2611	1556	5036	1568	3335	3189		1583	1792	2619
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)	94	103	552	105	765	3	512	283	138	7	442	1110
RTOR Reduction (vph)	0	0	492	0	0	3	0	65	0	0	0	327
Lane Group Flow (vph)	94	103	60	105	765	0	512	356	0	7	442	783
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot		NA	Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	6.4	10.8	10.8	15.9	20.3	0.0	25.6	25.6		31.7	31.7	31.7
Effective Green, g (s)	6.4	10.8	10.8	15.9	20.3	0.0	25.6	25.6		31.7	31.7	31.7
Actuated g/C Ratio	0.06	0.11	0.11	0.16	0.20	0.00	0.26	0.26		0.32	0.32	0.32
Clearance Time (s)	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
Lane Grp Cap (vph)	204	197	282	247	1022	0	854	816		502	568	830
v/s Ratio Prot	0.03	c0.06		0.07	c0.15		c0.15	0.11		0.00	0.25	
v/s Ratio Perm			0.02									c0.30
v/c Ratio	0.46	0.52	0.21	0.43	0.75	0.00	0.60	0.44		0.01	0.78	0.94
Uniform Delay, d1	45.1	42.2	40.7	37.9	37.5	50.0	32.7	31.2		23.4	31.0	33.3
Progression Factor	0.91	0.89	1.93	1.00	1.00	1.00	1.08	1.13		1.06	0.99	1.00
Incremental Delay, d2	0.5	1.0	0.1	0.4	2.7	0.0	2.8	1.5		0.0	0.6	2.6
Delay (s)	41.7	38.6	78.6	38.4	40.1	50.0	38.1	36.9		24.8	31.3	35.8
Level of Service	D	D	E	D	D	D	D	D		C	C	D
Approach Delay (s)		68.5			39.9			37.6			34.5	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM Average Control Delay	42.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	299	298	232	191	41	482	352	121	744	334
v/c Ratio	0.80	0.78	0.30	0.76	0.15	0.93	0.35	0.61	2.12	1.00
Control Delay	50.0	48.7	4.4	56.9	10.8	55.9	25.2	60.5	537.1	65.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	48.7	4.4	56.9	10.8	55.9	25.2	60.5	537.1	65.7
Queue Length 50th (ft)	187	186	0	122	0	316	106	78	~393	57
Queue Length 95th (ft)	257	254	27	186	27	#682	162	m#154	#512	m#240
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	523	531	996	366	383	516	1000	197	351	335
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	0.57	0.56	0.23	0.52	0.11	0.93	0.35	0.61	2.12	1.00

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	509	70	225	76	0	105	45	468	327	15	117	722
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	0.88		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.97		0.99		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	1.00
Frt	1.00	1.00	0.85		0.91		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.96	1.00		0.98		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1539	2440		1407		1358	1597	3163		1597	3195
Flt Permitted	0.95	0.96	1.00		0.98		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1539	2440		1407		1358	1597	3163		1597	3195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	525	72	232	78	0	108	46	482	337	15	121	744
RTOR Reduction (vph)	0	0	174	0	1	0	34	0	3	0	0	0
Lane Group Flow (vph)	299	298	58	0	190	0	7	482	349	0	121	744
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Prot	Prot			Prot	
Protected Phases	4	4		3	3		3	1	6		5	2
Permitted Phases			4									
Actuated Green, G (s)	24.8	24.8	24.8		17.9		17.9	32.3	31.5		12.3	11.0
Effective Green, g (s)	24.8	24.8	24.8		17.9		17.9	32.3	31.5		12.3	11.0
Actuated g/C Ratio	0.25	0.25	0.25		0.18		0.18	0.32	0.32		0.12	0.11
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	376	382	605		252		243	516	996		196	351
v/s Ratio Prot	c0.20	0.19			c0.14		0.01	c0.30	0.11		0.08	c0.23
v/s Ratio Perm			0.02									
v/c Ratio	0.80	0.78	0.10		0.75		0.03	0.93	0.35		0.62	2.12
Uniform Delay, d1	35.2	35.1	29.0		39.0		33.9	32.8	26.4		41.6	44.5
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.70	0.81		1.16	1.05
Incremental Delay, d2	10.4	9.2	0.0		10.8		0.0	24.0	1.0		3.4	511.8
Delay (s)	45.6	44.2	29.0		49.8		33.9	46.8	22.4		51.5	558.6
Level of Service	D	D	C		D		C	D	C		D	F
Approach Delay (s)		40.5			47.0				36.5			384.9
Approach LOS		D			D				D			F

Intersection Summary			
HCM Average Control Delay	173.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	324
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.96
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1372
Flt Permitted	1.00
Satd. Flow (perm)	1372
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	334
RTOR Reduction (vph)	184
Lane Group Flow (vph)	150
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	11.0
Effective Green, g (s)	11.0
Actuated g/C Ratio	0.11
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	151
v/s Ratio Prot	
v/s Ratio Perm	0.11
v/c Ratio	0.99
Uniform Delay, d1	44.5
Progression Factor	1.22
Incremental Delay, d2	64.6
Delay (s)	118.8
Level of Service	F
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,017	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,110	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,692	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	7,833	pcph	11,750	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	859	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,449	pcphpl
Average passenger-car speed, S	65.0	mph
Volume-to-capacity ratio, v/c	0.62	
Density, D	22.3	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,213	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,898	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,821	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,564	pcphpl
Average passenger-car speed, S	64.6	mph
Volume-to-capacity ratio, v/c	0.67	
Density, D	24.2	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,445	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,959	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,072	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,018	pcphpl
Average passenger-car speed, S	59.6	mph
Volume-to-capacity ratio, v/c	0.86	
Density, D	33.9	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,850	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,066	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,511	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,128	pcphpl
Average passenger-car speed, S	57.5	mph
Volume-to-capacity ratio, v/c	0.91	
Density, D	37.0	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,548	897	665	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,723	236	175	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,100	958	721	0	pcph

Volume ratio, VR	0.191

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,679	lc/h
Weaving lane changes, LC_W	1,390	lc/h
Non-weaving vehicle index, I_{NW}	284	
Non-weaving lane change, LC_{NW}	608	lc/h
Total lane changes, LC_{ALL}	1,998	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.389	
Average weaving speed, S_W	35.9	mph
Average non-weaving speed, S_{NW}	44.5	mph
Weaving segment speed, S	42.5	mph
Weaving segment density, D	41.3	pcpmpl
Level of Service, LOS	E	
Weaving segment volume-to-capacity ratio, v/c	0.87	
Weaving segment flow rate, v	8,779	pcph
Weaving segment capacity, c_W	9,830	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,835	pcph	11,750	pcph	No
Exiting freeway volume	8,083	pcph	9,400	pcph	No
On-ramp volume	958	pcph	2,000	pcph	No
Off-ramp volume	711	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	4,447	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,025	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.87	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,637	1,213	808	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,747	319	213	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	7,196	1,296	876	0	pcph

Volume ratio, VR	0.232

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,172	lc/h
Weaving lane changes, LC_W	2,165	lc/h
Non-weaving vehicle index, I_{NW}	936	
Non-weaving lane change, LC_{NW}	1,064	lc/h
Total lane changes, LC_{ALL}	3,230	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	0.801	
Average weaving speed, S_W	42.8	mph
Average non-weaving speed, S_{NW}	38.1	mph
Weaving segment speed, S	39.1	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.16	
Weaving segment flow rate, v	9,368	pcph
Weaving segment capacity, c_W	7,874	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	8,091	pcph	9,400	pcph	No
Exiting freeway volume	8,524	pcph	9,400	pcph	No
On-ramp volume	1,296	pcph	2,100	pcph	No
Off-ramp volume	863	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	4,864	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,028	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.16	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,129	1,989	1,721	574	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,613	523	453	151	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,645	2,125	1,866	613	pcph

Volume ratio, VR	0.355

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	3,992	lc/h
Weaving lane changes, LC_W	3,848	lc/h
Non-weaving vehicle index, I_{NW}	-116	
Non-weaving lane change, LC_{NW}	681	lc/h
Total lane changes, LC_{ALL}	4,530	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	22.8	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.66	
Weaving segment flow rate, v	11,250	pcph
Weaving segment capacity, c_W	6,572	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	8,552	pcph	9,400	pcph	No
Exiting freeway volume	8,838	pcph	9,400	pcph	No
On-ramp volume	2,738	pcph	2,100	pcph	Yes
Off-ramp volume	2,452	pcph	2,100	pcph	Yes

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	6,179	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,871	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.66	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,408	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,213	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,116	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	8,640	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	475	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,279	pcphpl
Average passenger-car speed, S	54.0	mph
Volume-to-capacity ratio, v/c	0.97	
Density, D	42.2	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,963	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,095	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,633	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,158	pcphpl
Average passenger-car speed, S	56.8	mph
Volume-to-capacity ratio, v/c	0.92	
Density, D	38.0	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,693	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,288	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,425	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	8,645	pcph	9,400	pcph	No
Exiting freeway volume		pcph		pcph	
On-ramp volume	780	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,356	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	10,800	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,842	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	11,709	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	10,902	pcph	9,400	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	807	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,927	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.25	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	11,555	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,041	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	12,528	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	3,132	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.33	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	8,875	1,925	548	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,335	507	144	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	9,622	2,057	594	214	pcph

Volume ratio, VR	0.212

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,651	lc/h
Weaving lane changes, LC_W	2,519	lc/h
Non-weaving vehicle index, I_{NW}	649	
Non-weaving lane change, LC_{NW}	1,435	lc/h
Total lane changes, LC_{ALL}	3,954	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.603	
Average weaving speed, S_W	34.2	mph
Average non-weaving speed, S_{NW}	30.9	mph
Weaving segment speed, S	31.6	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.55	
Weaving segment flow rate, v	12,487	pcph
Weaving segment capacity, c_W	7,841	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	10,250	pcph	9,400	pcph	Yes
Exiting freeway volume	11,721	pcph	9,400	pcph	Yes
On-ramp volume	2,270	pcph	2,000	pcph	Yes
Off-ramp volume	799	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	4,662	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,019	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.55	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	9,815	2,604	1,740	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,583	685	458	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	10,641	2,782	1,887	267	pcph

Volume ratio, VR	0.300

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	4,669	lc/h
Weaving lane changes, LC_W	4,631	lc/h
Non-weaving vehicle index, I_{NW}	1,244	
Non-weaving lane change, LC_{NW}	1,786	lc/h
Total lane changes, LC_{ALL}	6,416	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035)
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.526	
Average weaving speed, S_W	34.8	mph
Average non-weaving speed, S_{NW}	12.7	mph
Weaving segment speed, S	15.7	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.98	
Weaving segment flow rate, v	15,577	pcph
Weaving segment capacity, c_W	7,639	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	12,573	pcph	9,400	pcph	Yes
Exiting freeway volume	13,496	pcph	9,400	pcph	Yes
On-ramp volume	3,049	pcph	4,000	pcph	No
Off-ramp volume	2,126	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	5,581	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,967	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.98	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Cumulative (2035) With Project AM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	212	115	435	20	270	340
v/c Ratio	0.89	0.22	1.26	0.04	0.73	0.67
Control Delay	61.3	5.4	163.7	11.0	32.0	26.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.3	5.4	163.7	11.0	32.0	26.5
Queue Length 50th (ft)	73	0	~204	2	90	104
Queue Length 95th (ft)	#186	31	#357	15	m#164	#191
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	239	519	345	445	368	505
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	0.89	0.22	1.26	0.04	0.73	0.67

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	143	112	162	260	19	41	182	39	12	267	51
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.98	
Flt Protected		0.98	1.00		0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1835	1583		1828	1583		1811			1820	
Flt Permitted		0.47	1.00		0.67	1.00		0.71			0.99	
Satd. Flow (perm)		870	1583		1256	1583		1302			1799	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	65	147	115	167	268	20	42	188	40	12	275	53
RTOR Reduction (vph)	0	0	83	0	0	9	0	10	0	0	11	0
Lane Group Flow (vph)	0	212	32	0	435	11	0	260	0	0	329	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		239	435		345	435		358			495	
v/s Ratio Prot												
v/s Ratio Perm		0.24	0.02		c0.35	0.01		c0.20			c0.18	
v/c Ratio		0.89	0.07		1.26	0.02		0.73			0.66	
Uniform Delay, d1		20.9	16.1		21.8	15.9		19.7			19.3	
Progression Factor		1.00	1.00		1.00	1.00		0.95			1.00	
Incremental Delay, d2		35.0	0.3		138.7	0.1		11.8			6.9	
Delay (s)		55.9	16.4		160.5	16.0		30.5			26.2	
Level of Service		E	B		F	B		C			C	
Approach Delay (s)		42.0			154.1			30.5			26.2	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM Average Control Delay	72.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	162	962	265	264	546	65
v/c Ratio	0.70	0.55	0.28	0.52	0.77	0.19
Control Delay	57.3	18.0	13.7	48.7	45.3	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	18.0	13.7	48.7	45.3	9.5
Queue Length 50th (ft)	97	213	86	90	171	0
Queue Length 95th (ft)	#179	273	138	m94	231	35
Internal Link Dist (ft)			385	131	284	
Turn Bay Length (ft)						
Base Capacity (vph)	253	1779	965	563	773	377
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	0.64	0.54	0.27	0.47	0.71	0.17

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	157	933	192	65	120	136	0	0	530	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			4.0			4.0	4.0
Lane Util. Factor			1.00	0.97	1.00			0.95			0.95	1.00
Frpb, ped/bikes			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
Frt			0.86	1.00	0.96			1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (prot)			1565	3335	1788			3472			3438	1452
Flt Permitted			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (perm)			1565	3335	1788			3472			3438	1452
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	162	962	198	67	124	140	0	0	546	65
RTOR Reduction (vph)	0	0	0	0	11	0	0	0	0	0	0	52
Lane Group Flow (vph)	0	0	162	962	254	0	0	264	0	0	546	13
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					Perm
Protected Phases			1	6	6		1	1			4	
Permitted Phases												4
Actuated Green, G (s)			14.7	52.7	52.7			14.7			20.6	20.6
Effective Green, g (s)			14.7	52.7	52.7			14.7			20.6	20.6
Actuated g/C Ratio			0.15	0.53	0.53			0.15			0.21	0.21
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	3.0
Lane Grp Cap (vph)			230	1758	942			510			708	299
v/s Ratio Prot			c0.10	c0.29	0.14			0.08			c0.16	
v/s Ratio Perm												0.01
v/c Ratio			0.70	0.55	0.27			0.52			0.77	0.04
Uniform Delay, d1			40.6	15.7	13.0			39.4			37.5	31.8
Progression Factor			1.00	1.00	1.00			1.19			1.00	1.00
Incremental Delay, d2			10.1	1.2	0.7			0.6			5.2	0.1
Delay (s)			50.6	16.9	13.7			47.6			42.7	31.9
Level of Service			D	B	B			D			D	C
Approach Delay (s)		50.6			16.3			47.6			41.5	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	317	208	23	243	160
v/c Ratio	0.70	0.85	0.06	0.22	0.14
Control Delay	28.5	53.2	7.3	3.4	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	53.2	7.3	3.4	5.7
Queue Length 50th (ft)	109	86	0	17	19
Queue Length 95th (ft)	157	137	13	m45	56
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	898	509	814	1111	1169
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	0.35	0.41	0.03	0.22	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	197	85	96	106	22	39	102	95	14	113	29
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.96			1.00	0.85		0.95			0.97	
Flt Protected		1.00			0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1786			1819	1583		1747			1808	
Flt Permitted		0.97			0.54	1.00		0.94			0.98	
Satd. Flow (perm)		1730			1005	1583		1663			1770	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	203	88	99	109	23	40	105	98	14	116	30
RTOR Reduction (vph)	0	30	0	0	0	17	0	20	0	0	7	0
Lane Group Flow (vph)	0	287	0	0	208	6	0	223	0	0	153	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		17.1			17.1	17.1		45.9			45.9	
Effective Green, g (s)		17.1			17.1	17.1		45.9			45.9	
Actuated g/C Ratio		0.24			0.24	0.24		0.66			0.66	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		423			246	387		1090			1161	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.21	0.00		c0.13			0.09	
v/c Ratio		0.68			0.85	0.01		0.20			0.13	
Uniform Delay, d1		24.0			25.2	20.1		4.8			4.5	
Progression Factor		1.00			1.00	1.00		0.62			1.00	
Incremental Delay, d2		3.4			21.7	0.0		0.4			0.2	
Delay (s)		27.3			46.9	20.1		3.3			4.8	
Level of Service		C			D	C		A			A	
Approach Delay (s)		27.3			44.2			3.3			4.8	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	21.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	70.0	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			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	88	1722	838	101	108
v/c Ratio	0.55	0.43	0.25	0.57	0.43
Control Delay	50.1	2.2	8.2	54.9	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.1	2.2	8.2	54.9	13.4
Queue Length 50th (ft)	56	54	86	62	0
Queue Length 95th (ft)	m75	m69	160	111	48
Internal Link Dist (ft)		331	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	224	4038	3298	309	360
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	0.39	0.43	0.25	0.33	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	85	1670	765	48	98	105
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4680		1719	1496
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4680		1719	1496
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	88	1722	789	49	101	108
RTOR Reduction (vph)	0	0	3	0	0	97
Lane Group Flow (vph)	88	1722	835	0	101	11
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	8.1	81.7	69.6		10.3	10.3
Effective Green, g (s)	8.1	81.7	69.6		10.3	10.3
Actuated g/C Ratio	0.08	0.82	0.70		0.10	0.10
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)	139	4036	3257		177	154
v/s Ratio Prot	c0.05	c0.35	0.18		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.63	0.43	0.26		0.57	0.07
Uniform Delay, d1	44.5	2.6	5.6		42.7	40.5
Progression Factor	0.92	0.67	1.26		1.00	1.00
Incremental Delay, d2	5.5	0.3	0.2		2.7	0.1
Delay (s)	46.6	2.0	7.3		45.5	40.6
Level of Service	D	A	A		D	D
Approach Delay (s)		4.2	7.3		43.0	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1785	27	478	343	1022
v/c Ratio	0.73	0.24	0.18	0.60	0.92
Control Delay	21.0	29.6	8.7	33.3	36.9
Queue Delay	1.0	0.0	0.0	0.0	110.1
Total Delay	22.0	29.6	8.7	33.3	147.0
Queue Length 50th (ft)	257	9	29	181	271
Queue Length 95th (ft)	306	24	36	296	#456
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2452	138	2923	573	1116
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	378	0	0	0	297
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.86	0.20	0.16	0.60	1.25

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1460	307	27	473	340	1012
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		1.00	0.91	1.00	0.88
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4760		1719	4715	1641	2651
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4760		1719	4715	1641	2651
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	1475	310	27	478	343	1022
RTOR Reduction (vph)	33	0	0	0	0	189
Lane Group Flow (vph)	1752	0	27	478	343	833
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	48.9		4.2	57.1	34.9	34.9
Effective Green, g (s)	48.9		4.2	57.1	34.9	34.9
Actuated g/C Ratio	0.49		0.04	0.57	0.35	0.35
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)	2328		72	2692	573	925
v/s Ratio Prot	c0.37		c0.02	0.10	0.21	
v/s Ratio Perm						c0.31
v/c Ratio	0.75		0.38	0.18	0.60	0.90
Uniform Delay, d1	20.7		46.6	10.2	26.8	30.9
Progression Factor	1.00		0.56	0.87	1.00	1.00
Incremental Delay, d2	2.1		1.2	0.1	1.1	11.5
Delay (s)	22.9		27.2	9.0	27.9	42.3
Level of Service	C		C	A	C	D
Approach Delay (s)	22.9			10.0	38.7	
Approach LOS	C			A	D	

Intersection Summary			
HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	251	2162	136	254	405	107	149	956	265	250
v/c Ratio	0.45	1.25	0.23	0.79	0.66	0.25	0.37	1.87	1.00	0.63
Control Delay	28.7	144.1	9.2	60.1	39.2	34.6	23.0	414.5	98.0	44.7
Queue Delay	0.0	50.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.7	194.9	9.2	60.1	39.2	34.6	23.0	414.5	98.0	44.7
Queue Length 50th (ft)	108	~626	11	84	86	65	71	~564	171	72
Queue Length 95th (ft)	m156	#728	m33	#142	112	m51	m42	m#317	#334	108
Internal Link Dist (ft)		284			599		325			294
Turn Bay Length (ft)	170			195		210			200	
Base Capacity (vph)	552	1730	587	327	1635	430	406	510	266	1014
Starvation Cap Reductn	0	144	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	1.36	0.23	0.78	0.25	0.25	0.37	1.87	1.00	0.25

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	2097	132	246	350	43	104	145	927	257	198	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	1.00	1.00	
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	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	4940	1482	3335	4653		1586	1766	1439	1662	3268	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	4940	1482	3335	4653		1586	1766	1439	1662	3268	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	251	2162	136	254	361	44	107	149	956	265	204	46
RTOR Reduction (vph)	0	0	68	0	20	0	0	0	179	0	25	0
Lane Group Flow (vph)	251	2162	68	254	385	0	107	149	777	265	225	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	32.1	35.0	35.0	9.6	12.7		27.1	23.0	23.0	16.0	11.3	
Effective Green, g (s)	32.1	35.0	35.0	9.6	12.7		27.1	23.0	23.0	16.0	11.3	
Actuated g/C Ratio	0.32	0.35	0.35	0.10	0.13		0.27	0.23	0.23	0.16	0.11	
Clearance Time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
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)	552	1729	519	320	591		430	406	331	266	369	
v/s Ratio Prot	0.15	c0.44		c0.08	0.08		0.07	0.08		c0.16	0.07	
v/s Ratio Perm			0.05						c0.54			
v/c Ratio	0.45	1.25	0.13	0.79	0.65		0.25	0.37	2.35	1.00	0.61	
Uniform Delay, d1	27.0	32.5	22.1	44.2	41.5		28.5	32.4	38.5	42.0	42.3	
Progression Factor	0.95	0.92	1.16	0.93	0.86		1.14	0.69	0.91	1.00	1.00	
Incremental Delay, d2	0.1	115.7	0.3	11.9	5.5		0.0	0.0	606.6	53.7	2.1	
Delay (s)	25.9	145.6	26.0	53.0	41.4		32.6	22.4	641.5	95.7	44.3	
Level of Service	C	F	C	D	D		C	C	F	F	D	
Approach Delay (s)		127.4			45.9			511.6			70.8	
Approach LOS		F			D			F			E	

Intersection Summary			
HCM Average Control Delay	205.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	123.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	727	420	55	322	249
v/c Ratio	0.94	0.62	0.07	0.48	0.38
Control Delay	39.1	17.3	5.2	17.7	20.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.1	17.3	5.2	17.7	20.4
Queue Length 50th (ft)	266	119	5	91	98
Queue Length 95th (ft)	#504	209	20	162	165
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	787	690	829	675	653
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	0.92	0.61	0.07	0.48	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	530	67	101	307	53	29	190	93	34	162	46
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	
Frt		0.99			1.00	0.85		0.96			0.97	
Flt Protected		0.99			0.99	1.00		1.00			0.99	
Satd. Flow (prot)		1825			1840	1583		1779			1803	
Flt Permitted		0.83			0.72	1.00		0.96			0.93	
Satd. Flow (perm)		1520			1341	1583		1714			1682	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	112	546	69	104	316	55	30	196	96	35	167	47
RTOR Reduction (vph)	0	5	0	0	0	15	0	22	0	0	12	0
Lane Group Flow (vph)	0	722	0	0	420	40	0	300	0	0	237	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		35.3			35.3	35.3		26.7			26.7	
Effective Green, g (s)		35.3			35.3	35.3		26.7			26.7	
Actuated g/C Ratio		0.50			0.50	0.50		0.38			0.38	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		767			676	798		654			642	
v/s Ratio Prot												
v/s Ratio Perm		c0.47			0.31	0.03		c0.18			0.14	
v/c Ratio		0.94			0.62	0.05		0.46			0.37	
Uniform Delay, d1		16.4			12.5	8.8		16.2			15.6	
Progression Factor		1.00			1.00	1.00		1.00			1.24	
Incremental Delay, d2		19.6			2.0	0.0		2.3			1.6	
Delay (s)		36.0			14.5	8.9		18.6			20.9	
Level of Service		D			B	A		B			C	
Approach Delay (s)		36.0			13.9			18.6			20.9	
Approach LOS		D			B			B			C	

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	720	78	330	47	174	149
v/c Ratio	0.74	0.09	0.38	0.05	0.33	0.25
Control Delay	16.9	5.0	7.6	3.0	16.1	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	5.0	7.6	3.0	16.1	10.5
Queue Length 50th (ft)	182	7	54	0	43	22
Queue Length 95th (ft)	309	24	m39	m0	87	58
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	969	859	872	863	524	586
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	0.74	0.09	0.38	0.05	0.33	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	665	76	33	287	46	66	83	19	28	58	58
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.95	
Flt Protected		1.00	1.00		0.99	1.00		0.98			0.99	
Satd. Flow (prot)		1858	1583		1853	1583		1799			1745	
Flt Permitted		0.98	1.00		0.88	1.00		0.84			0.93	
Satd. Flow (perm)		1817	1583		1635	1583		1549			1638	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	34	686	78	34	296	47	68	86	20	29	60	60
RTOR Reduction (vph)	0	0	14	0	0	19	0	8	0	0	40	0
Lane Group Flow (vph)	0	720	64	0	330	28	0	166	0	0	109	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		969	844		872	844		516			546	
v/s Ratio Prot												
v/s Ratio Perm		c0.40	0.04		0.20	0.02		c0.11			0.07	
v/c Ratio		0.74	0.08		0.38	0.03		0.32			0.20	
Uniform Delay, d1		10.8	6.8		8.2	6.7		14.9			14.3	
Progression Factor		1.00	1.00		0.88	0.98		1.00			1.00	
Incremental Delay, d2		5.1	0.2		0.1	0.0		1.6			0.8	
Delay (s)		16.0	7.0		7.3	6.5		16.6			15.1	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		15.1			7.2			16.6			15.1	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	852	65	358	38	162	446
v/c Ratio	1.10	0.09	1.62	0.05	0.22	0.62
Control Delay	79.6	10.4	320.1	6.0	8.6	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.6	10.4	320.1	6.0	8.6	16.5
Queue Length 50th (ft)	~338	6	~193	3	25	134
Queue Length 95th (ft)	#547	m20	#265	16	57	m206
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	775	696	221	700	738	714
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	1.10	0.09	1.62	0.05	0.22	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	776	63	57	290	37	23	87	47	102	262	69
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.98	
Flt Protected		1.00	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1857	1583		1848	1583		1775			1802	
Flt Permitted		0.96	1.00		0.27	1.00		0.92			0.89	
Satd. Flow (perm)		1788	1583		509	1583		1645			1620	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	52	800	65	59	299	38	24	90	48	105	270	71
RTOR Reduction (vph)	0	0	10	0	0	14	0	26	0	0	11	0
Lane Group Flow (vph)	0	852	55	0	358	24	0	137	0	0	435	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		775	686		221	686		713			702	
v/s Ratio Prot												
v/s Ratio Perm		0.48	0.03		c0.70	0.02		0.08			c0.27	
v/c Ratio		1.10	0.08		1.62	0.03		0.19			0.62	
Uniform Delay, d1		17.0	10.0		17.0	9.8		10.5			13.2	
Progression Factor		0.87	1.26		1.00	1.00		1.00			1.05	
Incremental Delay, d2		60.4	0.2		298.8	0.1		0.6			2.6	
Delay (s)		75.2	12.8		315.8	9.9		11.1			16.4	
Level of Service		E	B		F	A		B			B	
Approach Delay (s)		70.7			286.5			11.1			16.4	
Approach LOS		E			F			B			B	

Intersection Summary			
HCM Average Control Delay	97.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	981	206	272	221	90	783	936	574	160
v/c Ratio	1.69	0.37	1.43	1.91	0.50	1.26	1.37	0.41	0.24
Control Delay	341.7	11.2	257.9	465.8	26.5	157.9	207.0	21.4	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	341.7	11.2	257.9	465.8	26.5	157.9	207.0	21.4	5.9
Queue Length 50th (ft)	~921	33	~125	~223	12	~234	~417	136	5
Queue Length 95th (ft)	#1161	90	#209	#376	61	m#302	#547	188	m39
Internal Link Dist (ft)	585			186		328		103	
Turn Bay Length (ft)									
Base Capacity (vph)	582	553	190	116	180	623	683	1392	680
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	18	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.69	0.37	1.43	1.91	0.50	1.26	1.37	0.42	0.24

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	325	627	200	264	214	87	0	539	220	908	557	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)		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	0.97	1.00	1.00		0.91		0.97	0.95	1.00
Frpb, ped/bikes		1.00	0.93	1.00	1.00	0.98		1.00		1.00	1.00	0.95
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85		0.96		1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)		1617	1304	2717	1660	1381		4151		2626	3094	1316
Flt Permitted		0.98	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (perm)		1617	1304	2717	1660	1381		4151		2626	3094	1316
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	335	646	206	272	221	90	0	556	227	936	574	160
RTOR Reduction (vph)	0	0	83	0	0	84	0	0	0	0	0	88
Lane Group Flow (vph)	0	981	123	272	221	6	0	783	0	936	574	72
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm				Prot		Perm
Protected Phases	8	8		7	7			6		5	2	
Permitted Phases			8			7						2
Actuated Green, G (s)		36.0	36.0	7.0	7.0	7.0		15.0		26.0	45.0	45.0
Effective Green, g (s)		36.0	36.0	7.0	7.0	7.0		15.0		26.0	45.0	45.0
Actuated g/C Ratio		0.36	0.36	0.07	0.07	0.07		0.15		0.26	0.45	0.45
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0		2.5		2.0	2.0	2.0
Lane Grp Cap (vph)		582	469	190	116	97		623		683	1392	592
v/s Ratio Prot		c0.61		0.10	c0.13			c0.19		c0.36	0.19	
v/s Ratio Perm			0.09			0.00						0.05
v/c Ratio		1.69	0.26	1.43	1.91	0.06		1.26		1.37	0.41	0.12
Uniform Delay, d1		32.0	22.6	46.5	46.5	43.4		42.5		37.0	18.6	16.0
Progression Factor		1.00	1.00	1.04	1.04	1.64		0.81		1.00	1.09	1.84
Incremental Delay, d2		315.9	0.2	221.6	437.5	0.3		126.2		175.5	0.9	0.4
Delay (s)		347.9	22.8	269.8	485.8	71.4		160.6		212.4	21.2	29.9
Level of Service		F	C	F	F	E		F		F	C	C
Approach Delay (s)		291.5			321.1			160.6			129.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	207.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	128.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	23	856	1714	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	24	882	1767	0	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	882	441			2649	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	882	441			2649	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	285	564			156	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3
Volume Total	24	588	883	1178
Volume Left	0	0	0	0
Volume Right	24	0	589	1178
cSH	564	1700	1700	1700
Volume to Capacity	0.04	0.35	0.52	0.69
Queue Length 95th (ft)	3	0	0	0
Control Delay (s)	11.7	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.7	0.0		
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	715	222	250	219	280	455
v/c Ratio	1.25	1.51	0.65	0.65	0.20	1.64
Control Delay	151.0	287.7	32.4	33.3	3.4	325.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	151.0	287.7	32.4	33.3	3.4	325.9
Queue Length 50th (ft)	~211	~142	97	85	13	~305
Queue Length 95th (ft)	#318	#270	#177	#176	28	#479
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	573	147	385	335	1411	278
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	1.25	1.51	0.65	0.65	0.20	1.64

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	547	122	215	214	28	77	136	272	189	211	41
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		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	
Frt		0.97		1.00	0.98			1.00	0.85		0.99	
Flt Protected		1.00		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)		2725		1413	1455			1461	2224		1430	
Flt Permitted		0.67		0.38	1.00			0.75	1.00		0.62	
Satd. Flow (perm)		1819		565	1455			1113	2224		906	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	25	564	126	222	221	29	79	140	280	195	218	42
RTOR Reduction (vph)	0	25	0	0	7	0	0	0	62	0	5	0
Lane Group Flow (vph)	0	690	0	222	243	0	0	219	218	0	450	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		22.0		19.0	19.0			22.0	44.5		22.0	
Effective Green, g (s)		22.0		19.0	19.0			22.0	41.0		22.0	
Actuated g/C Ratio		0.30		0.26	0.26			0.30	0.56		0.30	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		548		147	379			335	1249		273	
v/s Ratio Prot					0.17				0.10			
v/s Ratio Perm		c0.38		c0.39				0.20			c0.50	
v/c Ratio		1.26		1.51	0.64			0.65	0.17		1.65	
Uniform Delay, d1		25.5		27.0	24.0			22.2	7.8		25.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		130.7		261.4	2.8			3.5	0.0		307.8	
Delay (s)		156.2		288.4	26.8			25.7	7.8		333.3	
Level of Service		F		F	C			C	A		F	
Approach Delay (s)		156.2			149.8			15.6			333.3	
Approach LOS		F			F			B			F	

Intersection Summary			
HCM Average Control Delay	159.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	91.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	879	137	321	22	755	276
v/c Ratio	0.93	0.23	0.20	0.27	0.78	0.47
Control Delay	39.4	34.9	9.8	49.9	34.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	39.4	34.9	9.8	49.9	34.9	8.2
Queue Length 50th (ft)	196	42	31	10	251	17
Queue Length 95th (ft)	#311	m67	m67	m24	m276	m50
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	1019	587	1569	82	1076	625
Starvation Cap Reductn	0	0	0	0	18	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.23	0.20	0.27	0.71	0.44

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.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	427	426	133	311	21	732	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.93		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2542		2649	2731	1366	2731	1161
Flt Permitted	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2542		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	440	439	137	321	22	755	276
RTOR Reduction (vph)	188	0	0	0	0	0	185
Lane Group Flow (vph)	691	0	137	321	22	755	91
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	30.0		24.5	55.0	2.4	32.9	32.9
Effective Green, g (s)	30.0		24.5	55.0	2.4	32.9	32.9
Actuated g/C Ratio	0.30		0.24	0.55	0.02	0.33	0.33
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	763		649	1502	33	898	382
v/s Ratio Prot	c0.27		0.05	c0.12	0.02	c0.28	
v/s Ratio Perm							0.08
v/c Ratio	0.91		0.21	0.21	0.67	0.84	0.24
Uniform Delay, d1	33.6		30.1	11.5	48.4	31.1	24.4
Progression Factor	1.00		0.98	0.79	0.97	1.04	2.24
Incremental Delay, d2	14.0		0.0	0.3	25.3	7.1	1.1
Delay (s)	47.7		29.6	9.4	72.1	39.4	55.7
Level of Service	D		C	A	E	D	E
Approach Delay (s)	47.7			15.4		44.3	
Approach LOS	D			B		D	

Intersection Summary			
HCM Average Control Delay	40.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.6
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	124	295	143	531	238	234	215	971	246	846	78
v/c Ratio	0.64	0.66	0.44	0.56	0.60	0.47	0.80	1.09dr	0.61	0.82	0.15
Control Delay	55.6	47.7	10.8	36.7	40.9	14.3	61.7	31.6	30.6	30.3	4.7
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	55.6	47.7	10.8	36.7	40.9	14.3	61.7	31.6	30.6	30.3	4.7
Queue Length 50th (ft)	83	100	0	121	155	48	132	140	164	295	3
Queue Length 95th (ft)	143	139	52	156	228	105	#222	#303	m#233	m#481	m13
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	251	583	382	1131	475	560	315	1052	403	1028	524
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	0.49	0.51	0.37	0.47	0.50	0.42	0.68	0.92	0.61	0.82	0.15

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.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	137	278	142	526	236	232	213	160	801	244	838	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.94	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	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	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3237	1468	4388	1845	1568	1752	2700		1662	3202	1471
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3237	1468	4388	1845	1568	1752	2700		1662	3202	1471
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	138	281	143	531	238	234	215	162	809	246	846	78
RTOR Reduction (vph)	0	0	123	0	0	164	0	422	0	0	0	53
Lane Group Flow (vph)	124	295	20	531	238	70	215	549	0	246	846	25
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	13.8	13.8	13.8	21.5	21.5	21.5	15.4	23.3		24.3	32.2	32.2
Effective Green, g (s)	13.8	13.8	13.8	21.5	21.5	21.5	15.4	23.3		24.3	32.2	32.2
Actuated g/C Ratio	0.14	0.14	0.14	0.22	0.22	0.22	0.15	0.23		0.24	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	192	447	203	943	397	337	270	629		404	1031	474
v/s Ratio Prot	0.09	c0.09	0.01	0.12	c0.13	0.04	0.12	c0.20		0.15	c0.26	
v/s Ratio Perm												0.02
v/c Ratio	0.65	0.66	0.10	0.56	0.60	0.21	0.80	1.09dr		0.61	0.82	0.05
Uniform Delay, d1	40.8	40.9	37.7	35.1	35.4	32.3	40.8	36.9		33.6	31.2	23.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.84	1.00	1.00		0.68	0.63	0.55
Incremental Delay, d2	5.5	2.7	0.1	0.7	2.3	0.3	14.0	12.4		4.2	4.7	0.1
Delay (s)	46.3	43.6	37.7	35.7	37.7	59.7	54.8	49.3		27.3	24.5	13.0
Level of Service	D	D	D	D	D	E	D	D		C	C	B
Approach Delay (s)		42.7			41.8			50.3			24.3	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	39.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.1
Intersection Capacity Utilization	79.0%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	561	252	536	24	108	7	505	1926	6	198	402
v/c Ratio	1.15	0.53	0.49	0.24	0.19	1.00	0.36	1.37	0.03	0.73	0.55
Control Delay	118.1	34.8	8.0	49.7	38.6	374.4	22.3	188.5	45.0	67.2	18.6
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	118.1	34.8	8.0	49.7	38.6	374.4	22.3	188.5	45.0	67.2	18.6
Queue Length 50th (ft)	~234	163	20	15	24	0	90	~757	0	133	39
Queue Length 95th (ft)	m#336	m206	m72	41	36	#31	m91	m#515	m10	m169	m74
Internal Link Dist (ft)		732			376			1000		765	
Turn Bay Length (ft)	140			70			300		90		
Base Capacity (vph)	488	483	1091	124	1058	7	1388	1410	306	347	819
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	1.15	0.52	0.49	0.19	0.10	1.00	0.36	1.37	0.02	0.57	0.49

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	247	525	24	106	7	495	1101	787	6	194	394
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
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
Lane Util. Factor	0.97	1.00	0.88	1.00	0.91	1.00	0.97	0.95		1.00	1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	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	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1827	2638	1556	5036	1568	3335	3123		1531	1733	2482
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1827	2638	1556	5036	1568	3335	3123		1531	1733	2482
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)	561	252	536	24	108	7	505	1123	803	6	198	402
RTOR Reduction (vph)	0	0	396	0	0	7	0	116	0	0	0	339
Lane Group Flow (vph)	561	252	140	24	108	0	505	1810	0	6	198	63
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot		NA	Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	15.3	26.1	26.1	3.0	13.8	0.0	39.2	39.2		15.7	15.7	15.7
Effective Green, g (s)	15.3	26.1	26.1	3.0	13.8	0.0	39.2	39.2		15.7	15.7	15.7
Actuated g/C Ratio	0.15	0.26	0.26	0.03	0.14	0.00	0.39	0.39		0.16	0.16	0.16
Clearance Time (s)	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
Lane Grp Cap (vph)	487	477	689	47	695	0	1307	1224		240	272	390
v/s Ratio Prot	c0.18	c0.14		c0.02	0.02		0.15	c0.58		0.00	c0.11	
v/s Ratio Perm			0.05									0.03
v/c Ratio	1.15	0.53	0.20	0.51	0.16	0.00	0.39	1.48		0.03	0.73	0.16
Uniform Delay, d1	42.4	31.7	28.8	47.8	38.0	50.0	21.8	30.4		35.7	40.1	36.5
Progression Factor	0.84	0.97	2.38	1.00	1.00	1.00	1.02	0.87		1.36	1.34	4.29
Incremental Delay, d2	82.6	0.3	0.0	3.8	0.0	0.0	0.1	216.0		0.0	7.2	0.1
Delay (s)	118.3	31.1	68.8	51.6	38.0	50.0	22.4	242.5		48.5	60.9	156.6
Level of Service	F	C	E	D	D	D	C	F		D	E	F
Approach Delay (s)		82.3			41.0			196.8			124.3	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	148.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	978	993	459	90	26	226	304	97	561	124
v/c Ratio	1.26	1.26	0.34	0.60	0.16	0.97	0.52	0.78	1.60	0.51
Control Delay	150.9	154.6	10.2	56.9	16.1	83.1	32.5	89.2	314.4	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.9	154.6	10.2	56.9	16.1	83.1	32.5	89.2	314.4	28.1
Queue Length 50th (ft)	~844	~861	55	56	0	153	103	63	~257	3
Queue Length 95th (ft)	#1154	#1172	105	106	24	#299	143	m#148	#374	70
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	779	786	1344	358	364	232	581	128	351	242
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	1.26	1.26	0.34	0.25	0.07	0.97	0.52	0.76	1.60	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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1825	87	445	19	0	65	28	219	280	15	94	544
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	0.88		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.98		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	1.00		1.00	1.00
Frt	1.00	1.00	0.85		0.88		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.96	1.00		0.99		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1528	2453		1370		1326	1597	3158		1597	3195
Flt Permitted	0.95	0.96	1.00		0.99		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1528	2453		1370		1326	1597	3158		1597	3195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1881	90	459	20	0	67	29	226	289	15	97	561
RTOR Reduction (vph)	0	0	87	0	2	0	23	0	4	0	0	0
Lane Group Flow (vph)	978	993	372	0	88	0	3	226	300	0	97	561
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Perm	Prot			Prot	
Protected Phases	4	4		3	3			1	6		5	2
Permitted Phases			4				3					
Actuated Green, G (s)	51.4	51.4	51.4		9.7		9.7	14.5	17.7		7.7	10.4
Effective Green, g (s)	51.4	51.4	51.4		9.7		9.7	14.5	17.7		7.7	10.4
Actuated g/C Ratio	0.51	0.51	0.51		0.10		0.10	0.14	0.18		0.08	0.10
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	780	785	1261		133		129	232	559		123	332
v/s Ratio Prot	0.64	c0.65			c0.06			c0.14	0.09		0.06	c0.18
v/s Ratio Perm			0.15				0.00					
v/c Ratio	1.25	1.26	0.30		0.66		0.02	0.97	0.54		0.79	1.69
Uniform Delay, d1	24.3	24.3	13.9		43.6		40.8	42.6	37.4		45.4	44.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.64	0.80		1.19	1.12
Incremental Delay, d2	124.7	129.3	0.0		9.2		0.0	50.2	3.5		23.3	321.8
Delay (s)	149.0	153.6	14.0		52.8		40.9	77.6	33.3		77.4	371.8
Level of Service	F	F	B		D		D	E	C		E	F
Approach Delay (s)		125.4			50.1				52.2			287.7
Approach LOS		F			D				D			F

Intersection Summary			
HCM Average Control Delay	146.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	120
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.96
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1370
Flt Permitted	1.00
Satd. Flow (perm)	1370
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	124
RTOR Reduction (vph)	91
Lane Group Flow (vph)	33
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	10.4
Effective Green, g (s)	10.4
Actuated g/C Ratio	0.10
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	142
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.23
Uniform Delay, d1	41.1
Progression Factor	1.67
Incremental Delay, d2	3.3
Delay (s)	72.1
Level of Service	E
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	14,139	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,721	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	15,330	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	12,812	pcph	11,750	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	2,518	pcph	2,000	pcph	Yes

LOS and Performance Measures

Flow rate, v_p	2,555	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.09	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	11,782	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,101	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	12,774	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,555	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.09	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	9,616	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,531	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	10,426	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,607	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.11	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,655	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,278	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,384	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,346	pcphpl
Average passenger-car speed, S	52.3	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	44.8	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	9,212	404	2,570	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,424	106	676	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	9,988	432	2,786	0	pcph

Volume ratio, VR	0.244	

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	3,218	lc/h
Weaving lane changes, LC_W	2,928	lc/h
Non-weaving vehicle index, I_{NW}	400	
Non-weaving lane change, LC_{NW}	1,203	lc/h
Total lane changes, LC_{ALL}	4,131	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	2.464	
Average weaving speed, S_W	29.4	mph
Average non-weaving speed, S_{NW}	29.2	mph
Weaving segment speed, S	29.2	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.34	
Weaving segment flow rate, v	13,206	pcph
Weaving segment capacity, c_W	9,562	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	12,781	pcph	11,750	pcph	Yes
Exiting freeway volume	10,467	pcph	9,400	pcph	Yes
On-ramp volume	432	pcph	2,000	pcph	No
Off-ramp volume	2,746	pcph	2,100	pcph	Yes

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	4,988	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,984	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.34	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,654	1,001	1,962	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,014	263	516	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	8,299	1,069	2,127	0	pcph

Volume ratio, VR	0.278

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	3,197	lc/h
Weaving lane changes, LC_W	3,190	lc/h
Non-weaving vehicle index, I_{NW}	1,079	
Non-weaving lane change, LC_{NW}	1,291	lc/h
Total lane changes, LC_{ALL}	4,481	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.037	
Average weaving speed, S_W	39.5	mph
Average non-weaving speed, S_{NW}	28.2	mph
Weaving segment speed, S	30.6	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.44	
Weaving segment flow rate, v	11,496	pcph
Weaving segment capacity, c_W	7,730	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	10,442	pcph	9,400	pcph	Yes
Exiting freeway volume	9,415	pcph	9,400	pcph	Yes
On-ramp volume	1,069	pcph	2,100	pcph	No
Off-ramp volume	2,096	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	5,350	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,990	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.44	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	7,950	1,019	706	235	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,092	268	186	62	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	8,619	1,089	765	251	pcph

Volume ratio, VR	0.173

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,854	lc/h
Weaving lane changes, LC_W	1,710	lc/h
Non-weaving vehicle index, I_{NW}	-142	
Non-weaving lane change, LC_{NW}	1,014	lc/h
Total lane changes, LC_{ALL}	2,724	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	38.8	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.33	
Weaving segment flow rate, v	10,724	pcph
Weaving segment capacity, c_W	7,839	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	9,404	pcph	9,400	pcph	Yes
Exiting freeway volume	9,739	pcph	9,400	pcph	Yes
On-ramp volume	1,340	pcph	2,100	pcph	No
Off-ramp volume	1,005	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	4,260	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,018	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.33	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	13,348	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,513	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	14,473	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	11,842	pcph	9,400	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	2,630	pcph	2,000	pcph	Yes

LOS and Performance Measures

Flow rate, v_p	3,618	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.54	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	10,886	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,865	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	11,803	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,951	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.26	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	11,606	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,054	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	12,584	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	11,815	pcph	9,400	pcph	Yes
Exiting freeway volume		pcph		pcph	
On-ramp volume	769	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	3,146	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.34	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	12,343	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,248	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	13,383	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	12,615	pcph	9,400	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	768	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	3,346	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.42	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	13,062	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,437	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	14,162	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	3,541	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.51	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	11,336	1,007	990	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,983	265	261	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	12,291	1,076	1,073	214	pcph

Volume ratio, VR	0.147

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,149	lc/h
Weaving lane changes, LC_W	2,018	lc/h
Non-weaving vehicle index, I_{NW}	825	
Non-weaving lane change, LC_{NW}	1,984	lc/h
Total lane changes, LC_{ALL}	4,002	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.619	
Average weaving speed, S_W	34.1	mph
Average non-weaving speed, S_{NW}	31.9	mph
Weaving segment speed, S	32.2	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.77	
Weaving segment flow rate, v	14,654	pcph
Weaving segment capacity, c_W	8,038	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	13,384	pcph	9,400	pcph	Yes
Exiting freeway volume	13,402	pcph	9,400	pcph	Yes
On-ramp volume	1,290	pcph	2,000	pcph	No
Off-ramp volume	1,271	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	3,998	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,069	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.77	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	12,032	1,266	1,030	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	3,166	333	271	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	13,046	1,353	1,117	267	pcph

Volume ratio, VR	0.156	

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,469	lc/h
Weaving lane changes, LC_W	2,431	lc/h
Non-weaving vehicle index, I_{NW}	1,518	
Non-weaving lane change, LC_{NW}	3,077	lc/h
Total lane changes, LC_{ALL}	5,508	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035) Plus Project
Time period	AM Peak Hour

Performance Measures

Weaving intensity factor, W	1.353	
Average weaving speed, S_W	36.2	mph
Average non-weaving speed, S_{NW}	28.3	mph
Weaving segment speed, S	29.3	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.90	
Weaving segment flow rate, v	15,782	pcph
Weaving segment capacity, c_W	8,081	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	14,186	pcph	9,400	pcph	Yes
Exiting freeway volume	14,439	pcph	9,400	pcph	Yes
On-ramp volume	1,620	pcph	4,000	pcph	No
Off-ramp volume	1,368	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	4,096	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,080	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.90	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Cumulative (2035) With Project PM

FEHR PEERS

Queues
1: Miller Ave. & Linden Ave.

7/21/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	173	159	763	56	383	441
v/c Ratio	1.90	0.29	1.90	0.12	1.03	0.88
Control Delay	465.7	5.1	436.5	12.5	44.0	41.8
Queue Delay	0.0	0.1	71.7	0.0	0.0	0.1
Total Delay	465.7	5.2	508.2	12.5	44.0	41.9
Queue Length 50th (ft)	~99	0	~438	9	~153	147
Queue Length 95th (ft)	#203	37	#626	32	m#200	#300
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	91	551	401	451	373	504
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	45	31	0	0	1
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.90	0.31	2.06	0.12	1.03	0.88

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	91	157	222	534	55	49	282	49	14	358	64
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.98	
Flt Protected		0.98	1.00		0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1820	1583		1836	1583		1819			1823	
Flt Permitted		0.18	1.00		0.78	1.00		0.72			0.98	
Satd. Flow (perm)		332	1583		1457	1583		1323			1796	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	81	92	159	224	539	56	49	285	49	14	362	65
RTOR Reduction (vph)	0	0	115	0	0	15	0	9	0	0	10	0
Lane Group Flow (vph)	0	173	44	0	763	41	0	374	0	0	431	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Effective Green, g (s)		16.5	16.5		16.5	16.5		16.5			16.5	
Actuated g/C Ratio		0.28	0.28		0.28	0.28		0.28			0.28	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		91	435		401	435		364			494	
v/s Ratio Prot												
v/s Ratio Perm		0.52	0.03		c0.52	0.03		c0.28			c0.24	
v/c Ratio		1.90	0.10		1.90	0.09		1.03			0.87	
Uniform Delay, d1		21.8	16.2		21.8	16.2		21.8			20.7	
Progression Factor		1.00	1.00		1.00	1.00		0.80			1.00	
Incremental Delay, d2		443.6	0.5		415.5	0.4		22.1			18.7	
Delay (s)		465.4	16.7		437.2	16.6		39.4			39.5	
Level of Service		F	B		F	B		D			D	
Approach Delay (s)		250.5			408.5			39.4			39.5	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM Average Control Delay	228.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	100.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	139	365	554	644	423	71
v/c Ratio	0.33	0.25	0.70	0.69	0.70	0.23
Control Delay	34.9	18.0	27.2	43.6	44.8	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	18.0	27.2	43.6	44.8	10.0
Queue Length 50th (ft)	67	78	289	190	134	0
Queue Length 95th (ft)	146	92	346	m#356	176	36
Internal Link Dist (ft)			385	131	284	
Turn Bay Length (ft)						
Base Capacity (vph)	423	1668	909	937	756	375
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	0.33	0.22	0.61	0.69	0.56	0.19

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	135	354	430	108	308	316	0	0	410	69
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			1.00	0.97	1.00			0.95			0.95	1.00
Frpb, ped/bikes			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
Frt			0.86	1.00	0.97			1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (prot)			1565	3335	1800			3470			3438	1451
Flt Permitted			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (perm)			1565	3335	1800			3470			3438	1451
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	139	365	443	111	318	326	0	0	423	71
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	59
Lane Group Flow (vph)	0	0	139	365	544	0	0	644	0	0	423	12
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split			Split					Perm
Protected Phases			1	6	6		1	1			4	
Permitted Phases												4
Actuated Green, G (s)			27.0	43.4	43.4			27.0			17.6	17.6
Effective Green, g (s)			27.0	43.4	43.4			27.0			17.6	17.6
Actuated g/C Ratio			0.27	0.43	0.43			0.27			0.18	0.18
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	3.0
Lane Grp Cap (vph)			423	1447	781			937			605	255
v/s Ratio Prot			0.09	0.11	c0.30			c0.19			c0.12	
v/s Ratio Perm												0.01
v/c Ratio			0.33	0.25	0.70			0.69			0.70	0.05
Uniform Delay, d1			29.2	18.0	23.0			32.7			38.7	34.2
Progression Factor			1.00	1.00	1.00			1.14			1.00	1.00
Incremental Delay, d2			0.6	0.4	5.1			2.3			3.5	0.1
Delay (s)			29.9	18.4	28.0			39.6			42.2	34.3
Level of Service			C	B	C			D			D	C
Approach Delay (s)		29.9			24.2			39.6			41.1	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	251	632	48	399	187
v/c Ratio	0.38	0.91	0.06	0.52	0.24
Control Delay	11.9	35.8	5.8	12.6	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	35.8	5.8	12.6	13.2
Queue Length 50th (ft)	54	218	5	83	46
Queue Length 95th (ft)	101	#422	20	m87	88
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	712	752	815	771	779
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	0.35	0.84	0.06	0.52	0.24

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	156	48	200	413	47	26	263	98	8	136	38
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.97			1.00	0.85		0.97			0.97	
Flt Protected		0.99			0.98	1.00		1.00			1.00	
Satd. Flow (prot)		1799			1833	1583		1793			1806	
Flt Permitted		0.76			0.80	1.00		0.98			0.98	
Satd. Flow (perm)		1379			1483	1583		1756			1782	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	161	49	206	426	48	27	271	101	8	140	39
RTOR Reduction (vph)	0	13	0	0	0	13	0	17	0	0	13	0
Lane Group Flow (vph)	0	238	0	0	632	35	0	382	0	0	174	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		32.9			32.9	32.9		30.1			30.1	
Effective Green, g (s)		32.9			32.9	32.9		30.1			30.1	
Actuated g/C Ratio		0.47			0.47	0.47		0.43			0.43	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		648			697	744		755			766	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.43	0.02		c0.22			0.10	
v/c Ratio		0.37			0.91	0.05		0.51			0.23	
Uniform Delay, d1		11.9			17.1	10.1		14.5			12.6	
Progression Factor		1.00			1.00	1.00		0.78			1.00	
Incremental Delay, d2		0.1			15.1	0.0		1.0			0.7	
Delay (s)		12.0			32.3	10.1		12.3			13.3	
Level of Service		B			C	B		B			B	
Approach Delay (s)		12.0			30.7			12.3			13.3	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	122	605	2900	57	343
v/c Ratio	0.67	0.15	0.91	0.36	0.76
Control Delay	57.5	1.2	19.9	47.4	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	1.2	19.9	47.4	16.3
Queue Length 50th (ft)	85	8	691	35	0
Queue Length 95th (ft)	m116	m29	m#704	69	81
Internal Link Dist (ft)		331	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	223	4091	3193	309	552
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	0.55	0.15	0.91	0.18	0.62

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.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	118	587	2658	155	55	333
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4682		1719	1494
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4682		1719	1494
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	122	605	2740	160	57	343
RTOR Reduction (vph)	0	0	3	0	0	311
Lane Group Flow (vph)	122	605	2897	0	57	32
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot					Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	10.7	82.8	68.1		9.2	9.2
Effective Green, g (s)	10.7	82.8	68.1		9.2	9.2
Actuated g/C Ratio	0.11	0.83	0.68		0.09	0.09
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)	184	4090	3188		158	137
v/s Ratio Prot	c0.07	0.12	c0.62		c0.03	
v/s Ratio Perm						0.02
v/c Ratio	0.66	0.15	0.91		0.36	0.23
Uniform Delay, d1	42.9	1.7	13.3		42.6	42.1
Progression Factor	1.06	0.57	1.18		1.00	1.00
Incremental Delay, d2	4.8	0.1	2.3		0.5	0.3
Delay (s)	50.1	1.0	18.1		43.2	42.4
Level of Service	D	A	B		D	D
Approach Delay (s)		9.3	18.1		42.5	
Approach LOS		A	B		D	

Intersection Summary			
HCM Average Control Delay	18.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	648	48	2014	827	495
v/c Ratio	0.27	0.40	0.75	1.45	0.43
Control Delay	17.6	52.8	12.4	238.8	9.6
Queue Delay	0.0	0.0	75.3	0.0	0.0
Total Delay	17.6	52.8	87.7	238.8	9.6
Queue Length 50th (ft)	98	28	501	~736	39
Queue Length 95th (ft)	124	m24	m235	#1006	91
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2457	138	2923	572	1145
Starvation Cap Reductn	0	0	1192	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.35	1.16	1.45	0.43

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	516	126	48	1994	819	490
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		1.00	0.91	1.00	0.88
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4737		1719	4715	1641	2651
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4737		1719	4715	1641	2651
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	521	127	48	2014	827	495
RTOR Reduction (vph)	43	0	0	0	0	221
Lane Group Flow (vph)	605	0	48	2014	827	274
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	48.5		4.6	57.1	34.9	34.9
Effective Green, g (s)	48.5		4.6	57.1	34.9	34.9
Actuated g/C Ratio	0.48		0.05	0.57	0.35	0.35
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)	2297		79	2692	573	925
v/s Ratio Prot	0.13		0.03	c0.43	c0.50	
v/s Ratio Perm						0.10
v/c Ratio	0.26		0.61	0.75	1.44	0.30
Uniform Delay, d1	15.2		46.8	16.1	32.5	23.6
Progression Factor	1.38		1.16	0.77	1.00	1.00
Incremental Delay, d2	0.3		0.8	0.2	209.2	0.1
Delay (s)	21.2		55.3	12.6	241.8	23.7
Level of Service	C		E	B	F	C
Approach Delay (s)	21.2			13.6	160.1	
Approach LOS	C			B	F	

Intersection Summary			
HCM Average Control Delay	62.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	221	636	180	737	1692	287	223	123	99	1139
v/c Ratio	1.28	0.37	0.28	2.25	1.03	2.26	0.54	0.29	0.34	1.12
Control Delay	200.0	22.2	4.9	597.4	63.8	614.1	32.1	11.8	38.9	101.4
Queue Delay	0.0	0.0	0.0	0.0	177.2	0.0	0.0	0.0	0.0	0.5
Total Delay	200.0	22.2	4.9	597.4	241.0	614.1	32.1	11.8	38.9	101.9
Queue Length 50th (ft)	~180	89	0	~399	~428	~310	129	9	53	~437
Queue Length 95th (ft)	#338	122	35	#519	#522	m#476	m196	m35	107	#571
Internal Link Dist (ft)		284			599		325			294
Turn Bay Length (ft)	170			195		210			200	
Base Capacity (vph)	172	1719	633	327	1636	127	477	479	326	1014
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	461	0	0	0	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.28	0.37	0.28	2.25	1.44	2.26	0.47	0.26	0.30	1.12

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	214	617	175	715	1544	97	278	216	119	96	884	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	1.00	1.00	
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	0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	4940	1482	3335	4682		1586	1766	1439	1662	3261	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	4940	1482	3335	4682		1586	1766	1439	1662	3261	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	221	636	180	737	1592	100	287	223	123	99	911	228
RTOR Reduction (vph)	0	0	119	0	7	0	0	0	94	0	22	0
Lane Group Flow (vph)	221	636	61	737	1685	0	287	223	29	99	1117	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	10.0	34.0	34.0	9.8	34.0		8.8	23.4	23.4	16.4	30.4	
Effective Green, g (s)	10.0	34.0	34.0	9.8	34.0		8.8	23.4	23.4	16.4	30.4	
Actuated g/C Ratio	0.10	0.34	0.34	0.10	0.34		0.09	0.23	0.23	0.16	0.30	
Clearance Time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
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)	172	1680	504	327	1592		140	413	337	273	991	
v/s Ratio Prot	c0.13	0.13		c0.22	c0.36		c0.18	0.13		0.06	c0.34	
v/s Ratio Perm			0.04						0.02			
v/c Ratio	1.28	0.38	0.12	2.25	1.06		2.05	0.54	0.09	0.36	1.13	
Uniform Delay, d1	45.0	25.0	22.7	45.1	33.0		45.6	33.6	29.9	37.2	34.8	
Progression Factor	0.93	0.88	1.05	0.98	0.98		1.25	0.76	1.65	1.00	1.00	
Incremental Delay, d2	163.6	0.6	0.5	573.9	39.8		493.3	0.6	0.0	0.3	70.2	
Delay (s)	205.4	22.6	24.2	618.1	72.1		550.1	26.3	49.5	37.5	105.0	
Level of Service	F	C	C	F	E		F	C	D	D	F	
Approach Delay (s)		61.9			237.8			268.3			99.6	
Approach LOS		E			F			F			F	

Intersection Summary			
HCM Average Control Delay	175.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	608	793	58	575	424
v/c Ratio	1.21	1.11	0.07	1.01	0.66
Control Delay	132.2	88.3	6.9	63.1	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	132.2	88.3	6.9	63.1	21.2
Queue Length 50th (ft)	~325	~400	8	~232	143
Queue Length 95th (ft)	#515	#601	24	#439	m189
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	503	715	822	571	646
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	1.21	1.11	0.07	1.01	0.66

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	412	107	157	612	56	91	280	186	31	309	71
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	
Frt		0.98			1.00	0.85		0.95			0.98	
Flt Protected		0.99			0.99	1.00		0.99			1.00	
Satd. Flow (prot)		1806			1844	1583		1764			1813	
Flt Permitted		0.53			0.75	1.00		0.83			0.94	
Satd. Flow (perm)		955			1390	1583		1469			1709	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	73	425	110	162	631	58	94	289	192	32	319	73
RTOR Reduction (vph)	0	11	0	0	0	8	0	26	0	0	11	0
Lane Group Flow (vph)	0	597	0	0	793	50	0	549	0	0	413	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		36.0			36.0	36.0		26.0			26.0	
Effective Green, g (s)		36.0			36.0	36.0		26.0			26.0	
Actuated g/C Ratio		0.51			0.51	0.51		0.37			0.37	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		491			715	814		546			635	
v/s Ratio Prot												
v/s Ratio Perm		c0.62			0.57	0.03		c0.37			0.24	
v/c Ratio		1.22			1.11	0.06		1.01			0.65	
Uniform Delay, d1		17.0			17.0	8.5		22.0			18.2	
Progression Factor		1.00			1.00	1.00		1.00			0.92	
Incremental Delay, d2		114.5			67.7	0.0		40.0			4.4	
Delay (s)		131.5			84.7	8.6		62.0			21.2	
Level of Service		F			F	A		E			C	
Approach Delay (s)		131.5			79.5			62.0			21.2	
Approach LOS		F			E			E			C	

Intersection Summary			
HCM Average Control Delay	78.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	136.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	547	115	829	88	271	299
v/c Ratio	0.99	0.13	0.90	0.10	0.48	0.56
Control Delay	55.5	4.4	12.4	4.6	16.7	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	4.4	12.4	4.6	16.7	19.7
Queue Length 50th (ft)	178	9	132	7	63	78
Queue Length 95th (ft)	#378	29	m83	m2	124	147
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	550	872	925	858	570	532
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	0.99	0.13	0.90	0.10	0.48	0.56

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	462	112	61	743	85	48	133	82	80	143	68
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.97	
Flt Protected		0.99	1.00		1.00	1.00		0.99			0.99	
Satd. Flow (prot)		1851	1583		1856	1583		1768			1779	
Flt Permitted		0.55	1.00		0.93	1.00		0.91			0.85	
Satd. Flow (perm)		1033	1583		1734	1583		1629			1540	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	71	476	115	63	766	88	49	137	85	82	147	70
RTOR Reduction (vph)	0	0	28	0	0	14	0	27	0	0	19	0
Lane Group Flow (vph)	0	547	87	0	829	74	0	244	0	0	280	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		551	844		925	844		543			513	
v/s Ratio Prot												
v/s Ratio Perm		c0.53	0.06		0.48	0.05		0.15			c0.18	
v/c Ratio		0.99	0.10		0.90	0.09		0.45			0.55	
Uniform Delay, d1		13.9	6.9		12.5	6.9		15.7			16.3	
Progression Factor		1.00	1.00		0.66	0.88		1.00			1.00	
Incremental Delay, d2		36.6	0.2		1.5	0.0		2.7			4.1	
Delay (s)		50.5	7.2		9.8	6.1		18.3			20.4	
Level of Service		D	A		A	A		B			C	
Approach Delay (s)		43.0			9.4			18.3			20.4	
Approach LOS		D			A			B			C	

Intersection Summary			
HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	106.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	532	119	941	92	365	590
v/c Ratio	4.63	0.17	1.72	0.13	0.52	0.86
Control Delay	1652.2	9.2	353.5	8.7	15.0	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1652.2	9.2	353.5	8.7	15.0	18.8
Queue Length 50th (ft)	~375	11	~520	14	86	225
Queue Length 95th (ft)	m#412	m16	#721	37	155	m233
Internal Link Dist (ft)	455		585		365	321
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	115	715	546	699	700	685
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	4.63	0.17	1.72	0.13	0.52	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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	415	115	98	815	89	56	239	59	117	306	149
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.96	
Flt Protected		0.99	1.00		0.99	1.00		0.99			0.99	
Satd. Flow (prot)		1845	1583		1853	1583		1806			1779	
Flt Permitted		0.14	1.00		0.68	1.00		0.87			0.85	
Satd. Flow (perm)		266	1583		1261	1583		1587			1531	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	104	428	119	101	840	92	58	246	61	121	315	154
RTOR Reduction (vph)	0	0	29	0	0	13	0	12	0	0	21	0
Lane Group Flow (vph)	0	532	90	0	941	79	0	353	0	0	569	0
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Effective Green, g (s)		26.0	26.0		26.0	26.0		26.0			26.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43		0.43			0.43	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		115	686		546	686		688			663	
v/s Ratio Prot												
v/s Ratio Perm		c2.00	0.06		0.75	0.05		0.22			c0.37	
v/c Ratio		4.63	0.13		1.72	0.12		0.51			0.86	
Uniform Delay, d1		17.0	10.2		17.0	10.1		12.4			15.3	
Progression Factor		0.98	1.34		1.00	1.00		1.00			1.04	
Incremental Delay, d2		1641.3	0.2		333.2	0.3		2.7			1.4	
Delay (s)		1657.9	13.9		350.2	10.5		15.1			17.4	
Level of Service		F	B		F	B		B			B	
Approach Delay (s)		1357.4			320.0			15.1			17.4	
Approach LOS		F			F			B			B	

Intersection Summary			
HCM Average Control Delay	466.1	HCM Level of Service	F
HCM Volume to Capacity ratio	2.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	132.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	536	143	960	830	264	923	309	421	197
v/c Ratio	0.96	0.26	5.05	7.16	1.19	0.85	0.73	0.30	0.28
Control Delay	61.2	5.1	1846.6	2795.7	141.5	42.3	42.3	19.2	6.0
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.7	0.0
Total Delay	61.2	5.4	1846.6	2795.7	141.5	42.3	42.3	19.9	6.0
Queue Length 50th (ft)	325	0	~604	~1046	~117	219	98	126	29
Queue Length 95th (ft)	#535	40	m#720	m#1263	m#257	#320	111	98	20
Internal Link Dist (ft)	585			186		328		103	
Turn Bay Length (ft)									
Base Capacity (vph)	576	561	190	116	222	1089	683	1421	711
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	130	0	0	0	0	0	651	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.33	5.05	7.16	1.19	0.85	0.45	0.55	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	292	228	139	931	805	256	0	719	177	300	408	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)		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	0.97	1.00	1.00		0.91		0.97	0.95	1.00
Frpb, ped/bikes		1.00	0.93	1.00	1.00	0.98		1.00		1.00	1.00	0.95
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)		1599	1304	2717	1660	1381		4225		2626	3094	1316
Flt Permitted		0.97	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (perm)		1599	1304	2717	1660	1381		4225		2626	3094	1316
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	301	235	143	960	830	264	0	741	182	309	421	197
RTOR Reduction (vph)	0	0	93	0	0	126	0	0	0	0	0	107
Lane Group Flow (vph)	0	536	50	960	830	138	0	923	0	309	421	90
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Split		Perm	Split		Perm				Prot		Perm
Protected Phases	8	8		7	7			6		5	2	
Permitted Phases			8			7						2
Actuated Green, G (s)		35.1	35.1	7.0	7.0	7.0		25.8		16.1	45.9	45.9
Effective Green, g (s)		35.1	35.1	7.0	7.0	7.0		25.8		16.1	45.9	45.9
Actuated g/C Ratio		0.35	0.35	0.07	0.07	0.07		0.26		0.16	0.46	0.46
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)		2.5	2.5	3.0	3.0	3.0		2.5		2.0	2.0	2.0
Lane Grp Cap (vph)		561	458	190	116	97		1090		423	1420	604
v/s Ratio Prot		c0.34		0.35	c0.50			c0.22		c0.12	0.14	
v/s Ratio Perm			0.04			0.10						0.07
v/c Ratio		0.96	0.11	5.05	7.16	1.43		0.85		0.73	0.30	0.15
Uniform Delay, d1		31.7	21.9	46.5	46.5	46.5		35.2		39.9	16.9	15.7
Progression Factor		1.00	1.00	0.96	0.96	0.90		0.93		0.82	1.08	1.99
Incremental Delay, d2		27.0	0.1	1835.3	2787.6	241.4		5.5		5.2	0.5	0.5
Delay (s)		58.7	22.0	1880.0	2832.3	283.3		38.2		38.0	18.7	31.8
Level of Service		E	C	F	F	F		D		D	B	C
Approach Delay (s)		50.9			2059.6			38.2			27.9	
Approach LOS		D			F			D			C	

Intersection Summary			
HCM Average Control Delay	944.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	121.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	9	68	783	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	9	70	807	0	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	70	35			877	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	70	35			877	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	926	1030			766	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3
Volume Total	9	47	292	538
Volume Left	0	0	0	0
Volume Right	9	0	269	538
cSH	1030	1700	1700	1700
Volume to Capacity	0.01	0.03	0.17	0.32
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	8.5	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	8.5	0.0		
Approach LOS	A			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	493	300	566	276	247	431
v/c Ratio	1.03	1.64	1.47	0.92	0.17	1.61
Control Delay	75.4	335.8	250.8	62.8	1.2	316.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	335.8	250.8	62.8	1.2	316.7
Queue Length 50th (ft)	~117	~200	~360	119	0	~285
Queue Length 95th (ft)	#216	#344	#549	#259	13	#455
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	480	183	385	301	1452	267
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	1.03	1.64	1.47	0.92	0.17	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	350	70	291	492	57	107	161	240	146	201	71
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			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		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	
Frt		0.98		1.00	0.98			1.00	0.85		0.98	
Flt Protected		0.99		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)		2729		1413	1458			1458	2224		1414	
Flt Permitted		0.56		0.47	1.00			0.67	1.00		0.59	
Satd. Flow (perm)		1528		702	1458			999	2224		854	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	60	361	72	300	507	59	110	166	247	151	207	73
RTOR Reduction (vph)	0	19	0	0	6	0	0	0	108	0	10	0
Lane Group Flow (vph)	0	474	0	300	560	0	0	276	139	0	421	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm			Perm			Perm		custom	Perm		
Protected Phases		1			2			4	4 2		4	
Permitted Phases	1			2			4			4		
Actuated Green, G (s)		22.0		19.0	19.0			22.0	44.5		22.0	
Effective Green, g (s)		22.0		19.0	19.0			22.0	41.0		22.0	
Actuated g/C Ratio		0.30		0.26	0.26			0.30	0.56		0.30	
Clearance Time (s)		3.5		3.5	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		460		183	379			301	1249		257	
v/s Ratio Prot					0.38				0.06			
v/s Ratio Perm		c0.31		c0.43				0.28			c0.49	
v/c Ratio		1.03		1.64	1.48			0.92	0.11		1.64	
Uniform Delay, d1		25.5		27.0	27.0			24.6	7.5		25.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		50.1		311.0	228.8			30.5	0.0		304.5	
Delay (s)		75.6		338.0	255.8			55.1	7.5		330.0	
Level of Service		E		F	F			E	A		F	
Approach Delay (s)		75.6			284.3			32.6			330.0	
Approach LOS		E			F			C			F	

Intersection Summary			
HCM Average Control Delay	191.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	106.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	746	313	575	2	1182	339
v/c Ratio	0.88	0.79	0.32	0.02	0.90	0.46
Control Delay	32.5	47.7	6.8	46.5	48.3	21.7
Queue Delay	0.0	0.0	0.0	0.0	12.4	0.6
Total Delay	32.5	47.7	6.8	46.5	60.6	22.2
Queue Length 50th (ft)	143	107	42	1	425	136
Queue Length 95th (ft)	195	m#150	138	m2	m225	m79
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	1042	397	1777	82	1312	734
Starvation Cap Reductn	0	0	0	0	137	139
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.79	0.32	0.02	1.01	0.57

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.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	336	388	304	558	2	1147	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.97		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.92		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2527		2649	2731	1366	2731	1161
Flt Permitted	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2527		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	346	400	313	575	2	1182	339
RTOR Reduction (vph)	235	0	0	0	0	0	187
Lane Group Flow (vph)	511	0	313	575	2	1182	152
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type			Prot		Prot		Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	24.3		18.2	61.9	1.2	44.9	44.9
Effective Green, g (s)	24.3		18.2	61.9	1.2	44.9	44.9
Actuated g/C Ratio	0.24		0.18	0.62	0.01	0.45	0.45
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	614		482	1690	16	1226	521
v/s Ratio Prot	c0.20		c0.12	0.21	0.00	c0.43	
v/s Ratio Perm							0.13
v/c Ratio	0.83		0.65	0.34	0.12	0.96	0.29
Uniform Delay, d1	35.9		37.9	9.2	48.9	26.8	17.5
Progression Factor	1.00		0.89	0.67	1.04	1.97	8.79
Incremental Delay, d2	9.0		1.6	0.4	0.1	3.0	0.1
Delay (s)	44.9		35.2	6.5	50.9	55.6	153.8
Level of Service	D		D	A	D	E	F
Approach Delay (s)	44.9			16.6		77.4	
Approach LOS	D			B		E	

Intersection Summary			
HCM Average Control Delay	52.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	128	263	263	2094	337	554	187	688	208	1422	100
v/c Ratio	0.66	0.60	0.61	1.61	0.62	0.78	0.74	0.87	0.48	1.78	0.24
Control Delay	56.9	45.9	11.3	301.0	29.7	15.4	58.3	24.6	22.0	375.3	5.9
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	56.9	45.9	11.3	301.0	29.7	15.4	58.3	24.6	22.0	375.3	5.9
Queue Length 50th (ft)	85	87	0	~712	178	103	115	66	99	~748	14
Queue Length 95th (ft)	148	125	69	m#577	m174	m82	183	128	m134	m#873	m17
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	251	567	480	1302	547	711	315	953	433	800	417
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	0.51	0.46	0.55	1.61	0.62	0.78	0.59	0.72	0.48	1.78	0.24

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	204	260	2073	334	548	185	206	475	206	1408	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.94	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	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	0.90		1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3150	1468	4388	1845	1568	1752	2802		1662	3202	1470
Flt Permitted	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3150	1468	4388	1845	1568	1752	2802		1662	3202	1470
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	185	206	263	2094	337	554	187	208	480	208	1422	100
RTOR Reduction (vph)	0	0	227	0	0	246	0	416	0	0	0	50
Lane Group Flow (vph)	128	263	36	2094	337	308	187	272	0	208	1422	50
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split		Prot	Split		Prot	Prot			Prot		Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	13.8	13.8	13.8	29.7	29.7	29.7	14.4	13.4		26.0	25.0	25.0
Effective Green, g (s)	13.8	13.8	13.8	29.7	29.7	29.7	14.4	13.4		26.0	25.0	25.0
Actuated g/C Ratio	0.14	0.14	0.14	0.30	0.30	0.30	0.14	0.13		0.26	0.25	0.25
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	192	435	203	1303	548	466	252	375		432	801	368
v/s Ratio Prot	c0.09	0.08	0.02	c0.48	0.18	0.20	c0.11	0.10		0.13	c0.44	
v/s Ratio Perm												0.03
v/c Ratio	0.67	0.60	0.18	1.61	0.61	0.66	0.74	0.73		0.48	1.78	0.14
Uniform Delay, d1	40.9	40.5	38.1	35.1	30.2	30.7	41.0	41.5		31.3	37.5	29.1
Progression Factor	1.00	1.00	1.00	0.93	0.91	1.15	1.00	1.00		0.58	0.67	0.38
Incremental Delay, d2	6.6	1.6	0.2	273.5	0.2	0.3	9.8	5.8		2.3	351.9	0.5
Delay (s)	47.5	42.2	38.2	306.4	27.7	35.7	50.9	47.4		20.3	377.2	11.4
Level of Service	D	D	D	F	C	D	D	D		C	F	B
Approach Delay (s)		41.6			224.7			48.1			313.2	
Approach LOS		D			F			D			F	

Intersection Summary			
HCM Average Control Delay	205.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	247	103	552	105	765	3	594	483	7	520	1656
v/c Ratio	0.74	0.52	0.71	0.36	0.79	1.00	0.68	0.55	0.02	1.06	1.62
Control Delay	45.7	40.1	12.2	39.8	44.9	559.7	36.8	30.3	30.7	70.4	304.5
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	45.7	40.1	12.2	39.8	44.9	559.7	36.8	30.3	30.7	70.4	304.5
Queue Length 50th (ft)	84	63	26	58	169	0	137	97	3	~344	~798
Queue Length 95th (ft)	m#121	m100	73	114	212	#20	202	157	m6	m#315	m#499
Internal Link Dist (ft)		732			376			1000		765	
Turn Bay Length (ft)	140			70			300		90		
Base Capacity (vph)	350	438	1052	293	1058	3	1067	1073	433	490	1020
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	0.71	0.24	0.52	0.36	0.72	1.00	0.56	0.45	0.02	1.06	1.62

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	101	541	103	750	3	582	338	135	7	510	1623
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
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
Lane Util. Factor	0.97	1.00	0.88	1.00	0.91	1.00	0.97	0.95		1.00	1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	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	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1827	2611	1556	5036	1568	3335	3220		1531	1733	2490
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1827	2611	1556	5036	1568	3335	3220		1531	1733	2490
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)	247	103	552	105	765	3	594	345	138	7	520	1656
RTOR Reduction (vph)	0	0	492	0	0	3	0	47	0	0	0	317
Lane Group Flow (vph)	247	103	60	105	765	0	594	436	0	7	520	1339
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot		Perm	Prot		NA	Split			Split		Perm
Protected Phases	5	2		1	6		4	4		8	8	
Permitted Phases			2									8
Actuated Green, G (s)	10.4	10.8	10.8	18.8	19.2	0.0	26.1	26.1		28.3	28.3	28.3
Effective Green, g (s)	10.4	10.8	10.8	18.8	19.2	0.0	26.1	26.1		28.3	28.3	28.3
Actuated g/C Ratio	0.10	0.11	0.11	0.19	0.19	0.00	0.26	0.26		0.28	0.28	0.28
Clearance Time (s)	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
Lane Grp Cap (vph)	331	197	282	293	967	0	870	840		433	490	705
v/s Ratio Prot	c0.08	0.06		0.07	c0.15		c0.18	0.14		0.00	0.30	
v/s Ratio Perm			0.02									c0.54
v/c Ratio	0.75	0.52	0.21	0.36	0.79	0.00	0.68	0.52		0.02	1.06	1.90
Uniform Delay, d1	43.5	42.2	40.7	35.3	38.5	50.0	33.2	31.6		25.8	35.9	35.9
Progression Factor	0.78	0.79	2.17	1.00	1.00	1.00	1.00	1.04		1.04	1.03	1.22
Incremental Delay, d2	6.3	0.9	0.1	0.3	4.2	0.0	3.6	1.9		0.0	32.4	405.2
Delay (s)	40.2	34.2	88.6	35.6	42.7	50.0	36.9	34.7		26.7	69.4	449.1
Level of Service	D	C	F	D	D	D	D	C		C	E	F
Approach Delay (s)		69.2			41.9			35.9			357.3	
Approach LOS		E			D			D			F	

Intersection Summary			
HCM Average Control Delay	182.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	368	374	232	191	41	482	352	121	744	413
v/c Ratio	0.84	0.85	0.27	0.76	0.15	1.06	0.39	0.64	2.12	1.09
Control Delay	50.6	50.8	3.9	56.9	10.8	92.1	28.1	63.7	536.2	87.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	50.8	3.9	56.9	10.8	92.1	28.1	63.7	536.2	87.9
Queue Length 50th (ft)	228	232	0	122	0	~357	111	80	~394	~131
Queue Length 95th (ft)	321	326	27	186	27	#698	162	m#143	m#447	m#254
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	526	532	1000	366	375	453	893	188	351	379
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	0.70	0.70	0.23	0.52	0.11	1.06	0.39	0.64	2.12	1.09

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	650	70	225	76	0	105	45	468	327	15	117	722
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.95	0.95	0.88		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.97		0.99		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	1.00		1.00	1.00
Frt	1.00	1.00	0.85		0.91		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.96	1.00		0.98		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1517	1535	2444		1407		1326	1597	3163		1597	3195
Flt Permitted	0.95	0.96	1.00		0.98		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1517	1535	2444		1407		1326	1597	3163		1597	3195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	670	72	232	78	0	108	46	482	337	15	121	744
RTOR Reduction (vph)	0	0	165	0	1	0	34	0	3	0	0	0
Lane Group Flow (vph)	368	374	67	0	190	0	7	482	349	0	121	744
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split		Perm	Split			Perm	Prot			Prot	
Protected Phases	4	4		3	3			1	6		5	2
Permitted Phases			4				3					
Actuated Green, G (s)	28.8	28.8	28.8		17.9		17.9	28.4	28.1		11.7	10.9
Effective Green, g (s)	28.8	28.8	28.8		17.9		17.9	28.4	28.1		11.7	10.9
Actuated g/C Ratio	0.29	0.29	0.29		0.18		0.18	0.28	0.28		0.12	0.11
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	437	442	704		252		237	454	889		187	348
v/s Ratio Prot	0.24	c0.24			c0.14			c0.30	0.11		0.08	c0.23
v/s Ratio Perm			0.03				0.01					
v/c Ratio	0.84	0.85	0.09		0.75		0.03	1.06	0.39		0.65	2.14
Uniform Delay, d1	33.5	33.5	26.1		39.0		33.9	35.8	29.1		42.2	44.5
Progression Factor	1.00	1.00	1.00		1.00		1.00	0.73	0.84		1.22	1.07
Incremental Delay, d2	13.2	13.4	0.0		10.8		0.0	59.3	1.3		4.1	518.9
Delay (s)	46.7	46.9	26.1		49.8		33.9	85.4	25.6		55.3	566.4
Level of Service	D	D	C		D		C	F	C		E	F
Approach Delay (s)		41.8			47.0				60.1			402.5
Approach LOS		D			D				E			F

Intersection Summary			
HCM Average Control Delay	185.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	401
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.96
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1371
Flt Permitted	1.00
Satd. Flow (perm)	1371
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	413
RTOR Reduction (vph)	228
Lane Group Flow (vph)	185
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	10.9
Effective Green, g (s)	10.9
Actuated g/C Ratio	0.11
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	149
v/s Ratio Prot	
v/s Ratio Perm	0.13
v/c Ratio	1.24
Uniform Delay, d1	44.5
Progression Factor	1.50
Incremental Delay, d2	142.3
Delay (s)	209.0
Level of Service	F
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	I-380 to South Airport Blvd Off
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,838	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,063	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,498	pcph

Speed Inputs and Adjustments

Number of lanes, N	6	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	7,489	pcph	11,750	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	1,010	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	1,416	pcphpl
Average passenger-car speed, S	65.0	mph
Volume-to-capacity ratio, v/c	0.60	
Density, D	21.8	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between S Airport Blvd Ramps
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	6,893	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,814	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,474	pcph

Speed Inputs and Adjustments

Number of lanes, N	5	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,495	pcphpl
Average passenger-car speed, S	64.9	mph
Volume-to-capacity ratio, v/c	0.64	
Density, D	23.0	pcpmpl
Level of service, LOS	C	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Grand ramps
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,016	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,846	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	7,607	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	1,902	pcphpl
Average passenger-car speed, S	61.4	mph
Volume-to-capacity ratio, v/c	0.81	
Density, D	31.0	pcpmpl
Level of service, LOS	D	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Between Oyster Point ramps
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,850	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,066	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,511	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,128	pcphpl
Average passenger-car speed, S	57.5	mph
Volume-to-capacity ratio, v/c	0.91	
Density, D	37.0	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	5	ln
Weaving segment length, L_S	200	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,042	974	851	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,590	256	224	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,551	1,041	923	0	pcph

Volume ratio, VR	0.231

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	1,963	lc/h
Weaving lane changes, LC_W	1,674	lc/h
Non-weaving vehicle index, I_{NW}	262	
Non-weaving lane change, LC_{NW}	495	lc/h
Total lane changes, LC_{ALL}	2,169	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	South Airport Blvd On Ramp to E Grand Ave/Industrial Way
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.482	
Average weaving speed, S_W	35.1	mph
Average non-weaving speed, S_{NW}	42.7	mph
Weaving segment speed, S	40.7	mph
Weaving segment density, D	41.9	pcpmpl
Level of Service, LOS	E	
Weaving segment volume-to-capacity ratio, v/c	0.85	
Weaving segment flow rate, v	8,514	pcph
Weaving segment capacity, c_W	9,680	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,489	pcph	11,750	pcph	No
Exiting freeway volume	7,621	pcph	9,400	pcph	No
On-ramp volume	1,041	pcph	2,000	pcph	No
Off-ramp volume	909	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	200	300	4,851	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,994	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	0.85	1.00		No	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	650	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,208	1,642	808	0	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,634	432	213	0	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,731	1,754	876	0	pcph

Volume ratio, VR	0.281

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,630	lc/h
Weaving lane changes, LC_W	2,624	lc/h
Non-weaving vehicle index, I_{NW}	875	
Non-weaving lane change, LC_{NW}	969	lc/h
Total lane changes, LC_{ALL}	3,592	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	Grand/Airport On to Oyster Off
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	0.871	
Average weaving speed, S_W	41.7	mph
Average non-weaving speed, S_{NW}	34.8	mph
Weaving segment speed, S	36.5	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.18	
Weaving segment flow rate, v	9,362	pcph
Weaving segment capacity, c_W	7,721	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	7,633	pcph	9,400	pcph	No
Exiting freeway volume	8,524	pcph	9,400	pcph	No
On-ramp volume	1,754	pcph	2,100	pcph	No
Off-ramp volume	863	pcph	2,100	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	650	300	5,381	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,988	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.18	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	-80	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	6,129	1,989	1,721	574	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	1,613	523	453	151	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	6,645	2,125	1,866	613	pcph

Volume ratio, VR	0.355

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	3,992	lc/h
Weaving lane changes, LC_W	3,848	lc/h
Non-weaving vehicle index, I_{NW}	-116	
Non-weaving lane change, LC_{NW}	681	lc/h
Total lane changes, LC_{ALL}	4,530	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Northbound US 101
Segment	North of Oyster Point
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	#NUM!	
Average weaving speed, S_W	#NUM!	mph
Average non-weaving speed, S_{NW}	22.8	mph
Weaving segment speed, S	#NUM!	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.66	
Weaving segment flow rate, v	11,250	pcph
Weaving segment capacity, c_W	6,572	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	8,552	pcph	9,400	pcph	No
Exiting freeway volume	8,838	pcph	9,400	pcph	No
On-ramp volume	2,738	pcph	2,100	pcph	Yes
Off-ramp volume	2,452	pcph	2,100	pcph	Yes

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	-80	300	6,179	ft	Yes	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,871	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.66	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Oyster Point Blvd Off Ramp
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,418	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,215	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,127	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	8,640	pcph	9,400	pcph	No
On-ramp volume		pcph		pcph	
Off-ramp volume	486	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,282	pcphpl
Average passenger-car speed, S	54.0	mph
Volume-to-capacity ratio, v/c	0.97	
Density, D	42.3	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster Off and Airport On
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	7,963	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,095	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	8,633	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,158	pcphpl
Average passenger-car speed, S	56.8	mph
Volume-to-capacity ratio, v/c	0.92	
Density, D	38.0	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Airport Blvd On Ramp
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	8,693	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,288	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	9,425	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume	8,645	pcph	9,400	pcph	No
Exiting freeway volume		pcph		pcph	
On-ramp volume	780	pcph	2,000	pcph	No
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,356	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Produce/Airport Off
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	10,657	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	2,804	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	11,554	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume	10,629	pcph	9,400	pcph	Yes
On-ramp volume		pcph		pcph	
Off-ramp volume	925	pcph	2,000	pcph	No

LOS and Performance Measures

Flow rate, v_p	2,889	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.23	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce Ramps
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Flow Inputs and Adjustments

Volume, V	11,523	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	3,032	veh
Trucks and buses	6%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	
Driver popoulation factor, f_P	1.00	
Flow rate, v_p	12,493	pcph

Speed Inputs and Adjustments

Number of lanes, N	4	
Lane width	12.0	ft
Right-side lateral clearance	>6	ft
Total ramp density, TRD	2.00	ramps/mi
Lane width adjustment, f_{LW}	0.0	mph
Lateral clearance adjustment, f_{LC}	0.0	mph
TRD adjustment	5.8	mph
Calculated free-flow speed, FFS	69.6	mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	3,123	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.33	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	330	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	8,732	1,925	691	200	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,298	507	182	53	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	9,467	2,057	749	214	pcph

Volume ratio, VR	0.225

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	2,806	lc/h
Weaving lane changes, LC_W	2,674	lc/h
Non-weaving vehicle index, I_{NW}	639	
Non-weaving lane change, LC_{NW}	1,403	lc/h
Total lane changes, LC_{ALL}	4,077	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Oyster On and Miller Off
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.643	
Average weaving speed, S_W	33.9	mph
Average non-weaving speed, S_{NW}	29.8	mph
Weaving segment speed, S	30.6	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	1.55	
Weaving segment flow rate, v	12,487	pcph
Weaving segment capacity, c_W	7,803	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	10,250	pcph	9,400	pcph	Yes
Exiting freeway volume	11,568	pcph	9,400	pcph	Yes
On-ramp volume	2,270	pcph	2,000	pcph	Yes
Off-ramp volume	952	pcph	2,000	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	330	300	4,790	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	2,009	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	1.55	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Inputs

Segment type	Freeway	
Weaving configuration	One-sided	
Number of lanes, N	4	ln
Weaving segment length, L_S	570	ft
Freeway free-flow speed, FFS	65	mph
Minimum segment speed, S_{MIN}	15	mph
Freeway maximum capacity, c_{IFL}	2,350	pcphpl
Terrain type	Level	
Grade		
Length		mi

Conversion to pcph Under Base Conditions

	V_{FF}	V_{RF}	V_{FR}	V_{RR}	
Volume, V	9,783	3,241	1,740	250	vph
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v_{15}	2,574	853	458	66	veh
Trucks and buses	6%	3%	6%	3%	
Recreational vehicles	0%	0%	0%	0%	
Terrain type	Level	Level	Level	Level	
Grade					
Length					mi
Trucks and buses PCE, E_T	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, E_R	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, f_{HV}	0.971	0.985	0.971	0.985	
Driver popoulation factor, f_P	1.00	1.00	1.00	1.00	
Flow rate, v_p	10,606	3,463	1,887	267	pcph

Volume ratio, VR	0.330

Configuration Characteristics

Number of maneuver lanes, N_{WL}	2	ln
Interchange density, ID	2.0	int/mi
Minimum RF lane changes, LC_{RF}	1	lc/pc
Minimum FR lane changes, LC_{FR}	1	lc/pc
Minimum RR lane changes, LC_{RR}	0	lc/pc
Minimum weaving lane changes, LC_{MIN}	5,349	lc/h
Weaving lane changes, LC_W	5,311	lc/h
Non-weaving vehicle index, I_{NW}	1,240	
Non-weaving lane change, LC_{NW}	1,778	lc/h
Total lane changes, LC_{ALL}	7,090	lc/h

HCM 2010: Freeway Weaving Segment

Weaving Analysis

Project	SSF SALUP
Freeway	Southbound US 101
Segment	Between Produce on and I-380 west
Alternative	Cumulative (2035) Plus Project
Time period	PM Peak Hour

Performance Measures

Weaving intensity factor, W	1.651	
Average weaving speed, S_W	33.9	mph
Average non-weaving speed, S_{NW}	7.0	mph
Weaving segment speed, S	9.5	mph
Weaving segment density, D	-	pcpmpl
Level of Service, LOS	F	
Weaving segment volume-to-capacity ratio, v/c	2.23	
Weaving segment flow rate, v	16,223	pcph
Weaving segment capacity, c_W	7,068	vph

Capacity Checks

	Actual		Maximum		Violation?
Entering freeway volume	12,548	pcph	9,400	pcph	Yes
Exiting freeway volume	14,152	pcph	9,400	pcph	Yes
On-ramp volume	3,730	pcph	4,000	pcph	No
Off-ramp volume	2,126	pcph	4,400	pcph	No

Limitations on Weaving Segments

	Actual	Minimum	Maximum		Violation?	Note
Weaving length	570	300	5,905	ft	No	a, b

	Analyzed	Maximum		Violation?	Note
Density-based capacity, c_{IWL}	1,942	2,350	pcphpl	No	c

	Analyzed	Maximum		Violation?	Note
Volume-to-capacity ratio, v/c	2.23	1.00		Yes	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

b. Weaving segments longer than the calculated maximum length should be treated as basic segments.

c. The density-based capacity exceeds the capacity of a basic freeway segment under equivalent ideal conditions.

d. If the volume exceeds the weaving segment capacity, then the level of service is F.

Cumulative (2035) With Project Mitigated

FEHR PEERS

Queues
1: Linden Ave. & Miller Ave.

9/10/2014

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	212	115	435	20	270	340
v/c Ratio	0.58	0.19	1.00	0.04	0.80	0.74
Control Delay	24.4	4.5	66.7	0.1	41.0	31.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	4.5	66.7	0.1	41.0	31.8
Queue Length 50th (ft)	63	0	154	0	95	108
Queue Length 95th (ft)	126	29	#321	0	#208	#221
Internal Link Dist (ft)	1394		601		321	251
Turn Bay Length (ft)		60		60		
Base Capacity (vph)	367	592	437	563	337	460
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	0.58	0.19	1.00	0.04	0.80	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	143	112	162	260	19	41	182	39	12	267	51
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		3.5			3.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.98	
Flt Protected		0.98	1.00		0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1835	1583		1828	1583		1811			1820	
Flt Permitted		0.61	1.00		0.72	1.00		0.72			0.99	
Satd. Flow (perm)		1132	1583		1345	1583		1309			1798	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	65	147	115	167	268	20	42	188	40	12	275	53
RTOR Reduction (vph)	0	0	78	0	0	14	0	11	0	0	11	0
Lane Group Flow (vph)	0	212	37	0	435	7	0	260	0	0	329	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			3	
Permitted Phases	1		1	1		1	2			3		
Actuated Green, G (s)		19.5	19.5		19.5	19.5		15.0			15.0	
Effective Green, g (s)		19.5	19.5		19.5	19.5		15.0			15.0	
Actuated g/C Ratio		0.32	0.32		0.32	0.32		0.25			0.25	
Clearance Time (s)		3.5	3.5		3.5	3.5		3.5			3.5	
Lane Grp Cap (vph)		367	514		437	514		327			449	
v/s Ratio Prot												
v/s Ratio Perm		0.19	0.02		c0.32	0.00		c0.20			c0.18	
v/c Ratio		0.58	0.07		1.00	0.01		0.79			0.73	
Uniform Delay, d1		16.8	14.0		20.2	13.7		21.1			20.7	
Progression Factor		1.00	1.00		1.00	1.00		1.01			1.00	
Incremental Delay, d2		6.5	0.3		41.9	0.0		17.7			10.1	
Delay (s)		23.3	14.3		62.1	13.8		38.9			30.8	
Level of Service		C	B		E	B		D			C	
Approach Delay (s)		20.1			60.0			38.9			30.8	
Approach LOS		C			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	39.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	162	962	265	264	546	65
v/c Ratio	0.70	0.55	0.28	0.52	0.77	0.19
Control Delay	57.3	18.0	13.7	53.1	45.3	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	18.0	13.7	53.1	45.3	9.5
Queue Length 50th (ft)	97	213	86	90	171	0
Queue Length 95th (ft)	#179	273	138	m106	231	35
Internal Link Dist (ft)			385	131	284	
Turn Bay Length (ft)						
Base Capacity (vph)	253	1778	965	562	773	377
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	0.64	0.54	0.27	0.47	0.71	0.17

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	157	933	192	65	120	136	0	0	530	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			4.0			4.0	4.0
Lane Util. Factor			1.00	0.97	1.00			0.95			0.95	1.00
Frpb, ped/bikes			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
Frt			0.86	1.00	0.96			1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (prot)			1565	3335	1788			3472			3438	1452
Flt Permitted			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (perm)			1565	3335	1788			3472			3438	1452
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	162	962	198	67	124	140	0	0	546	65
RTOR Reduction (vph)	0	0	0	0	11	0	0	0	0	0	0	52
Lane Group Flow (vph)	0	0	162	962	254	0	0	264	0	0	546	13
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split	NA		Split	NA			NA	Perm
Protected Phases			1	6	6		1	1			4	
Permitted Phases												4
Actuated Green, G (s)			14.7	52.7	52.7			14.7			20.6	20.6
Effective Green, g (s)			14.7	52.7	52.7			14.7			20.6	20.6
Actuated g/C Ratio			0.15	0.53	0.53			0.15			0.21	0.21
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	3.0
Lane Grp Cap (vph)			230	1757	942			510			708	299
v/s Ratio Prot			c0.10	c0.29	0.14			0.08			c0.16	
v/s Ratio Perm												0.01
v/c Ratio			0.70	0.55	0.27			0.52			0.77	0.04
Uniform Delay, d1			40.6	15.7	13.0			39.4			37.5	31.8
Progression Factor			1.00	1.00	1.00			1.28			1.00	1.00
Incremental Delay, d2			10.1	1.2	0.7			0.9			5.2	0.1
Delay (s)			50.6	17.0	13.7			51.4			42.7	31.9
Level of Service			D	B	B			D			D	C
Approach Delay (s)		50.6			16.3			51.4			41.5	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	317	208	23	243	160
v/c Ratio	0.70	0.85	0.06	0.22	0.14
Control Delay	28.6	53.5	7.3	3.4	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.6	53.5	7.3	3.4	5.7
Queue Length 50th (ft)	109	86	0	17	19
Queue Length 95th (ft)	157	137	13	m45	56
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	897	509	814	1111	1169
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	0.35	0.41	0.03	0.22	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	197	85	96	106	22	39	102	95	14	113	29
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.96			1.00	0.85		0.95			0.97	
Flt Protected		1.00			0.98	1.00		0.99			1.00	
Satd. Flow (prot)		1786			1819	1583		1747			1808	
Flt Permitted		0.97			0.54	1.00		0.94			0.98	
Satd. Flow (perm)		1730			1005	1583		1663			1770	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	203	88	99	109	23	40	105	98	14	116	30
RTOR Reduction (vph)	0	30	0	0	0	17	0	20	0	0	7	0
Lane Group Flow (vph)	0	287	0	0	208	6	0	223	0	0	153	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		17.1			17.1	17.1		45.9			45.9	
Effective Green, g (s)		17.1			17.1	17.1		45.9			45.9	
Actuated g/C Ratio		0.24			0.24	0.24		0.66			0.66	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		422			245	386		1090			1160	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.21	0.00		c0.13			0.09	
v/c Ratio		0.68			0.85	0.01		0.20			0.13	
Uniform Delay, d1		24.0			25.2	20.1		4.8			4.5	
Progression Factor		1.00			1.00	1.00		0.62			1.00	
Incremental Delay, d2		3.4			22.2	0.0		0.4			0.2	
Delay (s)		27.4			47.4	20.1		3.3			4.8	
Level of Service		C			D	C		A			A	
Approach Delay (s)		27.4			44.7			3.3			4.8	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	70.0	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			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	88	1722	838	101	108
v/c Ratio	0.55	0.43	0.25	0.57	0.43
Control Delay	51.3	2.1	7.3	55.0	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	2.1	7.3	55.0	13.4
Queue Length 50th (ft)	56	53	77	62	0
Queue Length 95th (ft)	m78	m73	121	111	48
Internal Link Dist (ft)		331	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	224	4037	3297	309	359
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	0.39	0.43	0.25	0.33	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	85	1670	765	48	98	105
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4680		1719	1496
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4680		1719	1496
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	88	1722	789	49	101	108
RTOR Reduction (vph)	0	0	3	0	0	97
Lane Group Flow (vph)	88	1722	835	0	101	11
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	8.1	81.7	69.6		10.3	10.3
Effective Green, g (s)	8.1	81.7	69.6		10.3	10.3
Actuated g/C Ratio	0.08	0.82	0.70		0.10	0.10
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)	139	4035	3257		177	154
v/s Ratio Prot	c0.05	c0.35	0.18		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.63	0.43	0.26		0.57	0.07
Uniform Delay, d1	44.5	2.6	5.6		42.7	40.5
Progression Factor	0.93	0.66	1.12		1.00	1.00
Incremental Delay, d2	5.9	0.3	0.2		2.7	0.1
Delay (s)	47.4	2.0	6.5		45.5	40.6
Level of Service	D	A	A		D	D
Approach Delay (s)		4.2	6.5		43.0	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1785	27	478	343	1022
v/c Ratio	0.73	0.24	0.18	0.60	0.92
Control Delay	21.1	56.6	7.1	33.3	37.0
Queue Delay	0.9	0.0	0.0	0.0	13.0
Total Delay	22.0	56.6	7.1	33.3	49.9
Queue Length 50th (ft)	256	16	36	181	271
Queue Length 95th (ft)	303	37	45	296	#456
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	2451	137	2923	573	1115
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	359	0	0	0	102
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.85	0.20	0.16	0.60	1.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1460	307	27	473	340	1012
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		1.00	0.91	1.00	0.88
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4760		1719	4715	1641	2651
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4760		1719	4715	1641	2651
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	1475	310	27	478	343	1022
RTOR Reduction (vph)	33	0	0	0	0	189
Lane Group Flow (vph)	1752	0	27	478	343	833
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	48.9		4.2	57.1	34.9	34.9
Effective Green, g (s)	48.9		4.2	57.1	34.9	34.9
Actuated g/C Ratio	0.49		0.04	0.57	0.35	0.35
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)	2327		72	2692	572	925
v/s Ratio Prot	c0.37		c0.02	0.10	0.21	
v/s Ratio Perm						c0.31
v/c Ratio	0.75		0.38	0.18	0.60	0.90
Uniform Delay, d1	20.7		46.6	10.2	26.8	30.9
Progression Factor	1.01		1.17	0.70	1.00	1.00
Incremental Delay, d2	2.1		1.2	0.1	1.1	11.5
Delay (s)	23.0		55.6	7.3	27.9	42.3
Level of Service	C		E	A	C	D
Approach Delay (s)	23.0			9.9	38.7	
Approach LOS	C			A	D	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	251	2162	136	254	405	107	149	956	265	250
v/c Ratio	0.41	1.06	0.20	1.12	0.66	0.28	0.31	1.07	1.03	0.64
Control Delay	23.4	61.2	5.1	137.8	41.7	34.9	30.8	78.1	110.8	44.9
Queue Delay	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	77.2	5.1	137.8	41.7	34.9	30.8	78.1	110.8	44.9
Queue Length 50th (ft)	86	~546	5	~94	86	56	75	~311	~93	72
Queue Length 95th (ft)	m139	#655	m22	#176	115	110	129	#450	#174	108
Internal Link Dist (ft)		284			599		325			294
Turn Bay Length (ft)	170			195		210			200	
Base Capacity (vph)	610	2035	679	226	1421	376	487	891	257	967
Starvation Cap Reductn	0	229	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	0.41	1.20	0.20	1.12	0.29	0.28	0.31	1.07	1.03	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	2097	132	246	350	43	104	145	927	257	198	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	1.00	0.88	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	1.00	1.00	
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	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	4940	1483	3335	4653		1586	1766	2534	3224	3268	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	4940	1483	3335	4653		1586	1766	2534	3224	3268	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	251	2162	136	254	361	44	107	149	956	265	204	46
RTOR Reduction (vph)	0	0	68	0	19	0	0	0	192	0	24	0
Lane Group Flow (vph)	251	2162	68	254	386	0	107	149	764	265	226	0
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	35.5	41.2	41.2	6.8	12.7		23.7	27.6	27.6	8.0	11.3	
Effective Green, g (s)	35.5	41.2	41.2	6.8	12.7		23.7	27.6	27.6	8.0	11.3	
Actuated g/C Ratio	0.36	0.41	0.41	0.07	0.13		0.24	0.28	0.28	0.08	0.11	
Clearance Time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	
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)	610	2035	610	226	590		375	487	699	257	369	
v/s Ratio Prot	0.15	c0.44		c0.08	0.08		0.07	0.08		c0.08	0.07	
v/s Ratio Perm			0.05						c0.30			
v/c Ratio	0.41	1.06	0.11	1.12	0.65		0.29	0.31	1.09	1.03	0.61	
Uniform Delay, d1	24.4	29.4	18.1	46.6	41.6		31.2	28.6	36.2	46.0	42.3	
Progression Factor	0.87	0.86	0.92	0.91	0.93		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	35.2	0.2	97.1	5.5		0.2	0.1	62.3	64.4	2.1	
Delay (s)	21.2	60.3	17.0	139.5	44.0		31.4	28.8	98.5	110.4	44.4	
Level of Service	C	E	B	F	D		C	C	F	F	D	
Approach Delay (s)		54.2			80.8			84.0			78.4	
Approach LOS		D			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	67.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	727	420	55	322	249
v/c Ratio	0.94	0.62	0.07	0.48	0.38
Control Delay	38.8	17.2	5.2	17.7	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	17.2	5.2	17.7	20.5
Queue Length 50th (ft)	266	119	5	91	98
Queue Length 95th (ft)	#503	208	20	162	165
Internal Link Dist (ft)	494	887		220	332
Turn Bay Length (ft)			30		
Base Capacity (vph)	788	690	829	673	651
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	0.92	0.61	0.07	0.48	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	530	67	101	307	53	29	190	93	34	162	46
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	
Frt		0.99			1.00	0.85		0.96			0.97	
Flt Protected		0.99			0.99	1.00		1.00			0.99	
Satd. Flow (prot)		1825			1840	1583		1779			1803	
Flt Permitted		0.83			0.72	1.00		0.96			0.93	
Satd. Flow (perm)		1523			1342	1583		1714			1681	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	112	546	69	104	316	55	30	196	96	35	167	47
RTOR Reduction (vph)	0	5	0	0	0	15	0	22	0	0	12	0
Lane Group Flow (vph)	0	722	0	0	420	40	0	300	0	0	237	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		35.4			35.4	35.4		26.6			26.6	
Effective Green, g (s)		35.4			35.4	35.4		26.6			26.6	
Actuated g/C Ratio		0.51			0.51	0.51		0.38			0.38	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		4.0			4.0	4.0		2.0			2.0	
Lane Grp Cap (vph)		770			678	800		651			638	
v/s Ratio Prot												
v/s Ratio Perm		c0.47			0.31	0.03		c0.18			0.14	
v/c Ratio		0.94			0.62	0.05		0.46			0.37	
Uniform Delay, d1		16.3			12.5	8.8		16.3			15.7	
Progression Factor		1.00			1.00	1.00		1.00			1.24	
Incremental Delay, d2		18.9			1.9	0.0		2.3			1.6	
Delay (s)		35.1			14.4	8.8		18.7			21.0	
Level of Service		D			B	A		B			C	
Approach Delay (s)		35.1			13.7			18.7			21.0	
Approach LOS		D			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	720	78	330	47	174	149
v/c Ratio	0.74	0.09	0.38	0.05	0.33	0.25
Control Delay	16.9	5.0	6.1	1.1	16.1	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	5.0	6.1	1.1	16.1	10.5
Queue Length 50th (ft)	182	7	41	0	43	22
Queue Length 95th (ft)	309	24	54	m3	87	58
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	968	858	872	862	524	586
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	0.74	0.09	0.38	0.05	0.33	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	665	76	33	287	46	66	83	19	28	58	58
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.98			0.95	
Flt Protected		1.00	1.00		0.99	1.00		0.98			0.99	
Satd. Flow (prot)		1858	1583		1853	1583		1799			1745	
Flt Permitted		0.98	1.00		0.88	1.00		0.84			0.93	
Satd. Flow (perm)		1817	1583		1635	1583		1549			1638	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	34	686	78	34	296	47	68	86	20	29	60	60
RTOR Reduction (vph)	0	0	14	0	0	19	0	8	0	0	40	0
Lane Group Flow (vph)	0	720	64	0	330	28	0	166	0	0	109	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		969	844		872	844		516			546	
v/s Ratio Prot												
v/s Ratio Perm		c0.40	0.04		0.20	0.02		c0.11			0.07	
v/c Ratio		0.74	0.08		0.38	0.03		0.32			0.20	
Uniform Delay, d1		10.8	6.8		8.2	6.7		14.9			14.3	
Progression Factor		1.00	1.00		0.58	0.32		1.00			1.00	
Incremental Delay, d2		5.1	0.2		1.1	0.1		1.6			0.8	
Delay (s)		16.0	7.0		5.9	2.2		16.6			15.1	
Level of Service		B	A		A	A		B			B	
Approach Delay (s)		15.1			5.4			16.6			15.1	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	52	865	59	337	162	446
v/c Ratio	0.14	1.08	0.48	0.42	0.22	0.63
Control Delay	13.5	70.9	28.6	13.3	8.6	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	70.9	28.6	13.3	8.6	17.1
Queue Length 50th (ft)	10	~335	15	77	25	136
Queue Length 95th (ft)	m20	#545	#61	135	57	m206
Internal Link Dist (ft)		455		585	365	321
Turn Bay Length (ft)	30		30			
Base Capacity (vph)	384	803	124	800	738	713
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	0.14	1.08	0.48	0.42	0.22	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	776	63	57	290	37	23	87	47	102	262	69
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	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.96			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1842		1770	1831			1775			1802	
Flt Permitted	0.48	1.00		0.15	1.00			0.92			0.89	
Satd. Flow (perm)	886	1842		287	1831			1645			1620	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	52	800	65	59	299	38	24	90	48	105	270	71
RTOR Reduction (vph)	0	5	0	0	7	0	0	26	0	0	11	0
Lane Group Flow (vph)	52	860	0	59	330	0	0	137	0	0	435	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)	26.0	26.0		26.0	26.0			26.0			26.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0			26.0			26.0	
Actuated g/C Ratio	0.43	0.43		0.43	0.43			0.43			0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	383	798		124	793			712			702	
v/s Ratio Prot		c0.47			0.18							
v/s Ratio Perm	0.06			0.21				0.08			c0.27	
v/c Ratio	0.14	1.08		0.48	0.42			0.19			0.62	
Uniform Delay, d1	10.2	17.0		12.1	11.7			10.5			13.2	
Progression Factor	1.20	0.87		1.00	1.00			1.00			1.07	
Incremental Delay, d2	0.6	52.2		12.5	1.6			0.6			2.9	
Delay (s)	12.9	67.0		24.6	13.4			11.1			17.0	
Level of Service	B	E		C	B			B			B	
Approach Delay (s)		63.9			15.0			11.1			17.0	
Approach LOS		E			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	38.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	335	646	206	272	221	90	783	936	574	160
v/c Ratio	0.98	1.19	0.42	1.25	0.70	0.24	1.11	1.37	0.39	0.23
Control Delay	83.4	135.5	16.2	186.1	62.1	13.8	98.5	207.6	19.9	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	135.5	16.2	186.1	62.1	13.8	98.5	207.6	19.9	5.6
Queue Length 50th (ft)	213	~500	50	~115	111	3	~213	~414	133	3
Queue Length 95th (ft)	#390	#715	115	#200	#237	52	m#280	#544	178	m39
Internal Link Dist (ft)		585			186		328		103	
Turn Bay Length (ft)	50		50							
Base Capacity (vph)	343	542	495	217	315	378	706	682	1454	703
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	22	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	1.19	0.42	1.25	0.70	0.24	1.11	1.37	0.40	0.23

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	325	627	200	264	214	87	0	539	220	908	557	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)	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	0.97	1.00	1.00		0.91		0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.98		1.00		1.00	1.00	0.95
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		0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1562	1644	1304	2717	1660	1389		4151		2626	3094	1316
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (perm)	1562	1644	1304	2717	1660	1389		4151		2626	3094	1316
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	335	646	206	272	221	90	0	556	227	936	574	160
RTOR Reduction (vph)	0	0	66	0	0	73	0	0	0	0	0	85
Lane Group Flow (vph)	335	646	140	272	221	17	0	783	0	936	574	75
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm		NA		Prot	NA	Perm
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases			8			4						2
Actuated Green, G (s)	22.0	33.0	33.0	8.0	19.0	19.0		17.0		26.0	47.0	47.0
Effective Green, g (s)	22.0	33.0	33.0	8.0	19.0	19.0		17.0		26.0	47.0	47.0
Actuated g/C Ratio	0.22	0.33	0.33	0.08	0.19	0.19		0.17		0.26	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5	2.5	3.0	3.0	3.0		2.5		2.0	2.0	2.0
Lane Grp Cap (vph)	343	542	430	217	315	263		705		682	1454	618
v/s Ratio Prot	0.21	c0.39		c0.10	0.13			c0.19		c0.36	0.19	
v/s Ratio Perm			0.11			0.01						0.06
v/c Ratio	0.98	1.19	0.33	1.25	0.70	0.07		1.11		1.37	0.39	0.12
Uniform Delay, d1	38.7	33.5	25.2	46.0	37.9	33.2		41.5		37.0	17.2	14.9
Progression Factor	1.00	1.00	1.00	1.03	1.29	7.95		0.81		0.99	1.10	1.88
Incremental Delay, d2	41.9	103.5	0.3	145.9	6.9	0.1		65.8		176.4	0.8	0.4
Delay (s)	80.6	137.0	25.5	193.2	55.8	264.2		99.3		212.9	19.7	28.3
Level of Service	F	F	C	F	E	F		F		F	B	C
Approach Delay (s)		101.8			152.1			99.3			128.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	119.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	23	856	1714	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	24	882	1767	0	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	882	441			2649	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	882	441			2649	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	285	564			156	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3
Volume Total	24	588	883	1178
Volume Left	0	0	0	0
Volume Right	24	0	589	1178
cSH	564	1700	1700	1700
Volume to Capacity	0.04	0.35	0.52	0.69
Queue Length 95th (ft)	3	0	0	0
Control Delay (s)	11.7	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.7	0.0		
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	715	222	250	219	280	455
v/c Ratio	0.92	0.97	0.34	0.46	0.19	1.06
Control Delay	45.9	88.9	12.7	21.2	3.6	86.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	88.9	12.7	21.2	3.6	86.4
Queue Length 50th (ft)	173	112	66	77	14	~252
Queue Length 95th (ft)	#285	#245	116	140	31	#432
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	775	229	742	471	1439	429
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	0.92	0.97	0.34	0.46	0.19	1.06

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	547	122	215	214	28	77	136	272	189	211	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5		4.0	3.5			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		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	
Frt		0.97		1.00	0.98			1.00	0.85		0.99	
Flt Protected		1.00		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)		2724		1413	1454			1461	2224		1430	
Flt Permitted		0.94		0.95	1.00			0.77	1.00		0.70	
Satd. Flow (perm)		2562		1413	1454			1142	2224		1029	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	25	564	126	222	221	29	79	140	280	195	218	42
RTOR Reduction (vph)	0	23	0	0	6	0	0	0	51	0	5	0
Lane Group Flow (vph)	0	692	0	222	244	0	0	219	229	0	450	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm	NA		Prot	NA		Perm	NA	pt+ov	Perm	NA	
Protected Phases		6		5	2			4	4 5		8	
Permitted Phases	6						4			8		
Actuated Green, G (s)		23.5		13.0	40.5			33.0	49.0		33.0	
Effective Green, g (s)		23.5		13.0	40.5			33.0	49.0		33.0	
Actuated g/C Ratio		0.29		0.16	0.51			0.41	0.61		0.41	
Clearance Time (s)		3.5		4.0	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		3.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		752		229	736			471	1362		424	
v/s Ratio Prot				c0.16	0.17				0.10			
v/s Ratio Perm		c0.27						0.19			c0.44	
v/c Ratio		0.92		0.97	0.33			0.46	0.17		1.06	
Uniform Delay, d1		27.3		33.3	11.7			17.1	6.7		23.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		18.4		50.2	1.2			0.3	0.0		61.1	
Delay (s)		45.7		83.5	12.9			17.3	6.7		84.6	
Level of Service		D		F	B			B	A		F	
Approach Delay (s)		45.7			46.1			11.4			84.6	
Approach LOS		D			D			B			F	

Intersection Summary			
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	879	137	321	22	755	276
v/c Ratio	0.93	0.23	0.20	0.27	0.78	0.47
Control Delay	39.5	34.9	10.4	47.2	36.3	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	39.5	34.9	10.4	47.2	36.4	9.1
Queue Length 50th (ft)	196	39	33	11	253	20
Queue Length 95th (ft)	#311	m66	m70	m25	m285	m49
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	1018	586	1567	81	1076	624
Starvation Cap Reductn	0	0	0	0	19	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.23	0.20	0.27	0.71	0.44

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.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	427	426	133	311	21	732	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.93		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2542		2649	2731	1366	2731	1161
Flt Permitted	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2542		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	440	439	137	321	22	755	276
RTOR Reduction (vph)	188	0	0	0	0	0	185
Lane Group Flow (vph)	691	0	137	321	22	755	91
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type	NA		Prot	NA	Prot	NA	Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	30.0		24.5	55.0	2.4	32.9	32.9
Effective Green, g (s)	30.0		24.5	55.0	2.4	32.9	32.9
Actuated g/C Ratio	0.30		0.24	0.55	0.02	0.33	0.33
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	762		649	1502	32	898	381
v/s Ratio Prot	c0.27		0.05	c0.12	0.02	c0.28	
v/s Ratio Perm							0.08
v/c Ratio	0.91		0.21	0.21	0.69	0.84	0.24
Uniform Delay, d1	33.7		30.1	11.5	48.4	31.1	24.4
Progression Factor	1.00		0.98	0.85	0.90	1.08	2.51
Incremental Delay, d2	14.2		0.0	0.3	31.9	7.5	1.2
Delay (s)	47.8		29.5	10.0	75.3	41.0	62.5
Level of Service	D		C	A	E	D	E
Approach Delay (s)	47.8			15.8		47.4	
Approach LOS	D			B		D	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	124	295	143	531	238	234	215	971	246	846	78
v/c Ratio	0.65	0.66	0.44	0.56	0.60	0.47	0.80	1.09dr	0.61	0.82	0.14
Control Delay	55.8	47.7	10.8	36.9	41.3	9.3	61.8	31.5	30.8	30.4	2.8
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	55.8	47.7	10.8	36.9	41.3	9.3	61.8	31.5	30.8	30.4	2.8
Queue Length 50th (ft)	83	100	0	106	136	13	132	140	165	296	2
Queue Length 95th (ft)	143	139	52	136	206	73	#222	#304	m#233	m#481	m8
Internal Link Dist (ft)		288			732			427		1472	
Turn Bay Length (ft)	150		150	225		85	130		150		
Base Capacity (vph)	250	582	381	1130	475	559	315	1053	400	1028	541
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	0.50	0.51	0.38	0.47	0.50	0.42	0.68	0.92	0.61	0.82	0.14

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.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	137	278	142	526	236	232	213	160	801	244	838	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Lane Util. Factor	0.91	0.91	1.00	0.94	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	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	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1392	3237	1468	4388	1845	1568	1752	2700		1662	3202	1471
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	3237	1468	4388	1845	1568	1752	2700		1662	3202	1471
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	138	281	143	531	238	234	215	162	809	246	846	78
RTOR Reduction (vph)	0	0	123	0	0	164	0	420	0	0	0	53
Lane Group Flow (vph)	124	295	20	531	238	70	215	551	0	246	846	25
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split	NA	Prot	Split	NA	Prot	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	4	8	8	8	1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	13.8	13.8	13.8	21.5	21.5	21.5	15.4	23.5		24.1	32.2	32.2
Effective Green, g (s)	13.8	13.8	13.8	21.5	21.5	21.5	15.4	23.5		24.1	32.2	32.2
Actuated g/C Ratio	0.14	0.14	0.14	0.22	0.22	0.22	0.15	0.24		0.24	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.6		4.0	4.6	4.6
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0		2.0	3.5	3.5
Lane Grp Cap (vph)	192	446	202	943	396	337	269	634		400	1031	473
v/s Ratio Prot	0.09	c0.09	0.01	0.12	c0.13	0.04	0.12	c0.20		0.15	c0.26	
v/s Ratio Perm												0.02
v/c Ratio	0.65	0.66	0.10	0.56	0.60	0.21	0.80	1.09dr		0.61	0.82	0.05
Uniform Delay, d1	40.8	40.9	37.7	35.1	35.4	32.3	40.8	36.8		33.8	31.2	23.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.69	0.63	0.67
Incremental Delay, d2	5.5	2.8	0.1	0.8	2.6	0.3	14.3	11.8		4.4	4.7	0.1
Delay (s)	46.3	43.7	37.7	35.8	37.9	32.6	55.1	48.5		27.6	24.5	15.9
Level of Service	D	D	D	D	D	C	E	D		C	C	B
Approach Delay (s)		42.8			35.6			49.7			24.6	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	37.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	79.0%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	561	252	536	24	108	7	505	1926	6	198	402
v/c Ratio	1.20	0.67	0.55	0.36	0.28	0.03	0.86	0.88	0.10	0.23	0.24
Control Delay	163.0	64.6	6.0	84.2	65.6	0.3	74.4	24.4	72.7	24.6	4.3
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	163.0	64.6	6.0	84.2	65.6	0.3	74.4	24.4	72.7	24.6	4.3
Queue Length 50th (ft)	~342	240	0	23	37	0	248	640	6	108	25
Queue Length 95th (ft)	#463	321	52	56	57	0	306	#1156	22	190	59
Internal Link Dist (ft)		732			376			1000		765	
Turn Bay Length (ft)	140			70			300		90		
Base Capacity (vph)	466	414	1009	72	637	300	689	2180	193	854	1696
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	1.20	0.61	0.53	0.33	0.17	0.02	0.73	0.88	0.03	0.23	0.24

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	247	525	24	106	7	495	1101	787	6	194	394
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
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
Lane Util. Factor	0.97	1.00	0.88	1.00	0.91	1.00	0.97	0.95		1.00	1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	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	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1827	2622	1556	5036	1512	3335	3117		1531	1733	2503
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1827	2622	1556	5036	1512	3335	3117		1531	1733	2503
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)	561	252	536	24	108	7	505	1123	803	6	198	402
RTOR Reduction (vph)	0	0	426	0	0	6	0	59	0	0	0	98
Lane Group Flow (vph)	561	252	110	24	108	1	505	1867	0	6	198	304
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	5
Permitted Phases			2			6						8
Actuated Green, G (s)	22.0	30.9	30.9	4.1	13.0	13.0	26.5	97.7		1.3	72.5	94.5
Effective Green, g (s)	22.0	30.9	30.9	4.1	13.0	13.0	26.5	97.7		1.3	72.5	94.5
Actuated g/C Ratio	0.15	0.21	0.21	0.03	0.09	0.09	0.18	0.65		0.01	0.48	0.63
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
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
Lane Grp Cap (vph)	466	376	540	42	436	131	589	2030		13	837	1643
v/s Ratio Prot	c0.18	c0.14		0.02	0.02		c0.15	c0.60		0.00	0.11	0.03
v/s Ratio Perm			0.04			0.00						0.09
v/c Ratio	1.20	0.67	0.20	0.57	0.25	0.00	0.86	0.92		0.46	0.24	0.19
Uniform Delay, d1	64.0	54.9	49.4	72.1	63.9	62.6	59.9	22.7		74.0	22.6	11.6
Progression Factor	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	110.6	3.7	0.1	11.1	0.1	0.0	11.4	8.3		9.1	0.1	0.0
Delay (s)	174.6	58.5	49.4	83.2	64.0	62.6	71.3	31.0		83.2	22.7	11.6
Level of Service	F	E	D	F	E	E	E	C		F	C	B
Approach Delay (s)		103.2			67.3			39.4			16.0	
Approach LOS		F			E			D			B	

Intersection Summary			
HCM 2000 Control Delay	56.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	1317	654	459	90	26	226	304	97	561	124
v/c Ratio	0.97	0.96	0.50	0.31	0.08	0.93	0.35	0.69	0.84	0.35
Control Delay	43.8	51.4	8.3	13.4	0.5	101.7	42.2	85.5	65.5	20.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.8	51.4	8.3	13.4	0.5	101.7	42.2	85.5	65.5	20.9
Queue Length 50th (ft)	510	500	80	3	0	206	116	87	261	32
Queue Length 95th (ft)	#619	#723	166	55	0	#365	165	147	#350	92
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	1359	683	916	286	323	245	873	182	668	354
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	0.97	0.96	0.50	0.31	0.08	0.92	0.35	0.53	0.84	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1825	87	445	19	0	65	28	219	280	15	94	544
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.91	0.91	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		0.98		0.97	1.00	0.99		1.00	1.00
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		0.88		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.96	1.00		0.99		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2907	1467	1408		1365		1320	1597	3154		1597	3195
Flt Permitted	0.54	0.53	1.00		0.82		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1648	817	1408		1127		1320	1597	3154		1597	3195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1881	90	459	20	0	67	29	226	289	15	97	561
RTOR Reduction (vph)	0	0	127	0	69	0	21	0	3	0	0	0
Lane Group Flow (vph)	1317	654	332	0	21	0	5	226	301	0	97	561
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	Prot	NA		Prot	NA
Protected Phases	7	4			8			1	6		5	2
Permitted Phases	4		4	8			8					
Actuated Green, G (s)	78.5	78.5	78.5		27.0		27.0	21.2	38.6		12.4	29.3
Effective Green, g (s)	78.5	78.5	78.5		27.0		27.0	21.2	38.6		12.4	29.3
Actuated g/C Ratio	0.56	0.56	0.56		0.19		0.19	0.15	0.28		0.09	0.21
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	1360	683	789		217		254	241	869		141	668
v/s Ratio Prot	c0.34	0.33						c0.14	0.10		0.06	c0.18
v/s Ratio Perm	c0.21	0.21	0.24		0.02		0.00					
v/c Ratio	0.97	0.96	0.42		0.09		0.02	0.94	0.35		0.69	0.84
Uniform Delay, d1	25.5	29.2	17.7		46.5		45.8	58.7	40.6		61.9	53.1
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	17.1	24.0	0.1		0.1		0.0	40.7	1.1		10.6	12.1
Delay (s)	42.6	53.2	17.8		46.5		45.8	99.5	41.7		72.5	65.2
Level of Service	D	D	B		D		D	F	D		E	E
Approach Delay (s)		40.8			46.4				66.3			63.3
Approach LOS		D			D				E			E

Intersection Summary			
HCM 2000 Control Delay	49.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	120
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1385
Flt Permitted	1.00
Satd. Flow (perm)	1385
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	124
RTOR Reduction (vph)	65
Lane Group Flow (vph)	59
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	29.3
Effective Green, g (s)	29.3
Actuated g/C Ratio	0.21
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	289
v/s Ratio Prot	
v/s Ratio Perm	0.04
v/c Ratio	0.20
Uniform Delay, d1	45.7
Progression Factor	1.00
Incremental Delay, d2	1.6
Delay (s)	47.3
Level of Service	D
Approach Delay (s)	
Approach LOS	

Intersection Summary

Queues
1: Linden Ave. & Miller Ave.

9/10/2014

Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	173	159	224	595	383	441
v/c Ratio	0.57	0.30	0.51	0.57	0.73	0.75
Control Delay	28.3	5.5	24.1	10.9	26.5	28.0
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0
Total Delay	28.3	5.8	24.1	10.9	26.5	28.0
Queue Length 50th (ft)	54	0	69	120	130	136
Queue Length 95th (ft)	#114	38	128	202	m175	#266
Internal Link Dist (ft)	1394			601	321	251
Turn Bay Length (ft)		60	60			
Base Capacity (vph)	302	522	442	1040	528	585
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	94	0	0	0	1
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.37	0.51	0.57	0.73	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	91	157	222	534	55	49	282	49	14	358	64
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			3.5			3.5	
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.99			0.98			0.98	
Flt Protected		0.98	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1820	1583	1770	1836			1819			1823	
Flt Permitted		0.64	1.00	0.95	1.00			0.89			0.98	
Satd. Flow (perm)		1184	1583	1770	1836			1623			1798	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	81	92	159	224	539	56	49	285	49	14	362	65
RTOR Reduction (vph)	0	0	118	0	6	0	0	9	0	0	10	0
Lane Group Flow (vph)	0	173	41	224	589	0	0	374	0	0	431	0
Turn Type	Perm	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases		8		7	4			6			2	
Permitted Phases	8		8				6			2		
Actuated Green, G (s)		15.3	15.3	15.0	33.8			19.2			19.2	
Effective Green, g (s)		15.3	15.3	15.0	33.8			19.2			19.2	
Actuated g/C Ratio		0.26	0.26	0.25	0.56			0.32			0.32	
Clearance Time (s)		3.5	3.5	3.5	3.5			3.5			3.5	
Lane Grp Cap (vph)		301	403	442	1034			519			575	
v/s Ratio Prot				0.13	c0.32							
v/s Ratio Perm		0.15	0.03					0.23			c0.24	
v/c Ratio		0.57	0.10	0.51	0.57			0.72			0.75	
Uniform Delay, d1		19.5	17.1	19.3	8.4			18.0			18.2	
Progression Factor		1.00	1.00	1.00	1.00			1.10			1.00	
Incremental Delay, d2		7.8	0.5	4.1	2.3			5.7			8.7	
Delay (s)		27.3	17.6	23.4	10.7			25.6			26.9	
Level of Service		C	B	C	B			C			C	
Approach Delay (s)		22.6			14.2			25.6			26.9	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	139	365	554	644	423	71
v/c Ratio	0.33	0.25	0.70	0.69	0.70	0.23
Control Delay	34.9	18.0	27.2	39.4	44.8	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	18.0	27.2	39.4	44.8	10.0
Queue Length 50th (ft)	67	78	289	184	134	0
Queue Length 95th (ft)	146	92	346	#370	176	36
Internal Link Dist (ft)			385	131	284	
Turn Bay Length (ft)						
Base Capacity (vph)	422	1667	909	937	756	375
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	0.33	0.22	0.61	0.69	0.56	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	135	354	430	108	308	316	0	0	410	69
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			1.00	0.97	1.00			0.95			0.95	1.00
Frpb, ped/bikes			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
Frt			0.86	1.00	0.97			1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (prot)			1565	3335	1800			3470			3438	1451
Flt Permitted			1.00	0.95	1.00			0.98			1.00	1.00
Satd. Flow (perm)			1565	3335	1800			3470			3438	1451
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	139	365	443	111	318	326	0	0	423	71
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	59
Lane Group Flow (vph)	0	0	139	365	544	0	0	644	0	0	423	12
Confl. Peds. (#/hr)												10
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	0%	0%	5%	5%	3%	0%	0%	3%	0%	0%	5%	5%
Turn Type			Over	Split	NA		Split	NA			NA	Perm
Protected Phases			1	6	6		1	1			4	
Permitted Phases												4
Actuated Green, G (s)			27.0	43.4	43.4			27.0			17.6	17.6
Effective Green, g (s)			27.0	43.4	43.4			27.0			17.6	17.6
Actuated g/C Ratio			0.27	0.43	0.43			0.27			0.18	0.18
Clearance Time (s)			4.0	4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)			4.0	3.5	3.5			4.0			3.0	3.0
Lane Grp Cap (vph)			422	1447	781			936			605	255
v/s Ratio Prot			0.09	0.11	c0.30			c0.19			c0.12	
v/s Ratio Perm												0.01
v/c Ratio			0.33	0.25	0.70			0.69			0.70	0.05
Uniform Delay, d1			29.2	18.0	23.0			32.7			38.7	34.2
Progression Factor			1.00	1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2			0.6	0.4	5.1			2.3			3.5	0.1
Delay (s)			29.9	18.4	28.0			35.0			42.2	34.3
Level of Service			C	B	C			D			D	C
Approach Delay (s)		29.9			24.2			35.0			41.1	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	251	632	48	399	187
v/c Ratio	0.38	0.91	0.06	0.52	0.24
Control Delay	11.9	35.8	5.8	12.3	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	35.8	5.8	12.3	13.2
Queue Length 50th (ft)	54	218	5	87	46
Queue Length 95th (ft)	101	#422	20	m91	88
Internal Link Dist (ft)	543	1394		332	241
Turn Bay Length (ft)			50		
Base Capacity (vph)	711	752	814	771	778
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	0.35	0.84	0.06	0.52	0.24

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	156	48	200	413	47	26	263	98	8	136	38
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			3.5	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		0.97			1.00	0.85		0.97			0.97	
Flt Protected		0.99			0.98	1.00		1.00			1.00	
Satd. Flow (prot)		1799			1833	1583		1793			1806	
Flt Permitted		0.76			0.80	1.00		0.98			0.98	
Satd. Flow (perm)		1379			1483	1583		1756			1782	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	161	49	206	426	48	27	271	101	8	140	39
RTOR Reduction (vph)	0	13	0	0	0	13	0	17	0	0	13	0
Lane Group Flow (vph)	0	238	0	0	632	35	0	382	0	0	174	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)		32.9			32.9	32.9		30.1			30.1	
Effective Green, g (s)		32.9			32.9	32.9		30.1			30.1	
Actuated g/C Ratio		0.47			0.47	0.47		0.43			0.43	
Clearance Time (s)		3.5			3.5	3.5		3.5			3.5	
Vehicle Extension (s)		2.0			2.0	2.0		2.0			2.0	
Lane Grp Cap (vph)		648			697	744		755			766	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.43	0.02		c0.22			0.10	
v/c Ratio		0.37			0.91	0.05		0.51			0.23	
Uniform Delay, d1		11.9			17.1	10.1		14.5			12.6	
Progression Factor		1.00			1.00	1.00		0.77			1.00	
Incremental Delay, d2		0.1			15.1	0.0		0.7			0.7	
Delay (s)		12.0			32.3	10.1		12.0			13.3	
Level of Service		B			C	B		B			B	
Approach Delay (s)		12.0			30.7			12.0			13.3	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	122	605	2900	57	343
v/c Ratio	0.67	0.15	0.91	0.36	0.76
Control Delay	60.2	2.0	10.8	47.5	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	60.2	2.0	10.8	47.5	16.4
Queue Length 50th (ft)	75	16	189	35	0
Queue Length 95th (ft)	133	42	m#798	69	81
Internal Link Dist (ft)		331	860	300	
Turn Bay Length (ft)	130				
Base Capacity (vph)	223	4091	3192	309	552
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	0.55	0.15	0.91	0.18	0.62

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.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	118	587	2658	155	55	333
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	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	4940	4682		1719	1494
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1719	4940	4682		1719	1494
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	122	605	2740	160	57	343
RTOR Reduction (vph)	0	0	3	0	0	311
Lane Group Flow (vph)	122	605	2897	0	57	32
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				3		7
Heavy Vehicles (%)	5%	5%	10%	5%	5%	5%
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		3	
Permitted Phases						3
Actuated Green, G (s)	10.7	82.8	68.1		9.2	9.2
Effective Green, g (s)	10.7	82.8	68.1		9.2	9.2
Actuated g/C Ratio	0.11	0.83	0.68		0.09	0.09
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)	183	4090	3188		158	137
v/s Ratio Prot	c0.07	0.12	c0.62		c0.03	
v/s Ratio Perm						0.02
v/c Ratio	0.67	0.15	0.91		0.36	0.23
Uniform Delay, d1	42.9	1.7	13.3		42.6	42.1
Progression Factor	1.00	1.00	0.53		1.00	1.00
Incremental Delay, d2	6.9	0.1	1.6		0.5	0.3
Delay (s)	49.9	1.8	8.7		43.2	42.4
Level of Service	D	A	A		D	D
Approach Delay (s)		9.8	8.7		42.5	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	648	48	2014	827	495
v/c Ratio	0.34	0.47	0.95	1.07	0.33
Control Delay	18.7	60.5	37.8	81.2	3.0
Queue Delay	0.0	0.0	44.4	0.0	0.0
Total Delay	18.7	60.5	82.2	81.2	3.0
Queue Length 50th (ft)	86	30	438	~589	9
Queue Length 95th (ft)	113	#68	#561	#820	39
Internal Link Dist (ft)	860		284	426	
Turn Bay Length (ft)		70			230
Base Capacity (vph)	1885	103	2121	771	1482
Starvation Cap Reductn	0	0	512	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.34	0.47	1.25	1.07	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.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	516	126	48	1994	819	490
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		1.00	0.91	1.00	0.88
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4734		1719	4715	1641	2651
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4734		1719	4715	1641	2651
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	521	127	48	2014	827	495
RTOR Reduction (vph)	40	0	0	0	0	237
Lane Group Flow (vph)	608	0	48	2014	827	258
Confl. Peds. (#/hr)		23				9
Confl. Bikes (#/hr)		13				
Heavy Vehicles (%)	5%	5%	5%	10%	10%	5%
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	37.4		3.6	45.0	47.0	47.0
Effective Green, g (s)	37.4		3.6	45.0	47.0	47.0
Actuated g/C Ratio	0.37		0.04	0.45	0.47	0.47
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)	1770		61	2121	771	1245
v/s Ratio Prot	0.13		0.03	c0.43	c0.50	
v/s Ratio Perm						0.10
v/c Ratio	0.34		0.79	0.95	1.07	0.21
Uniform Delay, d1	22.5		47.8	26.4	26.5	15.6
Progression Factor	0.90		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5		44.6	10.8	53.7	0.0
Delay (s)	20.8		92.4	37.2	80.2	15.6
Level of Service	C		F	D	F	B
Approach Delay (s)	20.8			38.5	56.0	
Approach LOS	C			D	E	

Intersection Summary			
HCM 2000 Control Delay	41.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	221	636	180	737	1692	287	223	123	99	911	228
v/c Ratio	0.95	0.78	0.37	1.07	0.96	1.16	0.54	0.28	0.30	1.07	0.46
Control Delay	101.8	48.9	7.5	97.7	48.9	149.9	46.8	7.7	41.0	91.7	14.1
Queue Delay	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.8	52.2	7.5	97.7	48.9	149.9	46.8	7.7	41.0	91.7	14.1
Queue Length 50th (ft)	85	233	0	~311	440	~251	159	0	59	~392	35
Queue Length 95th (ft)	#163	302	56	#431	#553	#424	229	45	117	#522	108
Internal Link Dist (ft)		284			599		325			294	
Turn Bay Length (ft)	170			195		210			200		100
Base Capacity (vph)	232	813	486	690	1764	248	583	561	346	854	492
Starvation Cap Reductn	0	100	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	0.95	0.89	0.37	1.07	0.96	1.16	0.38	0.22	0.29	1.07	0.46

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	214	617	175	715	1544	97	278	216	119	96	884	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	4.6
Lane Util. Factor	0.97	0.95	1.00	0.97	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	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	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3335	3438	1474	3335	4682		1586	1766	1435	1662	3388	1457
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3335	3438	1474	3335	4682		1586	1766	1435	1662	3388	1457
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	221	636	180	737	1592	100	287	223	123	99	911	228
RTOR Reduction (vph)	0	0	139	0	6	0	0	0	94	0	0	125
Lane Group Flow (vph)	221	636	41	737	1686	0	287	223	29	99	911	103
Confl. Peds. (#/hr)			18			3			13			4
Confl. Bikes (#/hr)			8			1			4			4
Heavy Vehicles (%)	5%	5%	5%	5%	10%	5%	10%	4%	5%	5%	3%	5%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	8.0	26.4	26.4	23.8	42.4		18.8	27.0	27.0	21.4	29.0	29.0
Effective Green, g (s)	8.0	26.4	26.4	23.8	42.4		18.8	27.0	27.0	21.4	29.0	29.0
Actuated g/C Ratio	0.07	0.23	0.23	0.21	0.37		0.16	0.23	0.23	0.19	0.25	0.25
Clearance Time (s)	4.0	4.2	4.2	4.2	4.2		4.0	4.0	4.0	4.0	4.6	4.6
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
Lane Grp Cap (vph)	232	789	338	690	1726		259	414	336	309	854	367
v/s Ratio Prot	0.07	c0.18		c0.22	c0.36		c0.18	0.13		c0.06	c0.27	
v/s Ratio Perm			0.03						0.02			0.07
v/c Ratio	0.95	0.81	0.12	1.07	0.98		1.11	0.54	0.09	0.32	1.07	0.28
Uniform Delay, d1	53.3	41.9	35.1	45.6	35.8		48.1	38.5	34.4	40.5	43.0	34.6
Progression Factor	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	45.4	8.6	0.7	53.9	16.8		88.0	0.7	0.0	0.2	50.2	0.2
Delay (s)	98.7	50.5	35.9	99.5	52.6		136.1	39.2	34.4	40.7	93.2	34.8
Level of Service	F	D	D	F	D		F	D	C	D	F	C
Approach Delay (s)		58.2			66.8			82.2			78.2	
Approach LOS		E			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	69.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	608	162	689	575	424
v/c Ratio	0.96	0.45	0.73	1.01	0.66
Control Delay	46.6	16.0	18.5	63.1	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	16.0	18.5	63.1	21.2
Queue Length 50th (ft)	227	41	210	~232	143
Queue Length 95th (ft)	#451	92	338	#439	m189
Internal Link Dist (ft)	494		887	220	332
Turn Bay Length (ft)		30			
Base Capacity (vph)	632	357	950	571	646
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	0.96	0.45	0.73	1.01	0.66

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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	412	107	157	612	56	91	280	186	31	309	71
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	
Frt		0.98		1.00	0.99			0.95			0.98	
Flt Protected		0.99		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1806		1770	1839			1764			1813	
Flt Permitted		0.66		0.37	1.00			0.83			0.94	
Satd. Flow (perm)		1208		696	1839			1469			1709	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	73	425	110	162	631	58	94	289	192	32	319	73
RTOR Reduction (vph)	0	11	0	0	5	0	0	26	0	0	11	0
Lane Group Flow (vph)	0	597	0	162	684	0	0	549	0	0	413	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		36.0		36.0	36.0			26.0			26.0	
Effective Green, g (s)		36.0		36.0	36.0			26.0			26.0	
Actuated g/C Ratio		0.51		0.51	0.51			0.37			0.37	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		4.0		4.0	4.0			2.0			2.0	
Lane Grp Cap (vph)		621		357	945			545			634	
v/s Ratio Prot					0.37							
v/s Ratio Perm		c0.49		0.23				c0.37			0.24	
v/c Ratio		0.96		0.45	0.72			1.01			0.65	
Uniform Delay, d1		16.3		10.8	13.2			22.0			18.2	
Progression Factor		1.00		1.00	1.00			1.00			0.92	
Incremental Delay, d2		26.7		1.3	3.0			40.5			4.4	
Delay (s)		43.1		12.0	16.1			62.5			21.2	
Level of Service		D		B	B			E			C	
Approach Delay (s)		43.1			15.3			62.5			21.2	
Approach LOS		D			B			E			C	

Intersection Summary			
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	131.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	547	115	829	88	271	299
v/c Ratio	0.99	0.13	0.90	0.10	0.48	0.56
Control Delay	55.5	4.4	12.1	4.6	16.7	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	4.4	12.1	4.6	16.7	19.7
Queue Length 50th (ft)	178	9	134	7	63	78
Queue Length 95th (ft)	#378	29	m116	m4	124	147
Internal Link Dist (ft)	887		455		269	158
Turn Bay Length (ft)		30		30		
Base Capacity (vph)	550	871	924	858	570	532
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	0.99	0.13	0.90	0.10	0.48	0.56

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	462	112	61	743	85	48	133	82	80	143	68
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		1.00	1.00		1.00	1.00		1.00			1.00	
Frt		1.00	0.85		1.00	0.85		0.96			0.97	
Flt Protected		0.99	1.00		1.00	1.00		0.99			0.99	
Satd. Flow (prot)		1851	1583		1856	1583		1768			1779	
Flt Permitted		0.55	1.00		0.93	1.00		0.91			0.85	
Satd. Flow (perm)		1033	1583		1734	1583		1629			1540	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	71	476	115	63	766	88	49	137	85	82	147	70
RTOR Reduction (vph)	0	0	28	0	0	14	0	27	0	0	19	0
Lane Group Flow (vph)	0	547	87	0	829	74	0	244	0	0	280	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1		1	1		1	2			2		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Effective Green, g (s)		32.0	32.0		32.0	32.0		20.0			20.0	
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.33			0.33	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		550	844		924	844		543			513	
v/s Ratio Prot												
v/s Ratio Perm		c0.53	0.06		0.48	0.05		0.15			c0.18	
v/c Ratio		0.99	0.10		0.90	0.09		0.45			0.55	
Uniform Delay, d1		13.9	6.9		12.5	6.9		15.7			16.3	
Progression Factor		1.00	1.00		0.64	0.90		1.00			1.00	
Incremental Delay, d2		37.1	0.2		1.5	0.0		2.7			4.1	
Delay (s)		51.0	7.2		9.5	6.2		18.3			20.4	
Level of Service		D	A		A	A		B			C	
Approach Delay (s)		43.4			9.1			18.3			20.4	
Approach LOS		D			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	106.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	104	547	101	932	365	590
v/c Ratio	0.84	0.69	0.47	1.16	0.52	0.86
Control Delay	52.4	17.2	21.0	107.8	15.0	30.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.4	17.2	21.0	107.8	15.0	30.4
Queue Length 50th (ft)	29	143	25	~414	86	227
Queue Length 95th (ft)	m#52	m162	68	#621	155	m#368
Internal Link Dist (ft)		455		585	365	321
Turn Bay Length (ft)	30		30			
Base Capacity (vph)	124	796	216	801	699	684
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	0.84	0.69	0.47	1.16	0.52	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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	415	115	98	815	89	56	239	59	117	306	149
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	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.99			0.98			0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1802		1770	1835			1806			1779	
Flt Permitted	0.15	1.00		0.27	1.00			0.87			0.85	
Satd. Flow (perm)	287	1802		499	1835			1587			1531	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	104	428	119	101	840	92	58	246	61	121	315	154
RTOR Reduction (vph)	0	16	0	0	7	0	0	12	0	0	21	0
Lane Group Flow (vph)	104	531	0	101	925	0	0	353	0	0	569	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)	26.0	26.0		26.0	26.0			26.0			26.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0			26.0			26.0	
Actuated g/C Ratio	0.43	0.43		0.43	0.43			0.43			0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	124	780		216	795			687			663	
v/s Ratio Prot		0.29			c0.50							
v/s Ratio Perm	0.36			0.20				0.22			c0.37	
v/c Ratio	0.84	0.68		0.47	1.16			0.51			0.86	
Uniform Delay, d1	15.1	13.7		12.1	17.0			12.4			15.3	
Progression Factor	1.11	1.09		1.00	1.00			1.00			1.16	
Incremental Delay, d2	26.6	2.3		7.1	87.3			2.7			11.4	
Delay (s)	43.4	17.2		19.2	104.3			15.1			29.2	
Level of Service	D	B		B	F			B			C	
Approach Delay (s)		21.4			96.0			15.1			29.2	
Approach LOS		C			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	51.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	113.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	301	378	960	830	264	741	182	309	421	197
v/c Ratio	1.13	0.92	0.99	1.11	0.37	1.03	0.84	1.18	0.46	0.38
Control Delay	145.0	75.6	71.1	104.3	10.7	98.0	88.0	165.7	42.6	7.0
Queue Delay	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	145.0	75.6	71.1	104.9	10.7	98.0	88.0	165.7	42.6	7.2
Queue Length 50th (ft)	~316	321	446	~863	53	~263	163	~173	165	0
Queue Length 95th (ft)	#505	#517	#594	#1114	121	#353	#298	#271	218	61
Internal Link Dist (ft)		585		186		328			103	
Turn Bay Length (ft)	50						100			
Base Capacity (vph)	267	411	970	747	716	719	216	262	906	519
Starvation Cap Reductn	0	0	0	72	0	0	0	0	0	58
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	1.13	0.92	0.99	1.23	0.37	1.03	0.84	1.18	0.46	0.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	292	228	139	931	805	256	0	719	177	300	408	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)	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		0.97	1.00	1.00		0.91	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	1.00	0.99		1.00	0.99	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	1.00	1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1562	1499		2717	1660	1392		4381	1320	2626	3094	1299
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1562	1499		2717	1660	1392		4381	1320	2626	3094	1299
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	301	235	143	960	830	264	0	741	182	309	421	197
RTOR Reduction (vph)	0	15	0	0	0	90	0	0	0	0	0	139
Lane Group Flow (vph)	301	363	0	960	830	174	0	741	182	309	421	58
Confl. Peds. (#/hr)			45									10
Confl. Bikes (#/hr)			7			3			1			1
Heavy Vehicles (%)	4%	4%	4%	16%	3%	3%	3%	3%	5%	20%	5%	5%
Turn Type	Prot	NA		Prot	NA	Perm		NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases						4			6			2
Actuated Green, G (s)	24.0	37.0		50.0	63.0	63.0		23.0	23.0	14.0	41.0	41.0
Effective Green, g (s)	24.0	37.0		50.0	63.0	63.0		23.0	23.0	14.0	41.0	41.0
Actuated g/C Ratio	0.17	0.26		0.36	0.45	0.45		0.16	0.16	0.10	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
Vehicle Extension (s)	2.5	2.5		3.0	3.0	3.0		2.5	2.5	2.0	2.0	2.0
Lane Grp Cap (vph)	267	396		970	747	626		719	216	262	906	380
v/s Ratio Prot	c0.19	0.24		0.35	c0.50			c0.17		c0.12	0.14	
v/s Ratio Perm						0.12			0.14			0.04
v/c Ratio	1.13	0.92		0.99	1.11	0.28		1.03	0.84	1.18	0.46	0.15
Uniform Delay, d1	58.0	50.0		44.7	38.5	24.2		58.5	56.7	63.0	40.5	36.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	93.8	25.3		26.1	67.8	0.2		41.6	24.3	113.0	1.7	0.8
Delay (s)	151.8	75.3		70.8	106.3	24.4		100.1	81.1	176.0	42.2	37.5
Level of Service	F	E		E	F	C		F	F	F	D	D
Approach Delay (s)		109.2			79.2			96.4			85.8	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	88.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	9	68	783	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	9	70	807	0	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	70	35			877	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	70	35			877	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	926	1030			766	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3
Volume Total	9	47	292	538
Volume Left	0	0	0	0
Volume Right	9	0	269	538
cSH	1030	1700	1700	1700
Volume to Capacity	0.01	0.03	0.17	0.32
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	8.5	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	8.5	0.0		
Approach LOS	A			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	493	300	566	276	247	431
v/c Ratio	0.81	1.01	0.75	0.64	0.16	1.04
Control Delay	42.1	91.7	24.4	29.5	1.0	81.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	91.7	24.4	29.5	1.0	81.7
Queue Length 50th (ft)	132	~173	236	122	0	~261
Queue Length 95th (ft)	#214	#338	379	215	12	#446
Internal Link Dist (ft)	317		560	395		365
Turn Bay Length (ft)					100	
Base Capacity (vph)	607	298	757	430	1565	416
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	1.01	0.75	0.64	0.16	1.04

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	350	70	291	492	57	107	161	240	146	201	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5		4.0	3.5			3.0	3.0		3.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	0.88		1.00	
Frpb, ped/bikes		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	
Frt		0.98		1.00	0.98			1.00	0.85		0.98	
Flt Protected		0.99		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)		2727		1413	1457			1458	2224		1412	
Flt Permitted		0.83		0.95	1.00			0.71	1.00		0.69	
Satd. Flow (perm)		2269		1413	1457			1049	2224		995	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	60	361	72	300	507	59	110	166	247	151	207	73
RTOR Reduction (vph)	0	16	0	0	5	0	0	0	85	0	8	0
Lane Group Flow (vph)	0	477	0	300	561	0	0	276	162	0	423	0
Confl. Peds. (#/hr)			13			9			9			19
Confl. Bikes (#/hr)			2			1			2			7
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Turn Type	Perm	NA		Prot	NA		Perm	NA	pt+ov	Perm	NA	
Protected Phases		6		5	2			4	4 5		8	
Permitted Phases	6						4			8		
Actuated Green, G (s)		23.5		19.0	46.5			37.0	59.0		37.0	
Effective Green, g (s)		23.5		19.0	46.5			37.0	59.0		37.0	
Actuated g/C Ratio		0.26		0.21	0.52			0.41	0.66		0.41	
Clearance Time (s)		3.5		4.0	3.5			3.0			3.0	
Vehicle Extension (s)		2.0		3.0	2.0			2.0			2.0	
Lane Grp Cap (vph)		592		298	752			431	1457		409	
v/s Ratio Prot				c0.21	c0.39				0.07			
v/s Ratio Perm		0.21						0.26			c0.43	
v/c Ratio		0.81		1.01	0.75			0.64	0.11		1.03	
Uniform Delay, d1		31.1		35.5	17.1			21.2	5.8		26.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		11.2		53.8	6.7			2.4	0.0		53.4	
Delay (s)		42.4		89.3	23.8			23.6	5.8		79.9	
Level of Service		D		F	C			C	A		E	
Approach Delay (s)		42.4			46.5			15.2			79.9	
Approach LOS		D			D			B			E	

Intersection Summary			
HCM 2000 Control Delay	44.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	106.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	746	313	575	2	1182	339
v/c Ratio	0.88	0.79	0.32	0.02	0.90	0.46
Control Delay	32.6	64.8	15.6	45.0	36.5	4.5
Queue Delay	0.0	0.0	0.0	0.0	17.4	0.1
Total Delay	32.6	64.8	15.6	45.0	53.9	4.6
Queue Length 50th (ft)	143	104	91	1	355	0
Queue Length 95th (ft)	195	#167	216	9	#583	59
Internal Link Dist (ft)	560		1472		328	
Turn Bay Length (ft)		160		60		
Base Capacity (vph)	1042	397	1776	81	1312	734
Starvation Cap Reductn	0	0	0	0	157	38
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.79	0.32	0.02	1.02	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	336	388	304	558	2	1147	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11
Total Lost time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Lane Util. Factor	0.97		0.97	0.95	1.00	0.95	1.00
Frpb, ped/bikes	0.97		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00
Frt	0.92		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	2527		2649	2731	1366	2731	1161
Flt Permitted	0.98		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	2527		2649	2731	1366	2731	1161
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	346	400	313	575	2	1182	339
RTOR Reduction (vph)	235	0	0	0	0	0	187
Lane Group Flow (vph)	511	0	313	575	2	1182	152
Confl. Peds. (#/hr)		34					28
Confl. Bikes (#/hr)		1					1
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%
Turn Type	NA		Prot	NA	Prot	NA	Perm
Protected Phases	8		1	6	5	2	
Permitted Phases							2
Actuated Green, G (s)	24.3		18.2	61.9	1.2	44.9	44.9
Effective Green, g (s)	24.3		18.2	61.9	1.2	44.9	44.9
Actuated g/C Ratio	0.24		0.18	0.62	0.01	0.45	0.45
Clearance Time (s)	4.0		4.0	4.6	4.0	4.6	4.6
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	614		482	1690	16	1226	521
v/s Ratio Prot	c0.20		c0.12	0.21	0.00	c0.43	
v/s Ratio Perm							0.13
v/c Ratio	0.83		0.65	0.34	0.12	0.96	0.29
Uniform Delay, d1	35.9		37.9	9.2	48.9	26.8	17.5
Progression Factor	1.00		1.23	1.57	1.00	1.00	1.00
Incremental Delay, d2	9.0		2.1	0.5	1.3	18.4	1.4
Delay (s)	44.9		48.8	14.9	50.2	45.2	18.9
Level of Service	D		D	B	D	D	B
Approach Delay (s)	44.9			26.9		39.3	
Approach LOS	D			C		D	

Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	128	263	263	2094	337	554	187	208	480	208	1422	100
v/c Ratio	0.70	0.63	0.18	1.48	0.57	0.36	1.53	0.59	0.35	0.47	1.46	0.07
Control Delay	60.5	47.5	0.3	249.1	33.5	0.6	310.2	49.1	0.7	19.8	234.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.5	47.5	0.3	249.1	33.5	0.6	310.2	49.1	0.7	19.8	234.1	0.1
Queue Length 50th (ft)	86	87	0	~658	178	0	~168	67	0	93	~667	0
Queue Length 95th (ft)	150	127	0	#787	284	0	#305	102	0	m113	m#768	m0
Internal Link Dist (ft)		288			732			427			1472	
Turn Bay Length (ft)	150		150	225		85	130		200	150		
Base Capacity (vph)	236	535	1449	1413	594	1545	122	688	1363	446	973	1482
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.49	0.18	1.48	0.57	0.36	1.53	0.30	0.35	0.47	1.46	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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	204	260	2073	334	548	185	206	475	206	1408	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.5	4.5	4.0	4.0	4.6	4.0	4.0	4.6	4.0
Lane Util. Factor	0.91	0.91	1.00	0.94	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99	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	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1392	3150	1449	4388	1845	1545	1752	3374	1363	1662	3202	1482
Flt Permitted	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1392	3150	1449	4388	1845	1545	1752	3374	1363	1662	3202	1482
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	185	206	263	2094	337	554	187	208	480	208	1422	100
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	128	263	263	2094	337	554	187	208	480	208	1422	100
Confl. Peds. (#/hr)						7			3			2
Confl. Bikes (#/hr)			4			4						4
Heavy Vehicles (%)	18%	6%	10%	16%	3%	3%	3%	7%	17%	5%	9%	3%
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	13.3	13.3	100.0	32.2	32.2	100.0	7.0	10.5	100.0	26.9	30.4	100.0
Effective Green, g (s)	13.3	13.3	100.0	32.2	32.2	100.0	7.0	10.5	100.0	26.9	30.4	100.0
Actuated g/C Ratio	0.13	0.13	1.00	0.32	0.32	1.00	0.07	0.10	1.00	0.27	0.30	1.00
Clearance Time (s)	4.0	4.0		4.5	4.5		4.0	4.6		4.0	4.6	
Vehicle Extension (s)	2.0	2.0		3.0	3.0		2.0	2.0		2.0	3.5	
Lane Grp Cap (vph)	185	418	1449	1412	594	1545	122	354	1363	447	973	1482
v/s Ratio Prot	c0.09	0.08		c0.48	0.18		c0.11	0.06		0.13	c0.44	
v/s Ratio Perm			0.18			0.36			0.35			0.07
v/c Ratio	0.69	0.63	0.18	1.48	0.57	0.36	1.53	0.59	0.35	0.47	1.46	0.07
Uniform Delay, d1	41.4	41.0	0.0	33.9	28.1	0.0	46.5	42.7	0.0	30.5	34.8	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.55	0.62	1.00
Incremental Delay, d2	8.7	2.1	0.3	221.2	1.2	0.6	276.6	1.6	0.7	2.1	211.1	0.1
Delay (s)	50.1	43.2	0.3	255.1	29.4	0.6	323.1	44.3	0.7	19.0	232.6	0.1
Level of Service	D	D	A	F	C	A	F	D	A	B	F	A
Approach Delay (s)		27.3			182.4			80.0			193.5	
Approach LOS		C			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	154.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	247	103	552	105	765	3	594	483	7	520	1656
v/c Ratio	0.17	0.11	0.34	0.67	0.96	0.01	1.04	0.52	0.09	0.92	1.03
Control Delay	20.6	17.2	2.1	72.4	73.8	0.0	100.2	35.7	57.3	72.0	53.5
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	20.6	17.2	2.1	72.4	73.8	0.0	100.2	35.7	57.3	72.0	53.5
Queue Length 50th (ft)	58	41	0	79	217	0	~135	145	5	210	~699
Queue Length 95th (ft)	86	78	32	136	#303	0	#197	224	21	#309	#928
Internal Link Dist (ft)		732			376			1000		765	
Turn Bay Length (ft)	140			70			300		90		
Base Capacity (vph)	1417	919	1604	207	797	371	573	933	76	576	1604
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	0.17	0.11	0.34	0.51	0.96	0.01	1.04	0.52	0.09	0.90	1.03

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	101	541	103	750	3	582	338	135	7	510	1623
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
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
Lane Util. Factor	0.97	1.00	0.88	1.00	0.91	1.00	0.91	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1827	2643	1556	5036	1522	6257	3218		1531	3292	2575
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1827	2643	1556	5036	1522	6257	3218		1531	3292	2575
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)	247	103	552	105	765	3	594	345	138	7	520	1656
RTOR Reduction (vph)	0	0	274	0	0	3	0	34	0	0	0	17
Lane Group Flow (vph)	247	103	278	105	765	0	594	449	0	7	520	1639
Confl. Peds. (#/hr)			3			8			3			6
Confl. Bikes (#/hr)			5			2						3
Heavy Vehicles (%)	10%	4%	4%	16%	3%	3%	5%	5%	10%	14%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	5
Permitted Phases			2			6						8
Actuated Green, G (s)	53.4	60.4	60.4	12.0	19.0	19.0	11.0	30.4		1.2	20.6	74.0
Effective Green, g (s)	53.4	60.4	60.4	12.0	19.0	19.0	11.0	30.4		1.2	20.6	74.0
Actuated g/C Ratio	0.44	0.50	0.50	0.10	0.16	0.16	0.09	0.25		0.01	0.17	0.62
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
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
Lane Grp Cap (vph)	1416	919	1330	155	797	240	573	815		15	565	1673
v/s Ratio Prot	0.08	0.06		0.07	c0.15		c0.09	0.14		0.00	0.16	c0.44
v/s Ratio Perm			0.11			0.00						0.20
v/c Ratio	0.17	0.11	0.21	0.68	0.96	0.00	1.04	0.55		0.47	0.92	0.98
Uniform Delay, d1	20.0	15.7	16.5	52.1	50.1	42.5	54.5	38.9		59.1	48.9	22.3
Progression Factor	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	0.0	0.0	0.0	8.9	22.1	0.0	47.4	2.7		8.1	20.2	17.1
Delay (s)	20.1	15.7	16.6	61.0	72.2	42.5	101.9	41.5		67.2	69.1	39.3
Level of Service	C	B	B	E	E	D	F	D		E	E	D
Approach Delay (s)		17.4			70.8			74.8			46.5	
Approach LOS		B			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	WBR2	NBL	NBT	SBL	SBT	SBR2
Lane Group Flow (vph)	489	253	232	191	41	482	352	121	744	413
v/c Ratio	0.83	0.85	0.54	0.84	0.19	0.95	0.23	0.75	0.84	0.78
Control Delay	70.3	82.3	17.4	65.9	2.1	80.1	23.7	91.3	61.9	37.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.3	82.3	17.4	65.9	2.1	80.1	23.7	91.3	61.9	37.6
Queue Length 50th (ft)	245	254	35	115	0	462	106	117	380	213
Queue Length 95th (ft)	#380	#471	130	201	3	#701	153	185	#508	#396
Internal Link Dist (ft)		492		239			555		1000	
Turn Bay Length (ft)			150			295		100		125
Base Capacity (vph)	588	298	432	309	294	508	1564	212	882	529
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	0.83	0.85	0.54	0.62	0.14	0.95	0.23	0.57	0.84	0.78

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	650	70	225	76	0	105	45	468	327	15	117	722
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		3.0		3.0	3.5	4.0		3.0	4.0
Lane Util. Factor	0.91	0.91	1.00		0.95		0.95	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.98		0.97	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	1.00
Frt	1.00	1.00	0.85		0.91		0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	0.97	1.00		0.98		1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2907	1477	1402		1402		1318	1597	3159		1597	3195
Flt Permitted	0.95	0.97	1.00		0.98		1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	2907	1477	1402		1402		1318	1597	3159		1597	3195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	670	72	232	78	0	108	46	482	337	15	121	744
RTOR Reduction (vph)	0	0	149	0	71	0	36	0	2	0	0	0
Lane Group Flow (vph)	489	253	83	0	120	0	5	482	350	0	121	744
Confl. Peds. (#/hr)			5				10			17		
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Turn Type	Split	NA	Perm	Split	NA		Perm	Prot	NA		Prot	NA
Protected Phases	4	4		3	3			1	6		5	2
Permitted Phases			4				3					
Actuated Green, G (s)	30.3	30.3	30.3		16.8		16.8	47.5	74.1		15.3	41.4
Effective Green, g (s)	30.3	30.3	30.3		16.8		16.8	47.5	74.1		15.3	41.4
Actuated g/C Ratio	0.20	0.20	0.20		0.11		0.11	0.32	0.49		0.10	0.28
Clearance Time (s)	3.5	3.5	3.5		3.0		3.0	3.5	4.0		3.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	3.0	3.0		2.0	3.5
Lane Grp Cap (vph)	587	298	283		157		147	505	1560		162	881
v/s Ratio Prot	0.17	c0.17			c0.09			c0.30	0.11		0.08	c0.23
v/s Ratio Perm			0.06				0.00					
v/c Ratio	0.83	0.85	0.29		0.76		0.03	0.95	0.22		0.75	0.84
Uniform Delay, d1	57.4	57.6	50.8		64.7		59.3	50.2	21.6		65.5	51.3
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.4	18.9	0.2		17.8		0.0	28.7	0.3		15.1	9.7
Delay (s)	66.9	76.6	51.0		82.5		59.4	78.8	21.9		80.5	61.0
Level of Service	E	E	D		F		E	E	C		F	E
Approach Delay (s)		65.6			78.4				54.8			62.1
Approach LOS		E			E				D			E

Intersection Summary			
HCM 2000 Control Delay	62.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR2
Lane Configurations	
Volume (vph)	401
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.97
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1389
Flt Permitted	1.00
Satd. Flow (perm)	1389
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	413
RTOR Reduction (vph)	146
Lane Group Flow (vph)	267
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	6
Heavy Vehicles (%)	13%
Turn Type	Perm
Protected Phases	
Permitted Phases	2
Actuated Green, G (s)	41.4
Effective Green, g (s)	41.4
Actuated g/C Ratio	0.28
Clearance Time (s)	4.0
Vehicle Extension (s)	3.5
Lane Grp Cap (vph)	383
v/s Ratio Prot	
v/s Ratio Perm	0.19
v/c Ratio	0.70
Uniform Delay, d1	48.7
Progression Factor	1.00
Incremental Delay, d2	10.1
Delay (s)	58.8
Level of Service	E
Approach Delay (s)	
Approach LOS	

Intersection Summary

Appendix C

Plan+ Application for Study Area and Methodology Validation

EIR Transportation Analysis Assumptions

South San Francisco Caltrain Station Area Plan EIR

April 2014

SF12-0610

FEHR PEERS

FEHR PEERS

MEMORANDUM

Date: February 14, 2014

To: City of South San Francisco

CC: City of South San Francisco – Gerry Beaudin, Susy Kalkin
Atkins – Kim Avila
BMS Design Group – Paige Martin, Barbara Maloney

From: Fehr & Peers – Meghan Weir

Subject: South San Francisco Station Area Land Use Plan: EIR Transportation Analysis Assumptions

SF12-0610

This memorandum documents the transportation analysis assumptions for the South San Francisco Station Area Land Use Plan Environmental Impact Report (SSF SALUP EIR). The development plan for the South San Francisco Downtown Station Area Plan ("Proposed Project") includes a mix of new residential, commercial, industrial, office, and research & development (R&D) space in South San Francisco's Downtown and East of 101 areas. Fehr & Peers previously prepared a *Multi-Modal Station Access and Connectivity Memorandum* (November 30, 2012) and an *Alternatives Analysis: Preliminary Travel Demand Characteristics* memorandum (December 6, 2012) that detailed some preliminary transportation analysis assumptions.

This memorandum documents our proposed analysis assumptions for the Proposed Project, including the project description, trip generation, trip distribution, and trip assignment for the Proposed Project. Additionally Cumulative Baseline assumptions are also presented.

PROJECT DESCRIPTION

The Proposed Project includes new land uses and transportation infrastructure projects throughout the study area. Two future land use alternatives, Alternative A and Alternative B, were evaluated by the project team and as part of a public outreach and community engagement process. Both alternatives project a similar level of residential development, but Alternative B has substantially more office/R&D land uses. These uses would be clustered in the Eastside neighborhood adjacent to the existing East of US 101 office/R&D employment. Based on community input and direction

from City subcommittees and City Council, Alternative B was identified as the preferred plan for further development in the Station Area Specific Plan. Alternative B provides long-term opportunities for the city and residents to revitalize downtown while continuing to build on the robust employment base in the Proposed Project study area. Alternative B land uses are outlined in detail in the *South San Francisco Downtown Station Area Plan Administrative Draft*, Chapter 4, Land Use and Urban Design,

Proposed Land Uses

The Proposed Project, with Alternative B land uses, consists of two distinct areas: "West" (which includes Downtown and development west of Airport Boulevard and north of Railroad Avenue) and "East" (which includes development east of Airport Boulevard and south of Railroad Avenue). Significant additional new housing is located in the West area within a quarter-mile walk to the relocated Caltrain station, along with growth in office and commercial land uses to accommodate the increase in residential development. A major new employment district is proposed for the East area, adjacent to the relocated Caltrain station. This employment center will be within walking distance of the new residential development Downtown and the existing Grand Avenue commercial area.

Based on market demand and physical constraints, a full build out of Alternative B within the analysis time frame of approximately 35 years is not realistic. The following factors are considered:

- Real estate market assessment suggests modest/moderate demand for housing[1]
- Small parcel sizes in downtown area will make parcel assembly challenging and likely slow down rate of development
- A number of parcels are currently used for surface parking; development at these locations would not displace any existing units
- Historically, there has been little new housing development in South San Francisco (even before the recession); even if the local real estate market accelerates, housing development is not likely to suddenly boom
- New development often requires a first investment by the city to improve public space and shift real estate development patterns and opportunities; this will likely take five to ten years for streetscape and similar public improvements
- The city owns many of the surface parking and vacant lots (some of which are managed by the Redevelopment Agency) and there may be a lag in property availability, even with a local successor agency sorting out city owned properties

[1] BAE Urban Economics. South San Francisco Downtown Station Area Plan Market Demand Analysis, August 2012

All of this suggests that the pace of new development will likely remain modest. Therefore, the Proposed Project transportation analysis assumes 25 percent build out of Alternative B. Full build out of Alternative B will require significant property turnover and is considered too long-range for this transportation analysis.

Table 1 summarizes the Existing and Proposed Project land uses for each of the areas. As all existing land uses are estimates based on field observations, numbers have been rounded for conservative analysis. Proposed Project land uses are derived from 25 percent build out of Alternative B. Land use categories have been summarized to match the categories used in trip generation calculations:

- Residential land use includes all single family and multi-family housing.
- Office/R&D land use includes all office, and half of business commercial, as well as all future research and development land use.
- Commercial land use includes all general retail and hotel (existing) and half of business commercial. Other includes institutional, public and industrial land uses.

The trip generation is calculated separately for the West and East sub-areas as their different land use mixes will have different trip generation characteristics. The West portion of the study area includes all of Downtown, and the adjacent residential and mixed uses located west of Airport Boulevard and north of Railroad Avenue. The East portion of the study area includes all of the land uses east of Airport Boulevard and south of Railroad Avenue, most of which are separated from the West area by the Caltrain tracks and are more directly connected to the local street network east of the Caltrain tracks.

Table 1: Land Use Summary

Land Use Category	Existing	Existing + Alternative B - 25% Build Out
West		
Residential (dus)[1]	1,440	2,842
Office/R&D (ksf)[2]	219	351.9
Commercial/Other (ksf)	1,182	1,437
East		
Residential (dus)	0	33
Office/R&D (ksf)	136	1,511

Table 1: Land Use Summary		
Land Use Category	**Existing**	**Existing + Alternative B - 25% Build Out**
Other (ksf)	738	963

Notes:

1. Dwelling Units (dus) [Includes both single family and multifamily residential]
2. Thousand square feet (ksf)

Source: BMS, Land Use Studies Summary, November 2012

Proposed Transportation Network

A number of transportation projects have been proposed as part of the station area access improvements to accommodate the multi-modal goals and increased density from the Proposed Project. Transportation projects include capital improvements and policy updates for strategy implementation. These range from pedestrian alley improvements and city traffic impact fees, to road extensions and new parking meter technology. Projects that will impact the transportation network are outlined in below.

Table 2: Transportation Network Projects	
Projects	Details
Short Term Projects (0-5 years)	
Caltrain platform extension	Extend Caltrain station train platform to the south, opposite Grand Avenue and provide station improvements to provide direct access to the station for pedestrians and bicyclists
Grand Avenue improvements	Street narrowing, bike lanes, expanded sidewalk and parking reconfiguration; new pedestrian and bicycle underpass to provide direct access between downtown and Caltrain station along Grand Avenue alignment
Airport/Grand intersection redesign	Reduce corner radii, add corner curb extensions, extend bicycle lanes on Airport Boulevard, and eliminate northbound and westbound left turn movements

Table 2: Transportation Network Projects	
Projects	Details
On-Street Bicycle Network Enhancements	Installation of Airport Boulevard bicycle lanes south of Miller Avenue, Gateway Boulevard bicycle lanes north of Grand Avenue, and Grand Avenue bicycle lanes through Downtown; narrow vehicle lanes to 11-feet to accommodate bicycle lanes
Medium Term Projects (5-10 years)	
Alley Improvements to Downtown Lanes	Lanes in residential neighborhoods to include traffic calming to discourage through traffic. Lanes in commercial neighborhoods to act as pedestrian connections between commercial areas, and in residential areas to provide vehicle access to residential properties. First focus on the following alleys: Tamarack Lane, Fourth Lane, Third Lane and Second Lane
Extend Railroad Avenue – east of existing Caltrain tracks	Extension of Railroad Avenue east of the existing Caltrain tracks to East Grand Avenue/Allerton Avenue intersection, generally following the alignment of the abandoned railroad right-of-way connecting from west of U.S. 101, over Airport Boulevard and the Caltrain right-of-way, and using the existing underpass under U.S. 101. The cross section would include two travel lanes in each direction, wide bike lanes, and sidewalks on both sides for a total roadway width of approximately 65 feet. This will likely be implemented in phases, and will be a medium- and long-term project
Long Tem Projects (more than 10 years)	
Sylvester Road Extension	Extend Sylvester Road in the Eastside neighborhood to connect between Grand Avenue and Gateway Boulevard, and across the new Railroad Avenue extension
Extend Railroad Avenue	Complete extension of Railroad Avenue from South Linden Avenue to East Grand Avenue/Allerton Avenue intersection (this will be implemented in phases; see medium-term projects, above, for details)

TRIP GENERATION

Fehr & Peers estimated trip generation based on the Proposed Project land use. Methods commonly used by traffic engineers overestimate the trip generation impacts of mixed-use development because they do not accurately reflect the amount of internal trip-linking or the level of trips made by transit, biking, and/or walking. This results in increased development costs due to oversized infrastructure, skewed public perception, and resistance to approving smart growth. A more nuanced approach is recommended for mixed use development.

Current accepted methods, such as the Institute of Transportation Engineers (ITE) *Trip Generation* methodology, are primarily based on data collected at suburban, single-use, freestanding sites. These defining characteristics limit their applicability to mixed-use or multiuse development projects in urban settings with frequent and nearby local and regional transit service.

The land use mix, design features, and setting of the South San Francisco Downtown Station Area Specific Plan would include characteristics that influence travel behavior differently from typical single-use suburban developments. Thus, traditional data and methodologies, such as ITE, would not accurately estimate the project vehicle trip generation. In response to the limitations in the ITE methodology, and to provide a straightforward and empirically validated method of estimating vehicle trip generation at mixed-use developments, the US Environmental Protection Agency (EPA) sponsored a national study of the trip generation characteristics of multi-use sites. Fehr & Peers has continued research into the topic and evolved the EPA research into the Plan+ tool.

Plan+ has been locally validated to dozens of transit oriented development (TOD) sites in the Bay Area and across the country. See the *Alternatives Analysis: Preliminary Travel Demand Characteristics* memorandum (December 6, 2012) for more information on the Plan+ method and its calibration to South San Francisco conditions.

Trip Generation Results

Fehr & Peers collected input values for the Plan+ model for use in application on the Proposed Project trip generation. The Plan+ model uses internal project information such as land use mix, project area, intersection density, and transit stop placement as well as local and regional demographic data such as average household size and vehicle ownership, employment within one mile of the site, and employment within a 30 minute transit trip. **Appendix A** presents the Plan+ input values and data sources.

Table 3 summarizes the estimated trip generation for the Existing and Existing+ Project, based on the land use summary presented in **Table 1**. As shown in **Table 3**, the Proposed Project is estimated to generate about 2,100 AM peak hour vehicle trips and about 2,500 PM peak hour vehicle trips. The Proposed Project would generate approximately 58 percent more daily trips than the existing land uses. Plan+ does not calculate trip generation for each separate land use and mode, so the tool output was proportionally extrapolated to estimate vehicle trips for each land use. Transit, bicycle and pedestrian trip generation estimates remain aggregated because disaggregating the smaller numbers would be overly precise and not accurate.

Table 3: South San Francisco Downtown Station Area Plan Trip Generation

	Existing			Existing + Alternative B 25% Build Out		
	Daily	**AM**	**PM**	**Daily**	**AM**	**PM**
External Vehicle Trips[1]						
West	28,200	1,330	2,310	38,420	1,930	3,160
Residential	7,335	542	580	13,358	987	1,050
Office/R&D	1,803	254	208	2,510	356	297
Commercial/Other	19,062	534	1,522	22,552	587	1,813
East	12,920	880	1,330	26,770	2,380	2,990
Residential	0	0	0	272	17	28
Office/R&D	1,467	219	193	9,976	1,591	1,383
Other	11,453	661	1,137	16,523	771	1,579
Total	*41,120*	*2,210*	*3,640*	*65,190*	*4,310*	*6,150*
			Net New Vehicle Trips	***24,070***	***2,100***	***2,510***
External Transit Trips						
West	1,187	93	179	1,799	153	271
East	436	45	83	1,062	145	217
Total	*1,620*	*140*	*260*	*2,860*	*300*	*490*
			Net New Transit Trips	**1240**	**160**	***230***
External Walk/Bike Trips						
West	2,390	192	218	3,891	316	346
East	400	49	47	1,061	141	127
Total	*2,790*	*240*	*270*	*4,950*	*460*	*470*
			Net New Walk/Bike Trips	**2160**	**220**	***200***
Internal Trips (Walk/Bike)						
West	5,458	264	884	8,186	442	1,262
East	874	14	128	3,005	98	430
Total	*6,330*	*280*	*1,010*	*11,190*	*540*	*1,690*
			Net New Internal Trips	***4,860***	***260***	***680***

Note:

1. Trip generation forecasts account for the diversity of land uses, density, design, distance to transit, and accessibility of the study area. These factors contribute to an approximately 20% reduction in vehicle trips being generated compared to typical ITE trip generation rates.

Source: Fehr & Peers, 2013

summarizes new vehicle, transit, and walk/bike trip generation for the Proposed Project land uses, based on the above trip generation summary. This table provides the differences between Existing and Existing plus project (Alternative B at 25% build out), from the above table, with the same assumptions and level of detail. Transit, bicycle and pedestrian trips remain aggregated for all land uses.

Table 4: Project Trips - Alternative B - 25% Buildout

Period	Daily	AM	PM
External Vehicle Trips			
West	10,220	600	850
Residential	6,023	445	470
Office/R&D	707	102	89
Commercial/Other	3,490	53	291
East	13,850	1,500	1,660
Residential	272	17	28
Office/R&D	8,509	1,372	1,190
Other	5,070	110	442
Total	**24,070**	**2,100**	**2,510**
External Transit Trips			
West	612	60	92
East	626	100	134
Total	**1,240**	**160**	**230**
External Walk/Bike Trips			
West	1,501	124	128
East	661	92	80
Total	**2,160**	**220**	**200**
Internal Trips (Walk/Bike)			
West	2,728	178	378
East	2,131	84	302
Total	**4,860**	**260**	**680**

Source: Fehr & Peers 2013

In/Out Split of Generated Trips

The in/out split of land uses was determined by applying the most appropriate splits from the ITE Trip Generation Manual[2].

The trip generation in/out splits were applied to the number of external vehicle trips calculated using Plan+ to give total trip generation for in and out, as shown in **Table 5**.

[2] Institute of Transportation Engineers (2012). *Trip Generation Manual*, 9th ed.

Table 5 : Trip Generation In/Out Splits – External Vehicle Trips						
Land Use	**AM**			**PM**		
	In	**Out**	**Total**	**In**	**Out**	**Total**
West						
Residential	85	360	445	300	170	470
Commercial/Other	33	20	53	140	152	292
Office/R&D	90	14	104	14	75	88
TOTAL	**208**	**394**	**600**	**454**	**397**	**850**
East						
Residential	3	14	17	18	10	28
Commercial/Other	68	42	110	212	230	442
Office/R&D	1,195	178	1,373	222	967	1,189
TOTAL	**1,266**	**234**	**1,500**	**452**	**1,207**	**1,659**
Source: Fehr & Peers 2013						

TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution refers to the directions from which the trips generated by the Proposed Project (as shown is **Table 4**) will approach and depart, using the In/Out movement summarized in **Table 5**. Proposed Project trip distribution estimates were developed based on the locations of complementary land uses, existing travel patterns in the area, the MTC regional travel demand model, census data, and nearby project assumptions including the *East of 101 Traffic Study*[3]. These sources were used to inform two separate composite trip distribution profiles: one each for the West and East areas. In addition, care was taken to estimate the trips that are identified as traveling in-between the West and East areas due to complementary land uses between the two sites. Origins and destinations are related to home and work trips connected to the study area. Some residential trips originate in the West area or west of the study area, and connect to the north, south, west and East area. However, no significant volume of residential trips originate in the East area and connect to east of the study area.

The Proposed Project trip distribution for each of the areas is shown on **Figure 1** and **Figure 2**. Study intersections are shown on **Figure 3**. Project trips are then assigned to the roadway network and study intersections, as shown in **Figure 4** and **Figure 5**.

[3] TJKM Consultants (October 2011). *Traffic Study for the East of 101 Area in the City of South San Francisco* – Final Report.

STUDY ROADWAY FACILITIES

The recommended analysis locations (study intersections and freeway facilities) were selected based on the potential of the project to create significant environmental impacts on important transportation facilities. Study intersections and freeway facilities that will be analyzed in the Project EIR are listed below.

Study Intersections

1. Miller Avenue/Linden Avenue
2. Miller Avenue/Airport Boulevard
3. Miller Avenue/Spruce Avenue
4. Grand Avenue Overcrossing/Dubuque Avenue
5. East Grand Avenue/Grand Avenue Overcrossing
6. East Grand Avenue/Gateway Boulevard
7. Grand Avenue/Spruce Avenue
8. Grand Avenue/Maple Avenue
9. Grand Avenue/Linden Avenue
10. Grand Avenue/Airport Boulevard
11. East Grand Avenue/Industrial Way/US 101 NB Off-Ramp
12. Baden Avenue/Linden Avenue
13. Baden Avenue/Airport Boulevard
14. San Mateo Avenue/Produce Avenue/South Airport Boulevard
15. South Airport Boulevard/Gateway Boulevard
16. US 101 NB Ramps/Wonder Color Lane/South Airport Boulevard

Freeway Segments

1. US 101 North of Oyster Point Boulevard
2. US 101 Oyster Point Boulevard to Airport Boulevard/Grand Avenue
3. US 101 Airport Boulevard/Grand Avenue to South Airport Boulevard
4. US 101 South Airport Boulevard to I-380

On-Ramps

1. Northbound on-ramp from Grand Avenue/Airport Boulevard
2. Northbound on-ramp from South Airport Boulevard
3. Southbound on-ramp from Produce Avenue

Off-Ramps

1. Southbound off-ramp to Airport Boulevard/Miller Avenue
2. Northbound off-ramp to East Grand Avenue/Industrial Way
3. Southbound off-ramp to South Airport Boulevard/Produce Avenue
4. Northbound off-ramp to South Airport Boulevard

EXISTING CONDITIONS

In order to evaluate the existing traffic conditions, vehicle turning movement counts were collected for the 16 study intersections. Eleven of the 16 intersections were studied as part of the *East of 101 Traffic Study*[4]. The remaining five intersection counts were collected in June of 2013.

The traffic volumes presented in the *East of 101 Traffic Study* were collected in 2008. Spot-check traffic counts were collected in October 2013 at the following four local street intersections and compared against the 2008 intersection volumes to determine if there has been substantial growth to traffic in the study area:

1. Miller Avenue/Linden Avenue
2. East Grand Avenue/Gateway Boulevard
3. Grand Avenue/Airport Avenue
4. US 101 NB Ramps/Wonder Color Lane/South Airport Boulevard

These four intersections represent a sample of intersections in the study area that will be evaluated in the SSF SALUP EIR. Overall, the October 2013 traffic volumes show a 19 percent increase in the PM peak hour, and a four percent increase in the AM peak hour since 2008.

Because the October 2013 intersection volumes are higher than their 2008 counterparts at the four spot-check intersections, all 2008 intersection volumes were factored up to better represent current levels of traffic Vehicle volumes were increased by four percent for AM peak hours, and by 19 percent in the PM peak hours, providing a more appropriate set of existing vehicle volume data to evaluate project impacts. The five intersections with June 2013 vehicle volumes data were not adjusted.

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[4] TJKM Transportation Consultants, *Traffic Study for the East of 101 Area in the City of South San Francisco.* October 2011.

Figure 6 and **Figure 7** illustrate the modified existing peak hour traffic volumes, lane configurations and traffic controls for the 16 study intersections.

CUMULATIVE BASELINE ASSUMPTIONS

There are several cumulative baseline assumptions that we would like to discuss with the City before we proceed with our traffic modeling. Typically, projects that are not fully funded are not included in the cumulative baseline conditions. The funding and feasibility for the following three improvement projects is unclear and therefore they are assumed not to be in place for our cumulative analysis.

Produce Avenue Freeway Overpass

The Produce Avenue freeway overpass is considered for its potential to provide alternate access to the U.S. 101 freeway from the East area to alleviate traffic congestion along Grand Avenue and Airport Boulevard. These improvements are expected to primarily impact study intersections located south of Grand Avenue and East Grand Avenue in the study area.

A Produce Avenue freeway overpass is expected to impact the South Airport Boulevard / Wondercolor Lane / U.S. 101 southbound off-ramp intersection, but will relieve traffic congestion along the Grand Avenue overpass. The cost effectiveness of constructing the Produce Avenue freeway overpass needs to be explored with a more focused study.

Relocate Southbound U.S. 101 Off-Ramp

This would include relocating the southbound U.S. 101 / Miller Avenue /Airport Boulevard off-ramp to form a fifth leg at the Airport Boulevard / Grand Avenue intersection, including closing the northbound U.S. 101/Grand Avenue/Airport Boulevard on-ramp.

These intersection modifications are expected to significantly impact the intersection, which currently has a constrained right-of-way.

Relocate Northbound U.S. 101 On-Ramp to Dubuque

This would include relocating the northbound U.S. 101/Grand Avenue/Airport Boulevard on-ramp to Dubuque Avenue and prohibiting southbound access from Dubuque Avenue to the Grand Avenue overpass.

Although these modifications would likely cause the intersection to operate at acceptable levels of service, there is not enough right of way to accommodate the expected eastbound left-turn traffic queuing at the intersection. The feasibility of the proposed improvements will need to be determined with a more focused analysis.

Future Forecasting Approach

Cumulative turning movement volumes were obtained from the *East of 101 Traffic Study* representing the Long Term Cumulative (2035) plus Oyster Point Redevelopment Conditions. These volumes were developed using a traffic model that was built from the City/County Association of Governments of San Mateo County (C/CAG) model framework with a specific refinement to its trip distribution assumptions based on recent surveys and knowledge of traffic patterns in the study area. The model was calibrated to account for local project conditions prior to generating the future travel demand forecasts. A model calibration is a process that includes revisions of network attributes and adjustments of the model estimated demands to more closely match existing traffic counts. For the study intersections that were not studied as part of the *East of 101 Traffic Study*, a manual adjustment based on regional growth factors was applied.

Cumulative freeway segment volumes were estimated using a similar methodology consistent with the *East of 101 Traffic Study* and based on expected regional growth.

ANALYSIS SCENARIOS AND PARAMETERS

We proposed to analyze the following scenarios for the 16 study intersections, four bi-directional freeway segments, three on-ramps and four off-ramps:

- Existing Conditions
- Existing Plus Project Conditions
- Cumulative No Project Conditions
- Cumulative with Project Conditions

Analysis Methods

Signalized and unsignalized intersections will be analyzed using the 2000 Highway Capacity Manual (HCM) methodology in the Synchro 7 analysis software suite. Intersections will be given a level of service (LOS) grade ranging from A, representing the best operating conditions, to LOS F, representing the worst operating conditions for each of the proposed analysis scenarios.

Freeway segments will be analyzed using the volume-to-capacity (V/C) ratio methodology as outlined in the 2010 HCM. Using the collected peak hour volumes and theoretical freeway peak hour capacities, the V/C ratio for each segment will be calculated and used to assign each segment an LOS.

Significance Criteria

The City of South San Francisco defined acceptable level of service for intersections. Level of Service A through D are considered acceptable, and LOS E and F unacceptable. A change from an acceptable to an unacceptable LOS is considered a significant impact. The following guidelines have been outlined in the City of South San Francisco General Plan[5]:

- Strive to maintain LOS D or better on arterial and collector streets.
- Accept LOS E or F after finding that there is no feasible and practical way to mitigate the lower level of service, and the uses resulting in the lower level of service are of clear overall public benefit.
- Exempt development within one-quarter mile of a Caltrain of BART station or a ferry terminal from LOS standards.

If applicable and defined by the City, additional impact criteria will be considered for freeway segments, pedestrian and bicycle facilities, transit, emergency access and parking.

NEXT STEPS

We appreciate your time to review and comment on the assumptions described in this memo prior to the commencement of the technical analysis. Please provide comments by November 22, 2013.

Please contact Meghan at (415) 692-7770 or m.weir@fehrandpeers.com with comments or questions.

[5] City of South San Francisco, *General Plan*, Chapter 4 - Transportation

Attachments:

Figure 1 - External Trip Distribution (West)

Figure 2 - External Trip Distribution (East)

Figure 3 - Study Intersections and Freeway Segments/Ramps

Figure 4 – Project Trip Assignment – Intersections 1-8

Figure 5 – Project Trip assignment – Intersections 9-16

Figure 6 - Existing Peak Hour Traffic Volumes, Lane Configurations and Traffic Controls – Intersections 1-8

Figure 7 - Existing Peak Hour Traffic Volumes, Lane Configurations and Traffic Controls – Intersections 9-16

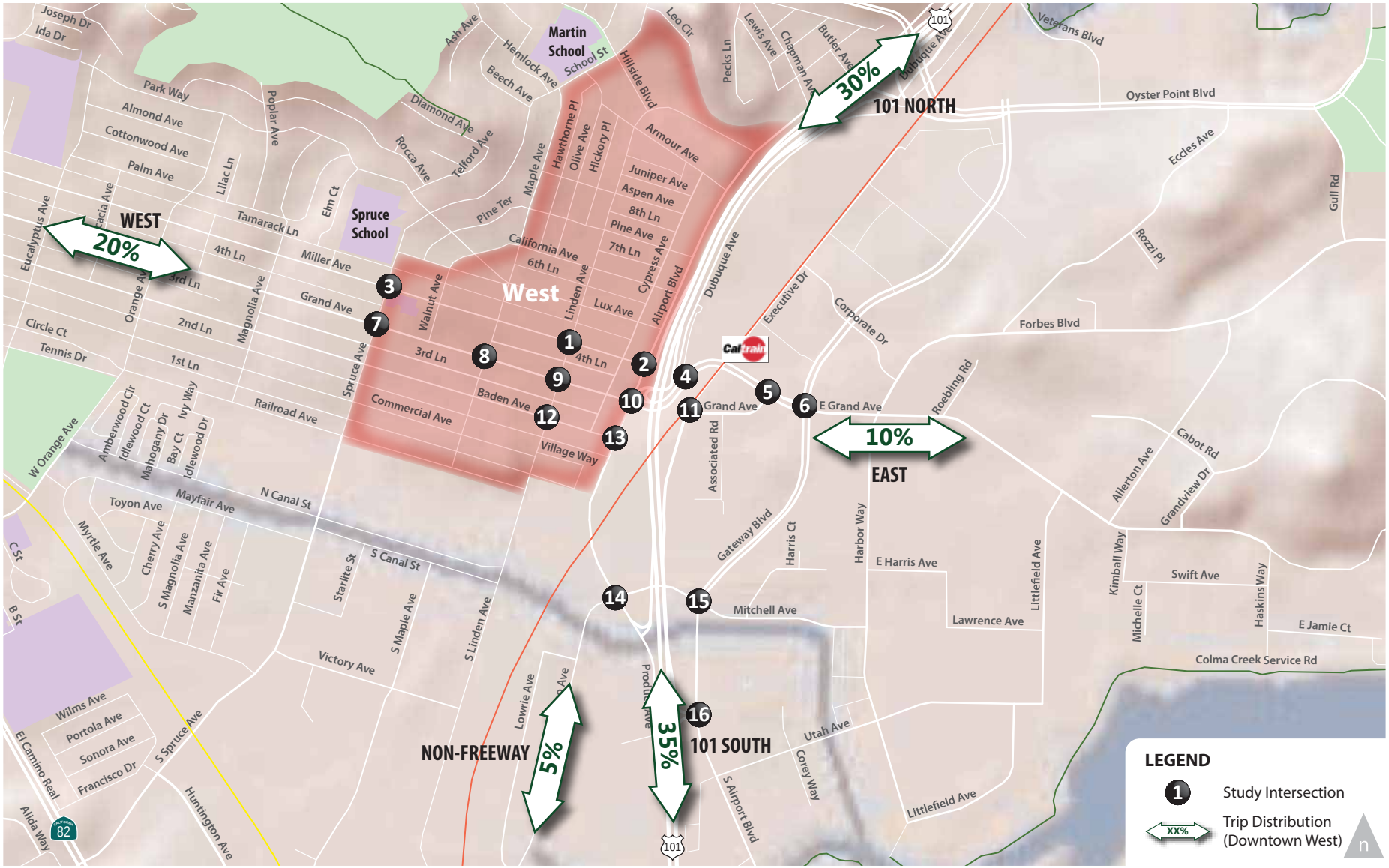

Figure 1

External Trip Distribution (West)

SF12-0610_Z2A_TripDistroWest

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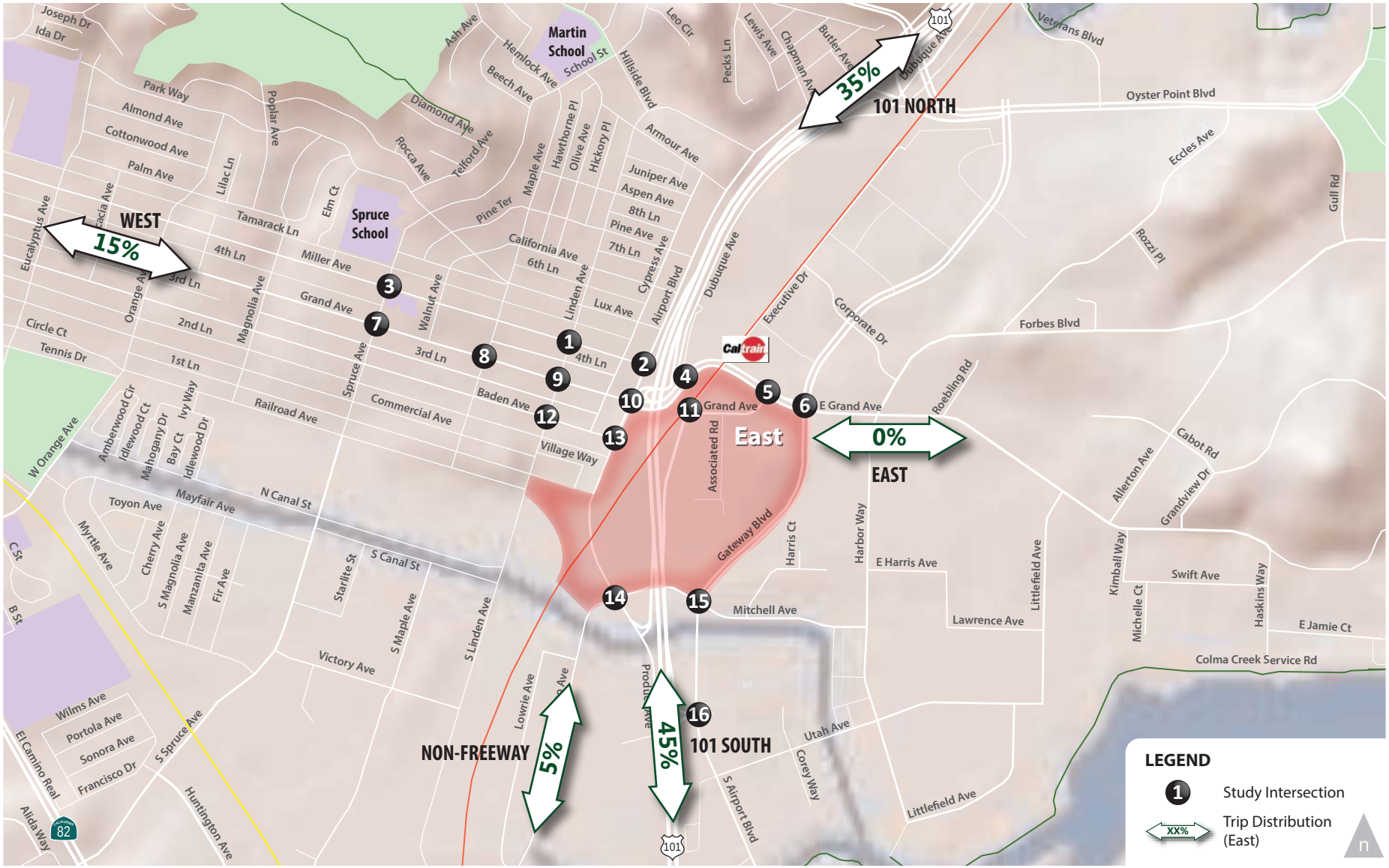

Figure 2

External Trip Distribution (East)

SF12-0610_Z2B_TripDistroEast

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Figure 3

Study Intersections and Freeway Segments/Ramps

SF12-0610_1_StudyIntFwySeg

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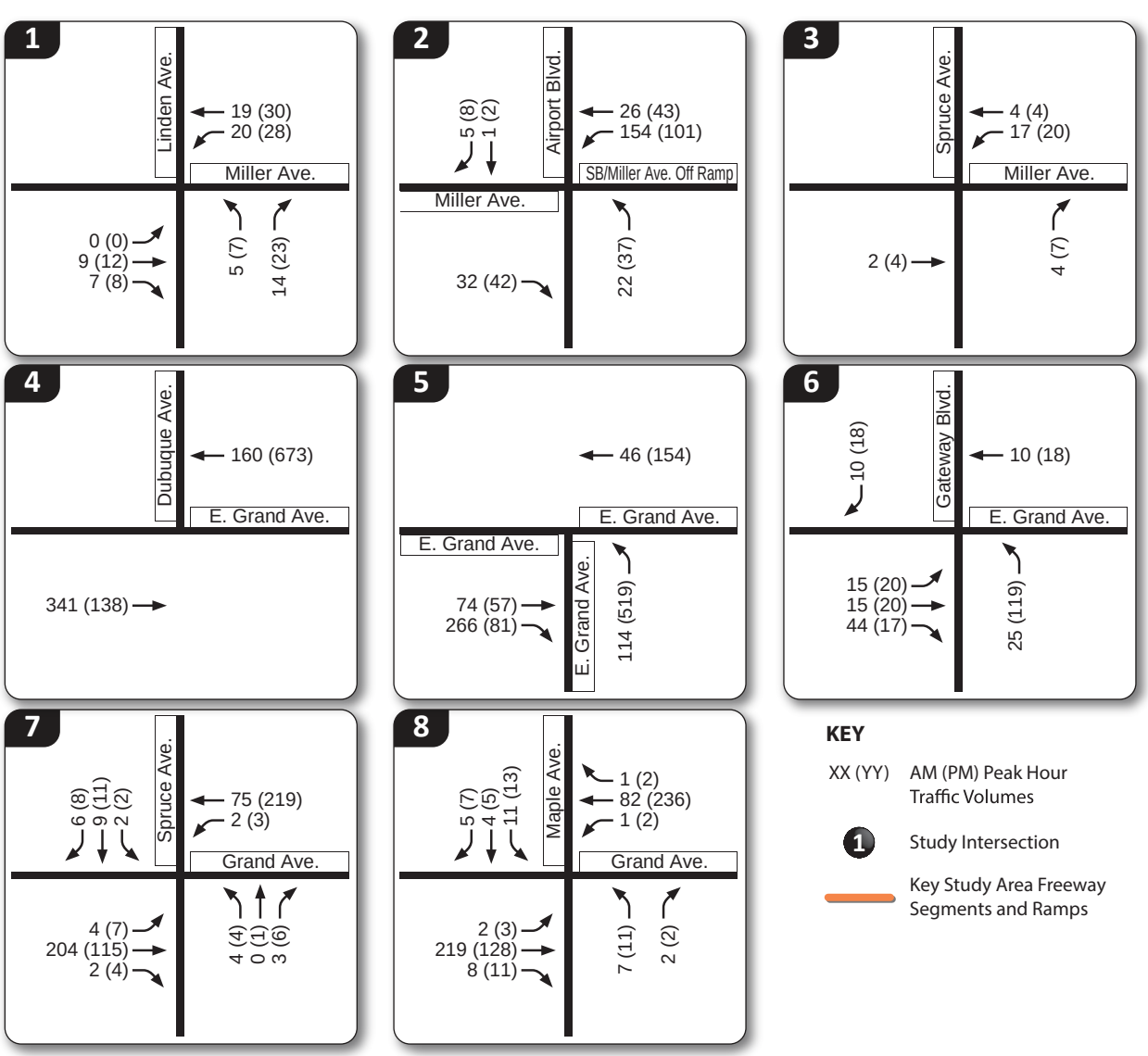

KEY

XX (YY) AM (PM) Peak Hour Traffic Volumes

1 Study Intersection

Key Study Area Freeway Segments and Ramps

Figure 4

Project Trip Assignment – Intersections 1-8

SF12-0610_Z3A_PTA

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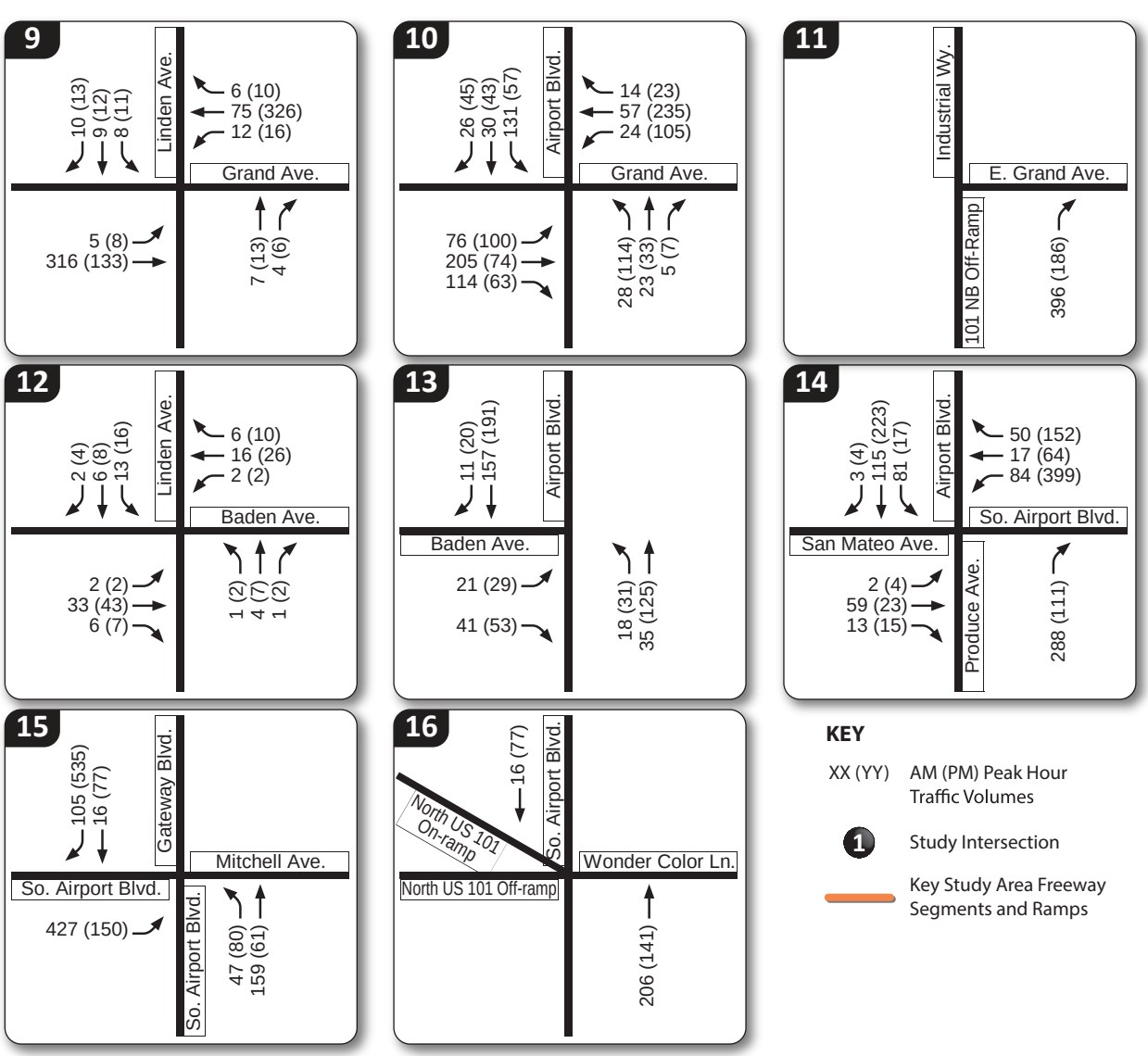

Figure 5

Project Trip assignment – Intersections 9-16

SF12-0610_Z3B_PTA

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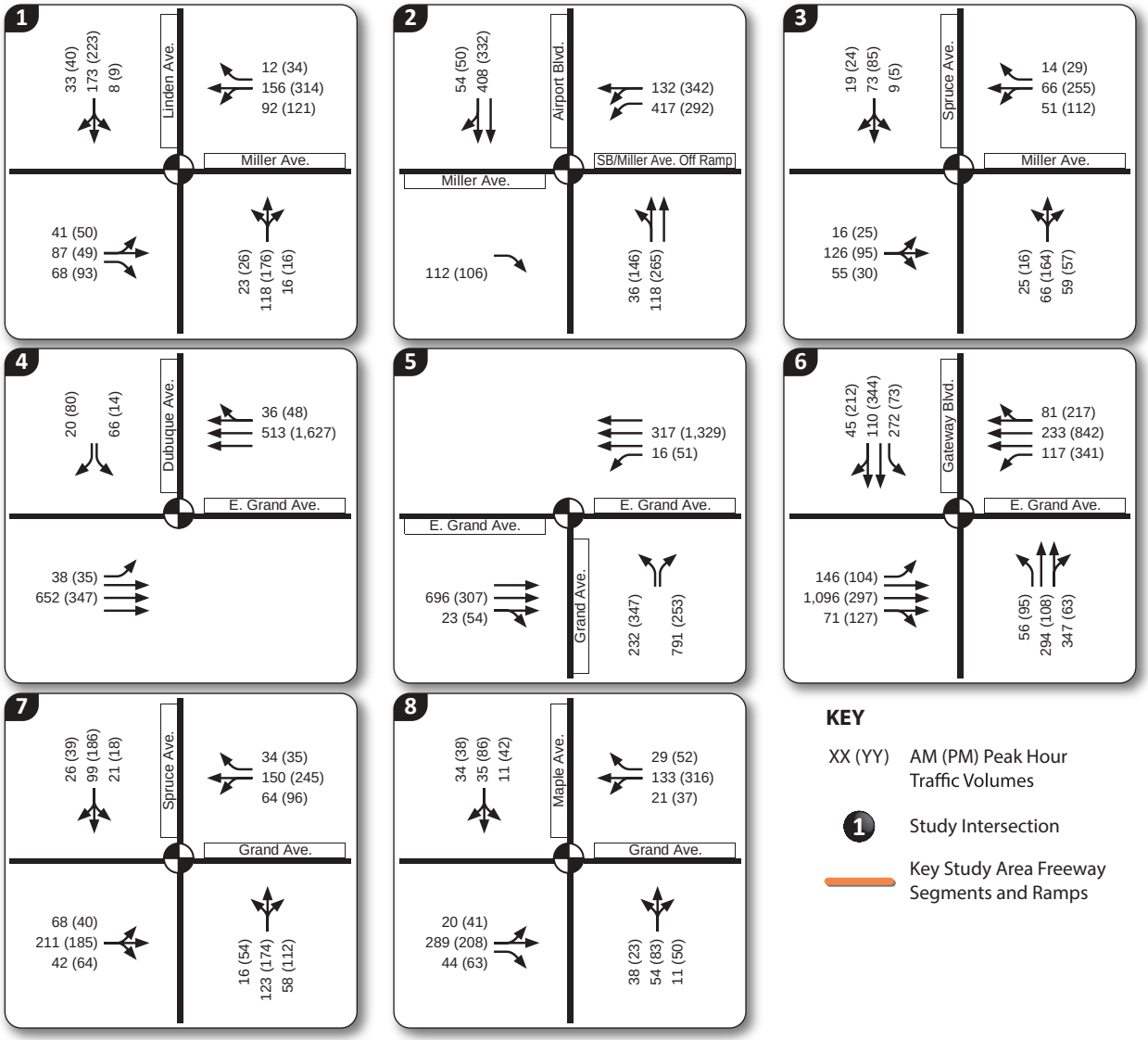

Figure 6

Existing
Peak Hour Traffic Volumes, Lane Configurations and Traffic Controls – Intersections 1-8

SF12-0610_Z1A_ExVols

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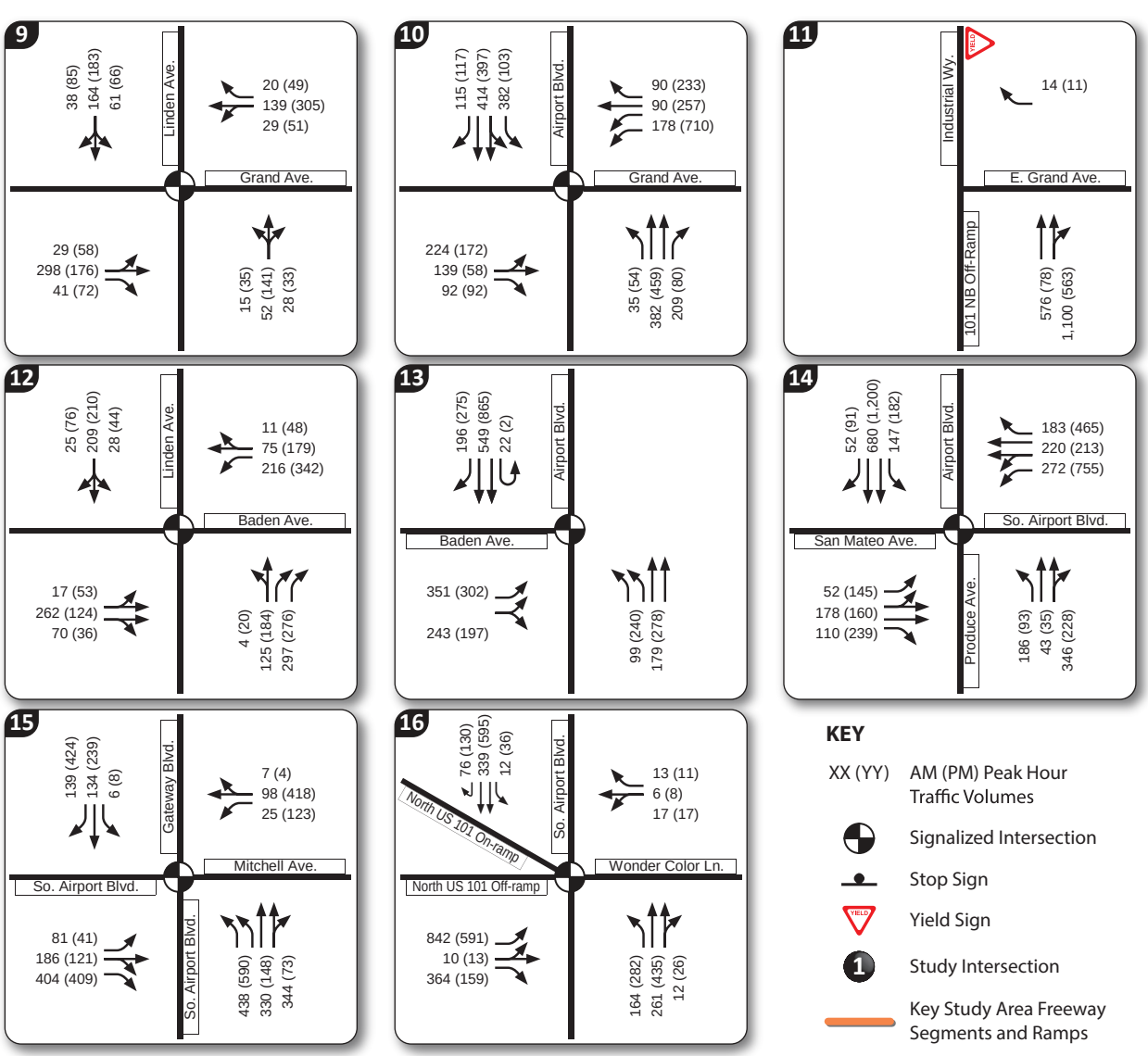

Figure 7

Existing
Peak Hour Traffic Volumes, Lane Configurations and Traffic Controls – Intersections 9-16

SF12-0610_Z1B_ExVols

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APPENDIX A:
MIXED-USE DEVELOPMENT (MXD) TRIP GENERATION ASSUMPTIONS

TABLE A-1: MXD MODEL INPUTS		
Input Variable	**Input Value**	**Source**
Developed Area	300	Proposed Project Study Area
Intersections per Square Mile	90	Proposed Project Study Area
Percentage of households within ¼ mile of site	100%	Proposed Project Study Area (entire site will function as TOD)
Average Household Size	3.10	Census 2000 and ACS 2011 data
Average Vehicles Owned per Dwelling Unit	1.50	Census 2000 and ACS 2011 data
Employment within 1 Mile of the Project Site	29,500	MTC Travel Demand Model (includes employment
Employment within a 30 minute trip by transit	84,300	MTC Travel Demand Model
Total Regional Employment	3,456,400	BayAreaCensus.CA.gov

Source: Fehr & Peers, October 2013.